THE HISTORY OF CARTOGRAPHY

VOLUME TWO, BOOK THREE

Cartography in the Traditional African, American, Arctic, Australian, and Pacific Societies

Edited by

DAVID WOODWARD

and

G. MALCOLM LEWIS

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PLATE 1. FIGHT AND FLIGHT. (See pp. 14–15.) This was first thought to illustrate a battle, but it is now considered more likely to represent the mystical struggle against evil spirits by shamans in trance. The facsimile reproduction shown here–pencil, watercolor, and poster paint by R. Townley Johnson–is based on photographs and tracings of the original. Length of the original: 90 cm. Pakhuis Pass, Clanwilliam District, Western Cape. From R. Townley Johnson, *Major Rock Paintings of Southern Africa: Facsimile Reproductions*, ed. T. M. O'C. Maggs (Cape Town: D. Philip, 1979), pl. 67 (p. 62). By permission of the Townley Johnson Family Trust and David Philip Publishers Pty. Ltd., Claremont, South Africa.

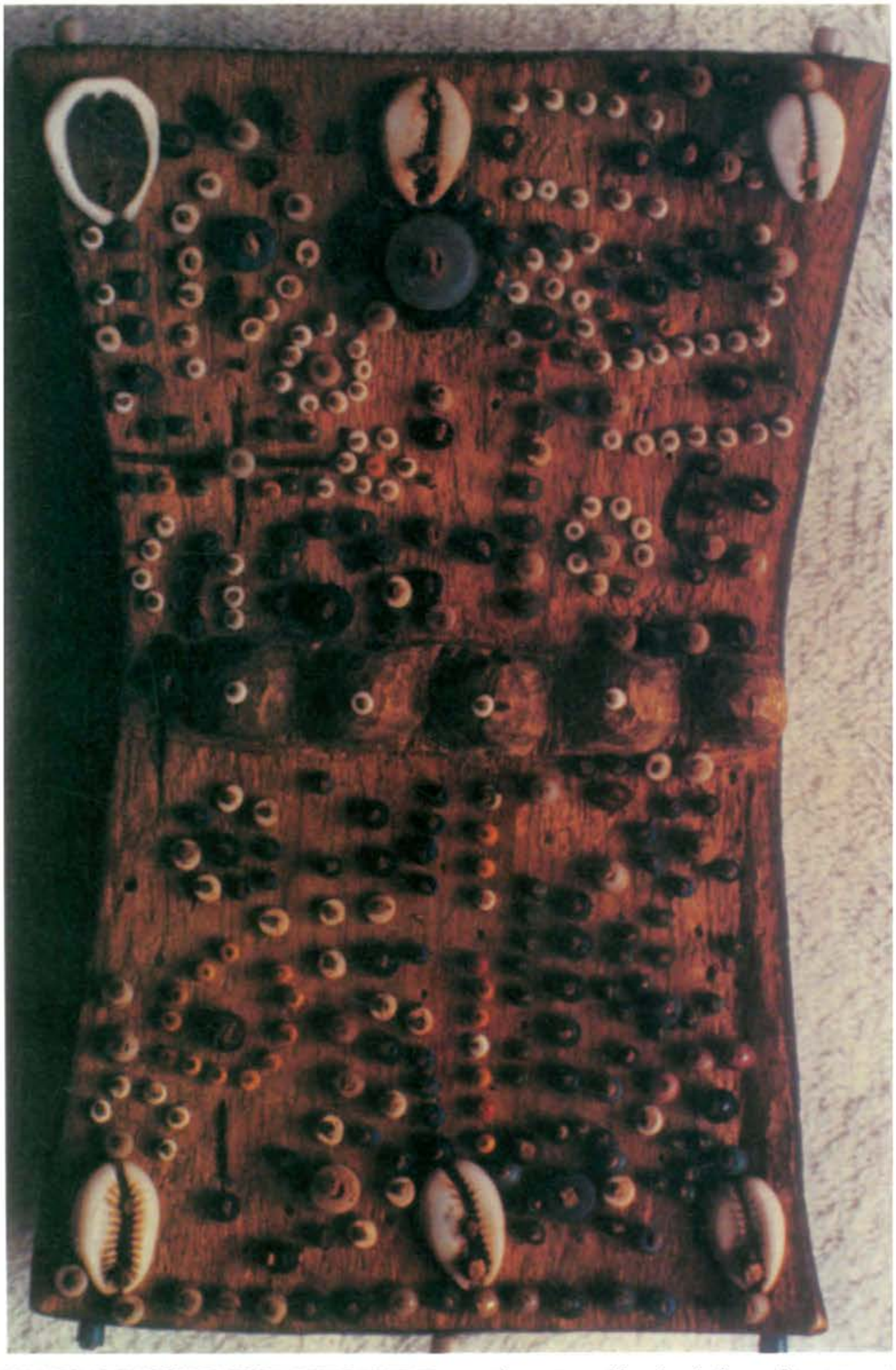


PLATE 2. *LUKASA* MEMORY BOARD USED DURING THE LAST STAGE OF BUDYE SOCIETY INITIATION CEREMONIES. (See pp. 32–33.) Made of wood, shells, and beads. *Lukasa* are mnemonic maps that enable praise singers to recount the history of a specific Luba king. The placement and configuration of beads, shells, and incisions in the board recalls the location of spirit capitals, lakes, and other places important to royal history.
Size of the original: ca. 20–25 cm long × 13 cm wide. Photograph courtesy of Thomas Reefe.

PLATE 3. KING NJOYA'S SURVEY MAP OF BAMUM. (See p. 43.) Map of the kingdom of Bamum by Ibrahim Njoya in ink and crayon. Oriented to the west. Place-names are written in the *mfèmfè* alphabet. Acquired by the museum in 1937. Njoya appears to have based this version on an older original. Size of the original: 93.0 × 87.5 cm. Photograph courtesy of the Museum of Ethnography, Geneva (Gift of Jean Rusillon 1966; no. 33553).

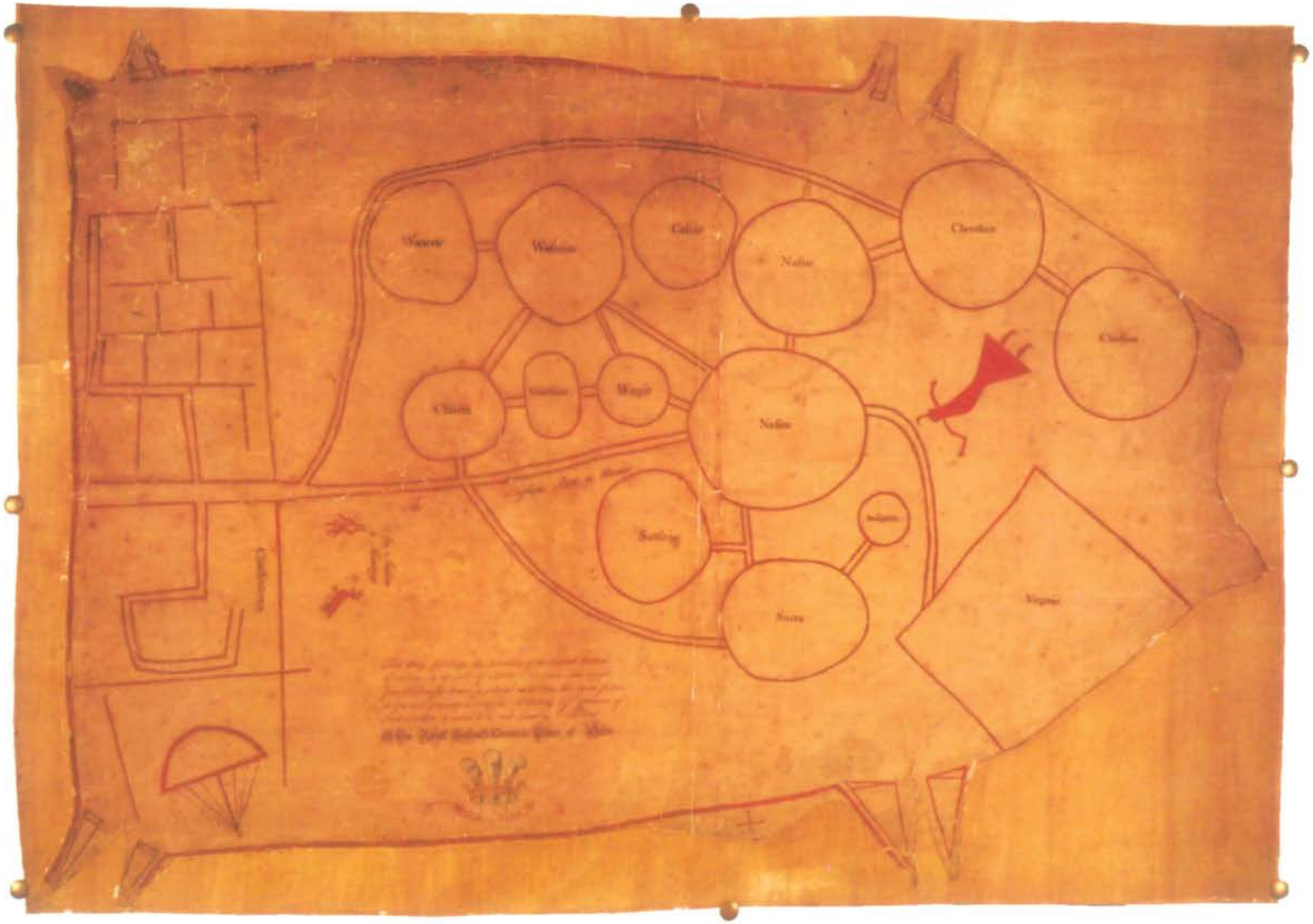


PLATE 4. SUPPLEMENTED MANUSCRIPT COPY OF THE CA. 1721 CATAWBA MAP ON SKIN OF INDIAN AREAS IN THE SOUTH CAROLINA HINTERLAND. (See p. 101.) The caption at the bottom of the map states: "This Map describing the Scituation of the Several Nations of the Indians to the NW. of South Carolina was coppyed from a Draught drawn & painted on a Deer-Skin by an Indian Cacique and presented to Francis Nicholson Esqu^{r}. Governour of South Carolina by whom it is most humbly Dedicated To His Royal Highness George Prince of Wales." The original was made to show English colonial administrators strategically important linkages between Indian groups and with South Carolina and Virginia.
Size of the original: 81 × 112 cm. By permission of the British Library, London (Add. MS. 4723 [formerly Sloane MS. 4723]).

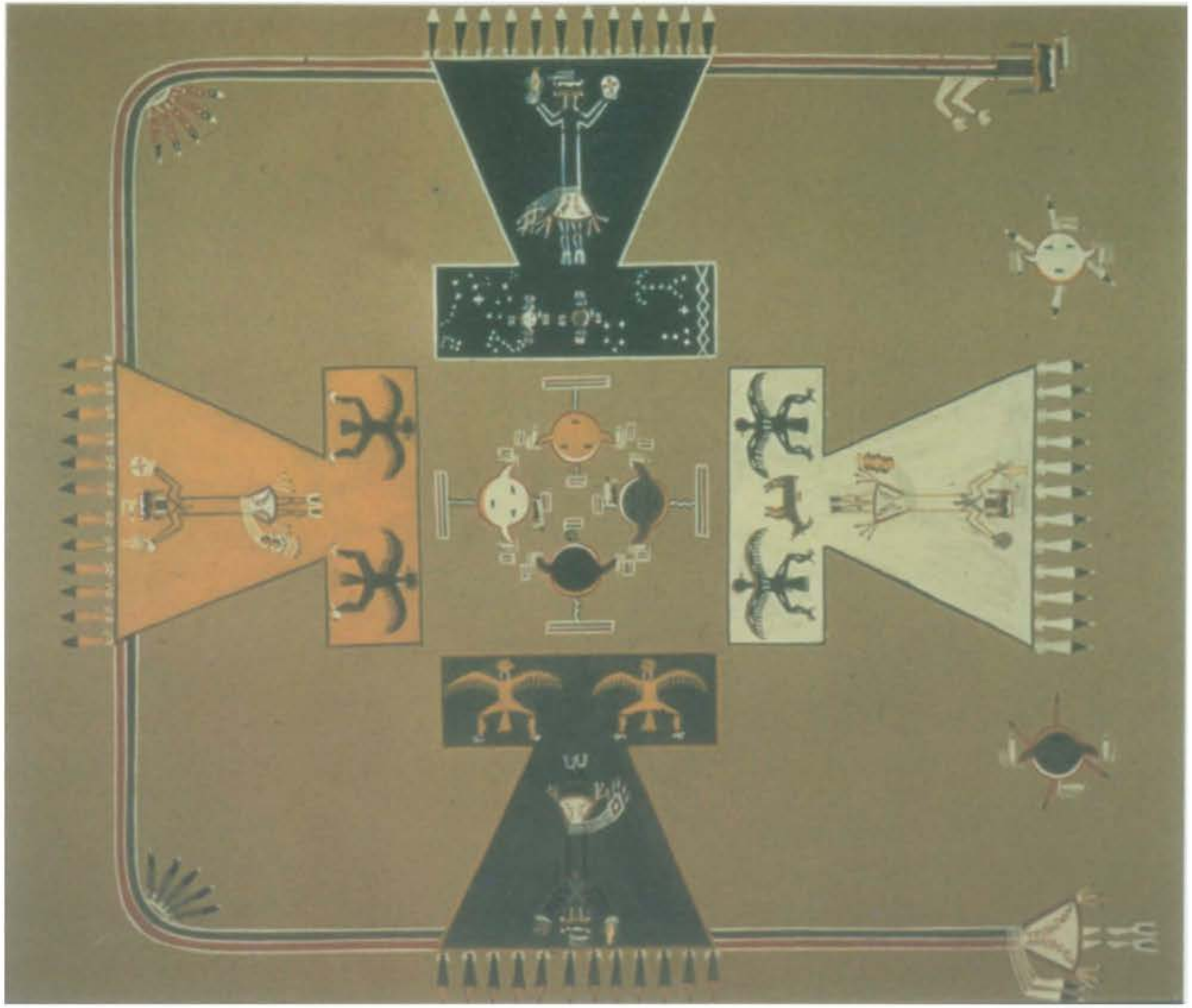


PLATE 5. NAVAJO MALE SHOOTINGWAY, "THE SKIES," BEFORE 1933. (See p. 110.) The reproduction, painted by Franc J. Newcomb in 1937, represents the four cardinal light phenomena–the white of dawn in the east, the blue of day sky in the south, the yellow of evening in the west, and the black of night in the north. Of the objects depicted in the sky in the north, the Milky Way is the most obvious: a cane (lattice) symbolizes an old man who leans on the cane while he waits for the sun to come up so he can say his prayers. Also shown are stars, sun, moon, and a holy person. The traditional sandpainting from which this was derived was used in the Male Shootingway ceremony, which could last two, five, or nine nights. Many Shootingway ceremonies were conducted to cure respiratory and gastrointestinal diseases.
Photograph courtesy of the Wheelwright Museum of the American Indian, Santa Fe, New Mexico (P4 no. 11).

PLATE 6. QUAPAW PAINTED BISON HIDE SHOWING THE ROUTE FOLLOWED BY QUAPAW WARRIORS TO CONFRONT ENEMIES, MID-EIGHTEENTH CENTURY. (See p. 117.) Overall, the route, represented by a single line through three Indian villages and Arkansas Post, is shaped by the design, but the sinuosity of its final stage may have been intended to be an approximate plan. This could be the oldest extant Indian map artifact.
Size of the original: 189.4 × 146.5 cm. Photograph courtesy of the Musée de l'Homme, Paris (MH 34.33.7).

PLATE 7. PAINTED PAWNEE CELESTIAL CHART ON TANNED ANTELOPE SKIN OR DEERSKIN. (See pp. 123–25.) Originally belonging to the Skiri band of Pawnees, the chart was collected at Pawnee, Oklahoma, in 1906 as part of a sacred bundle. It may be a descendant of a precontact original. The Milky Way, which the Pawnees thought of as parting the heavens and as the pathway of departed spirits, is represented by small dots across the middle of the chart. Adjacent to the Milky Way is a circle of eleven stars known as the Council of Chiefs. The North Star ("star-that-does-not-move"), chief over the other stars, is among the largest. There are traces of three pigments: black, red, and yellow.
Size of the original: 66 × 46 cm. By permission of the Pawnee Tribe of Oklahoma. Photograph courtesy of the Field Museum, Chicago (neg. no. 16231c).

PLATE 8. IKMALLIK, ACCOMPANIED BY TIAGASHU, EXTENDING A MAP FOR CAPTAIN JOHN ROSS. (See p. 159.) The HMS *Victory* was at Felix Harbour on the west shore of the Gulf of Boothia on 12 January 1830. Ross was attempting to obtain information about the coasts and waterways to the south. He provided Ikmallik, a Netsilik, with a sketch of what he already knew, and Ikmallik is shown here adding to it. Pen, ink, and watercolor by John Ross.
Size of the original: 13.5 × 21.5 cm. Photograph courtesy of the Scott Polar Research Institute, Cambridge (acc. no. 66/3/2).

PLATE 9. PAGE 1 OF THE CODEX XOLOTL, CA. 1542. (See p. 205.) On the first sheet of the Codex Xolotl, a map of the Valley of Mexico serves as the backdrop to the narrative of Xolotl, a legendary thirteenth-century warlord. The map shows topographic and hydrographic features as well as hieroglyphic place-names of places in the valley and beyond. Oriented to the east, the upper part of the map shows a narrow cord of dark mountains running roughly parallel to the top edge (compare fig. 5.17). This correlates with the part of the volcanic cordillera that bounds the valley to the east-southeast; set within it are the lofty peaks of Popocatepetl (Smoking Mountain in Nahuatl) and Iztaccihuatl (White Lady). Parallel to the mountains in the lower half of the page are the lakes of the valley, abstracted into the shape of a fishhook and greatly reduced in size. Hieroglyphic toponyms mark prominent settlements in the valley. For instance, the hook-shaped hill, lying directly to the right of the lake, is named Culhuacan (from Nahuatl *coloa,* meaning curved). Along the edges of this frayed *amatl* paper sheet a line of footprints is dimly visible, marking the path of Xolotl's circumambulation to establish the boundaries of his future realm.
Size of the original: ca. 42 × 48 cm. Photograph courtesy of the Bibliothèque Nationale, Paris (1–10, p. 1).

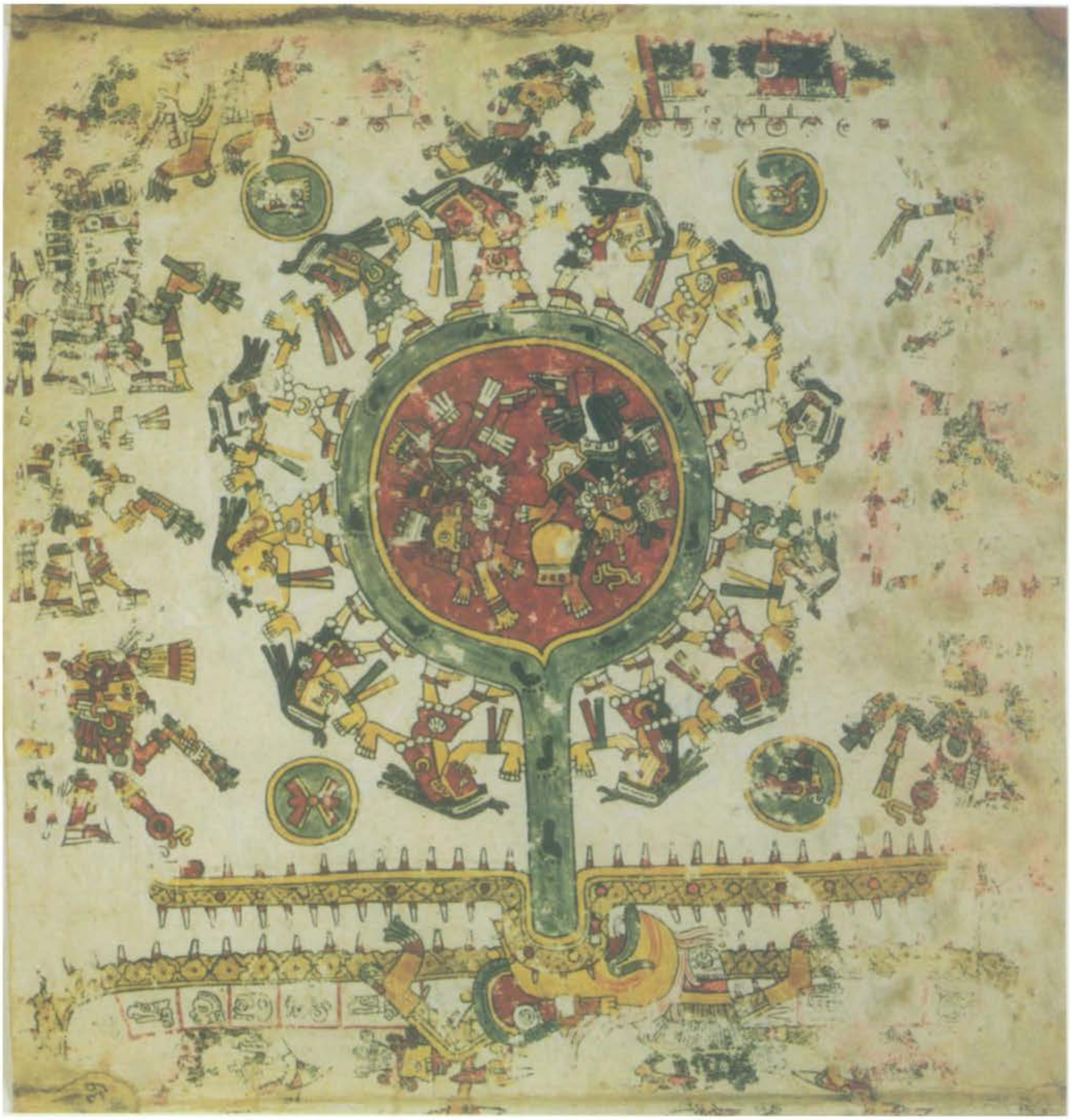


PLATE 10. VENUS AS THE MORNING STAR IN THE CODEX BORGIA. (See p. 239.) This is one of a series of eighteen pages in the pre-Hispanic screenfold codex showing the movement of Venus through stages in its periodic cycle. This page seems to mark the moment Venus the morning star plunged below the horizon to begin its journey through the Underworld, before reappearing as the evening star. This celestial event is shown metaphorically: the bottom register of the page is dominated by two spiny bands, the upper being the maw of the earth monster, the lower, its body. In essence, the gaping earth–the horizon–is waiting to swallow Venus. Venus, in turn, is personified by two versions of the deity Quetzalcoatl inside the descending red orb. As Venus plummets downward, so do the twelve female deities encircling it; their path toward the engulfing horizon is marked by footprints within a blue path. The rest of the page is filled with other deity figures and calendrical dates pertaining to this event.
Size of the original: 27 × 26.5 cm. Photograph courtesy of the Biblioteca Apostolica Vaticana, Rome (Codex Borgia, p. 39).

PLATE 11. MAPA DE SANTA CRUZ. (See p. 244.) This postconquest manuscript map on skin is a rare depiction of the Valley of Mexico. The indigenous artist was undoubtedly influenced by European city maps, which would have been available in this busy capital of the Spanish colony. The twin cities of Tlatelolco and Tenochtitlan are greatly enlarged at center, allowing the viewer to pick out emblematic architecture, most of it religious, such as the Tlatelolco monastery at the right center. The landscape that unrolls around the central city is filled with small genre scenes: boatmen netting birds and fish, herders rounding up sheep and cattle, porters bending under loads.

Size of the original: ca. 75 × 114 cm. Photograph courtesy of the Universitetsbibliotek, Uppsala.

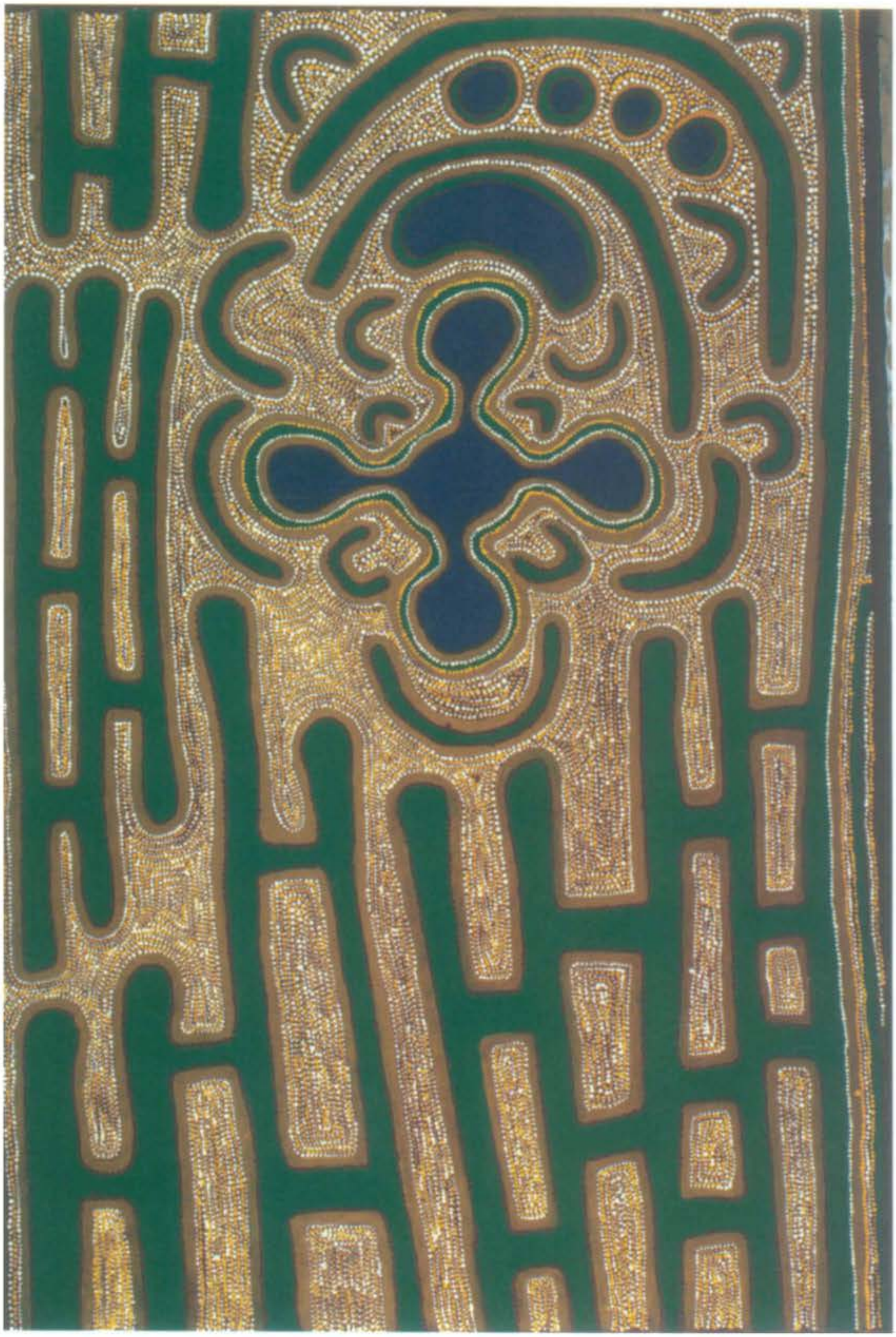
PLATE 12. LIENZO OF PETLACALA. (See p. 246.) In the center of this modern cartographic history (1953) painted on cloth, a large figure identified within as Charles V of Spain (r. 1517–56) sanctions the founding of Petlacala, carried out by three figures who face him. Framing this central rectangle are the names and symbols of Petlacala's boundaries. On the far outside frame, three variants of a peregrination tale are written.

Size of the original: 78 cm × 99 cm. Photograph courtesy of Marion Oettinger Jr., San Antonio, Texas.

PLATE 13. COSMIC FERTILITY MAPPED BY BIÁ OF THE TUKANO. (See p. 307.) The positioning of men, women, and celestial bodies encodes the natural order of society. The central motif is the sun, and above is a snake design of yellow diamond shapes split in half. To the right of the snake appears a row of dots indicating insemination; the group of multicolored diamonds represents women. The two yellow, double-scroll motifs to the left of the snake are male symbols, while below the sun are clustered the wooden stools of the men whose ritual songs help sustain the regeneration of the universe.
From Gerardo Reichel-Dolmatoff, *Beyond the Milky Way: Hallucinatory Imagery of the Tukano Indians* (Los Angeles: UCLA Latin American Center Publications, 1978), pl. I. By permission of Gerardo Reichel-Dolmatoff Foundation, Bogotá, Colombia.

PLATE 14. KORYAK DANCING COAT. (See pp. 333–34.) The coat is made of tanned reindeer skin and was purchased from a Koryak shaman. Tassels and embroidery decorate the garment; disks of varying diameter made of bleached hide represent the stars and constellations in the summer and winter skies. The false belt, sewn with silk thread around the waist, is thought to represent the summer Milky Way. See figure 8.8. Photograph courtesy of the National Museum of Natural History, Smithsonian Institution, Washington, D.C. By permission of the Department of Library Services, American Museum of Natural History, New York (70-3892).

PLATE 15. "X-RAY" IMAGE OF SALTWATER TURTLE, WESTERN ARNHEM LAND, CA. 1884. (See p. 366.) Ochers on bark, taken from a camp on Field Island, near South Alligator River, by Captain F. Carrington in 1884. Size of the original: 83 × 63.5 cm. Photograph courtesy of the South Australian Museum, Adelaide (A45559).



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Size of the original: 181.5 × 120.5 cm. Photograph courtesy of the South Australian Museum, Adelaide. By permission of Peter Skipper, c/o Duncan Kentish Fine Art, P.O. Box 629, North Adelaide, South Australia.

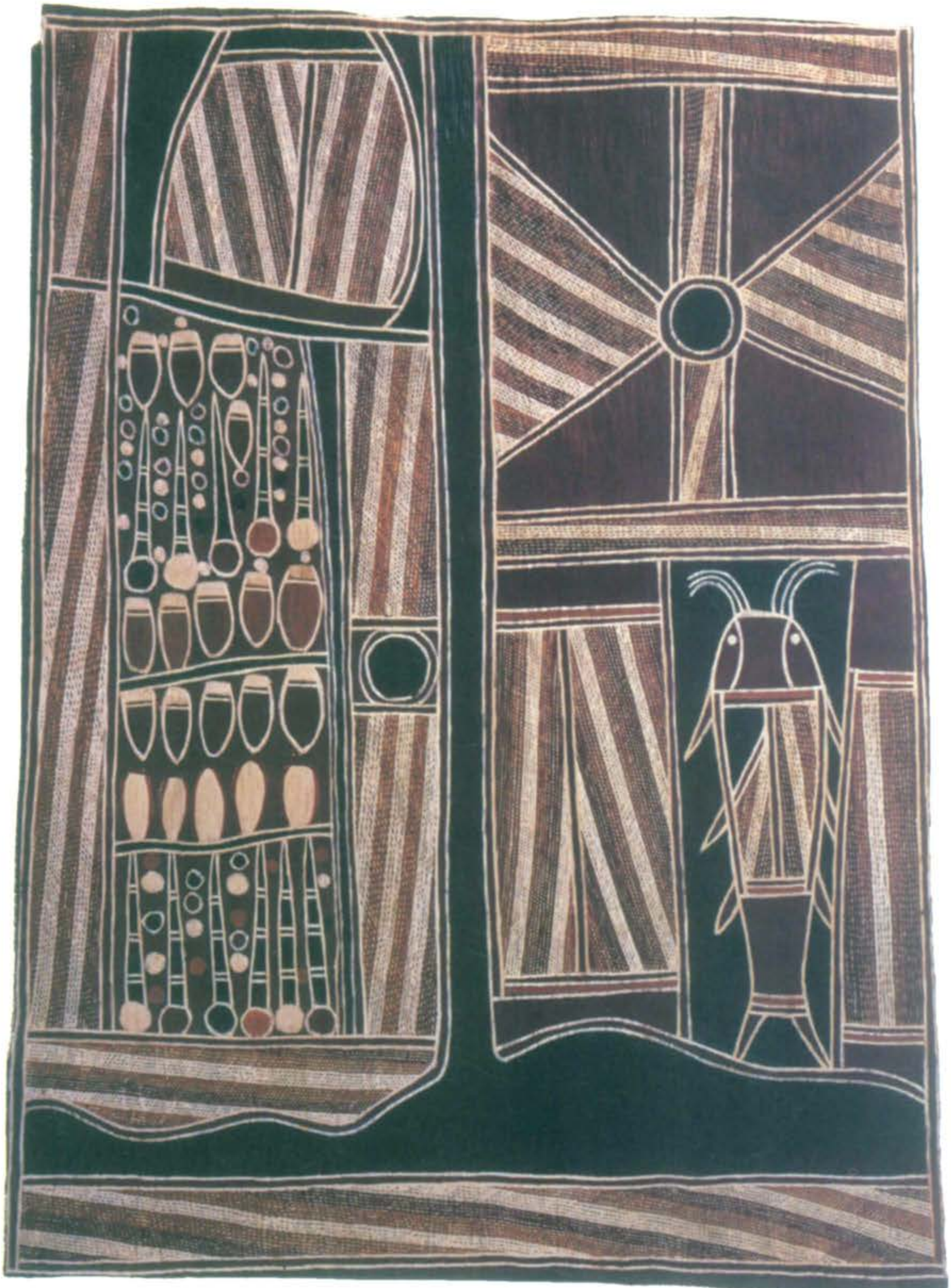

PLATE 17. *SACRED PLACES AT MILMINDJARR'*. (See pp. 371–73.) In Manharrngu country the Djan'kawu Sisters created the well Milmindjarr' by plunging their digging sticks into the ground, then had a ceremony there. They were looking for fish and caught a small catfish, which is also represented in this painting. They gave birth to the peoples of the area. The tide swells, rising up the river's course, which is entered by fish. Later the tide will turn, and water and fish will be borne out to sea. The painting, ochers on bark, was made for sale by David Malangi, central Arnhem Land. The painting was purchased in 1982 by the South Australian Museum; it arrived from Ramingining with little documentation. See figure 9.14. Size of the original: 107 × 79 cm. Photograph courtesy of the South Australian Museum, Adelaide (A67850).

PLATE 18. DJARRAKPI LANDSCAPE. (See p. 373.) Painting, ochers on bark, made for an ethnographic collector by Banapana Maymuru, northeast Arnhem Land. For three interpretations of the painting, see figure 9.15. Photograph courtesy of Howard Morphy.

PLATE 19. *PANKALANGU CEREMONIES AT YAMUNTURNGA*, 1987. (See p. 379.) Synthetic polymer paint on wooden carrying dish made for sale by Sonder Nampitjinpa, Walpiri (Papunya), Western Desert. The painting depicts ceremonial camps; the arcs represent women sitting in a formal arrangement. Length of the original: 131.2 cm. Photograph courtesy of the National Gallery of Australia, Canberra. © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

PLATE 20. VARIOUS TOAS, CA. 1904. (See p. 383.) Ochers on wood from Killalpaninna Lutheran Mission, South Australia, made for an ethnographic collector. Heights of the originals: 19 to 57 cm. Photograph courtesy of the South Australian Museum, Adelaide.

PLATE 21. MAP OF THE GOROMURU (GURRUMURU) RIVER AREA. (See pp. 402–3.) Drawn by Djimbun and Maṯtjuḏi, northeast Arnhem Land, 1970. Pencil and felt-tip pen on paper. Private collection.

PLATE 22. DETAIL OF THE PORT OF MACASSAR BY MUNGGERAUI (MUNGGURRAWUY). (See pp. 412–13.) Yirrkala, northeast Arnhem Land, 1947. Crayon on paper.

Photograph by J. E. Stanton, courtesy of the Berndt Museum of Anthropology, Perth (WU6970).

PLATE 23. THREE MOUNTAINS OF THE IATMUL *MAI* RITUAL, REPRESENTING THE THREE TOTEMIC REGIONS OF THE WORLD. (See pp. 439–40.) The photograph shows a tall platform, from which the *mai* spirits will descend and dance among women and children. The backdrop of the platform, woven from leaves and strips of bamboo, represents three mountains, the three totemic regions of the world created by the first ancestors of each of the three main clans in the villages. Kombrangowi Mountain is the region of the world that lies to the south of the Sepik River. Mayviimbiit Mountain is the land that spreads to the north of the river. The third is Woliagwi Mountain, which represents the ocean and distant islands. In the foreground are men preparing for the *mai* ritual; atop the platform are the masked and costumed *mai* dancers. By permission of Eric Kline Silverman.

PLATE 24. HAND SKETCH OF THE SOUTH PART OF THE MIDDLE (SOUTH) ISLAND BY MANTELL, CA. 1848–52. (See p. 521.) This map incorporates the basic information on the five lakes, which were drawn in Walter Baldock Durrant Mantell's Sketchbook No. 2 by Te Ware Korari (figs. 14.28–14.30). The names of these lakes are Tekapo (Tekapō; Takapō), Takamoana (the Māori name for small Lake Alexandrina, which empties via smaller Lake McGregor into Lake Tekapo), Wakarukumoana (Whakarukumoana; the Māori names for Lake McGregor), Pukaki (Pūkaki), and Ohau (Ōhau; Ōhou). The map also shows Mantell's track from Otago Harbour to Kaiapoi. Size of the original: 21 × 20 cm. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington (834caq/ca.1848/acc. no. 23,676).

Preface

My twenty-year experience with the History of Cartography Project (the idea goes back to May 1977) has been rather like attempting to map a large mountainous, forested island without the benefit of a view from above. At the beginning Brian Harley and I, with a group of trusted advisers, landed on the hospitable beach of classical and medieval cartography. As the journey inland continued into Islamic, Indian, Chinese, Japanese, Korean, and other Asian cartographies, it became obvious that we were in terra incognita. But as the routes wound upward, posing some difficult and momentous choices at various forks in the road, the layout of the surrounding landscape became progressively apparent. With the publication of this book, we may have climbed high enough that we will soon be able to see the whole island. But now there lurks a growing realization–both daunting and profoundly comforting–that when we reach the summit it will become abundantly clear that our "island" is firmly attached to a massive continent.

The redefinition and expansion of the canon of early maps was designed to bring into the history of cartography maps that had previously been ignored or relegated to the margins of the subject. In the original general outline sketched in the late 1970s, our intention was to include the "foundations" of world cartography, down to A.D. 1500 in both Western and non-Western societies, in a single "archaic" first volume. That first volume was to describe not only the maps of prehistoric, ancient, and medieval Europe and the Mediterranean and the premodern cartographies of the Islamic, South Asian, and East Asian realms, but also those of "primitive" peoples in different parts of the world. After deciding to devote two books of volume 2 to Islamic and Asian cartography, we were left with the question of how to treat the cartographies of the rest of the non-Western world.

Brian Harley's interests were in almost every way remarkably complementary to my own, and our personal working relationship was extremely cordial. Despite often heated discussions, we almost never disagreed fundamentally about how a problem should be solved. But there was one point relevant to the plans for this volume on which I deferred to him only reluctantly. Harley was adamant that there should be no separate volume dealing with the indigenous cartographies of the African, American, Arctic, Australian, and Pacific cultures. He believed they could be satisfactorily explained only in the context of European contact. In volume 3, covering the period of first European contact with the Americas, for example, there would be sections for North America, Mesoamerica, and South America, each subdivided into "purely" indigenous cartographies, the period of encounter, and "purely" colonial mapping. The same general plan was to hold for volumes 4 and 5, where indigenous cartography would be treated at the time of European contact–Australia and the Pacific in volume 4, Africa and the Arctic and Subarctic in volume 5, for example. Harley believed this was the only satisfactory way to bring out the contrasts and connections in the worldviews of natives and colonists.

At the time of Harley's death in December 1991, just on the eve of the Columbian quincentenary, when such issues of contact were being hotly debated, this made a great deal of theoretical sense; and since much surviving indigenous cartography has been produced in the social context of communicating with Europeans, it still makes sense. The roots of my uneasiness lay in my desire to present each culture's cartography on its own terms: it seemed appropriate to treat them separately. A practical matter intervened as well. We were having great difficulty finding authors to write sections on the three subdivisions that Harley had proposed for each region. The arrangement of these sections within several volumes was also cumbersome. Furthermore, since this project started, the interest of anthropologists and ethnographers in indigenous cartography had expanded enormously, and it seemed as if a separate summary treatment would provide a fundamental resource for this burgeoning attention.

With the advice of several scholars working on these subjects, therefore, I decided to form a separate book, the first serious global attempt to describe and explain traditional cartography in English. *Plus ça change, plus c'est la même chose,* because it had been both Harley's and my own first intent to keep all the indigenous material together, except that it was originally to be included in volume 1. The wisdom of the decision to create this book will no doubt be tested by time, but I should point out that in the later volumes dealing with cartography in modern Europe the issues of colonial encounter will be fully addressed from the European side.

We have not been faced with the complex romanization or transliteration issues we encountered with the books dealing with Arabic, Chinese, Japanese, and Korean scripts, although we have used the United States Board on Geographic Names for transliteration of Russian. In recent years, however, usage of the names of indigenous groups has come under scrutiny. In particular, the editors of *The Cambridge History of the Native Peoples of the Americas* have recommended discontinuing the nineteenth-century convention of referring to collective members of indigenous groups in the singular. We have followed this policy for the chapters on the North American, Mesoamerican, Andean, and Arctic and Subarctic peoples but have followed the wishes of the authors of the other chapters where local variations of this policy warranted.

In thanking the many people who have contributed chapters to this book, I speak on behalf of the entire staff of the History of Cartography Project. Discussions frequently turned to our good fortune in attracting specialist authors and critics, and we owe them great gratitude for their patience over the past decade (often through extremely difficult personal circumstances) as the scope and focus of the book changed dramatically.

It is first my pleasure to acknowledge an enormous debt to G. Malcolm Lewis, my coeditor for this book. In March 1978 Lewis was asked to write a chapter on Amerindian cartography for volume 1, and in 1979 he was appointed a section adviser in that volume for what we then called "preliterate" cartography. He has since been a wonderfully supportive colleague through many vicissitudes, and when we decided to make indigenous cartography a separate book he was the obvious person to invite as coeditor.

That we were able to grapple at all with the problems involved in this work and later felt able to comment on some important interpretive issues in our Introduction and Concluding Remarks is largely due to the scholarship of the specialist authors from several disciplines, including archaeology, ethnology, historical and cultural geography, cultural anthropology, sociology, and art history. In the fullest sense, this is their volume. We wish to acknowledge the good grace with which they have accepted editorial intervention at various stages in the work as the subject grew beneath our feet. It is indeed a privilege to name them here: Phillip Lionel Barton, Thomas J. Bassett, Ben Finney, William Gustav Gartner, G. Malcolm Lewis, Tim Maggs, Barbara E. Mundy, Elena Okladnikova, Boris Polevoy, Eric Kline Silverman, Peter Sutton, and Neil L. Whitehead. Only they know the extent of expansion, rewriting, and recasting that resulted from editorial efforts and the demands of the University of Chicago Press's two anonymous readers. I hope they can now share our pride in the final result.

Several scholars have advised us, either at the early stages of the book's planning or as the manuscripts were completed in draft. These include James M. Blaut, Barry Brailsford, Hal Conklin, William Davenport, Carolyn Dean, James Delahanty, Catherine Delano Smith, William Denevan, Greg Dening, Henry Drewal, James R. Gibson, John Hemming, David Lewis-Williams, Peter Nabokov, Benjamin S. Orlove, Nicholas Peterson, Alexei Postnikov, Allen F. Roberts, Polly Roberts, Frank Salomon, Jeanette Sherbondy, Yi-Fu Tuan, Gary Urton, Jan Vansina, Denis Wood, H. C. Woodhouse, and Karl S. Zimmerer.

We owe a special debt to Jude Leimer, who has been managing editor of the History of Cartography Project since 1982 and has provided the editorial and managerial continuity so crucial to an undertaking of this type. She has controlled the daily operations of this work–in liaison with the University of Chicago Press and with authors, advisers, and editors–with such determination and strength of personality that I can only describe her as indispensable.

Anyone who has experienced the problems of managing a small office within a large university will also appreciate how essential were the contributions of Susan MacKerer and her successors Veronica Cid and Beth Freundlich. Beth joined the Project in September 1996 and has expertly taken control of our finances, accounts, budgets, outreach, and office management.

There are two project assistants on staff, one responsible for illustrations and one for bibliographical work. Christina Dando, followed in 1996 by Kristen Overbeck, doggedly pursued libraries and archives to the remotest corners of the world through mail, courier (both commercial and personal), fax, e-mail, and telephone, and it is due to their efforts that we have been able to select the highest-quality illustrations in often difficult circumstances. Line drawings and reference maps were skillfully prepared at the University of Wisconsin Cartographic Laboratory in the Department of Geography at Madison by its director, Onno Brouwer, and his staff of graduate and undergraduate assistants: Michael Desbarres, Daniel H. Maher, Ryan Meyer, Kathryn Sopa, Qingling Wang, and Richard Worthington. Another cartographer who contributed extensively to this volume was Josh Hane, who was tragically killed in a climbing accident on Mount Hunter, Denali National Park, Alaska, on 22 June 1996.

In addition to its role in helping to define the scope and methods of the history of cartography, the *History* is intended to provide a basic work of reference for both scholars and general readers. As a result, continuing attention has been paid to bibliographical accuracy. Barbara Whalen, followed by Margo Kleinfeld, exactingly tracked down and checked arcane references and quotations in sometimes obscure publications in many languages. They have been helped by the excellent library facilities on our campus and the efficient Inter-Library Loan department at Memorial Library led by Judy Tuohy. Translation assistance was provided for this volume by Michael Batek, Valentin Bogorov, Maria Dziemiela, Peyton Engel, Heidi Glaesel, Laurie S. Z. Greenberg, Fernando Gonzales, Mathias Le Bosse, Frank Poulin, Todd Reeve, and Gnoumon Yazon. Other essential clerical, computer, and library help has been provided by Christian Brannstrom, Charles Dean, Paul Dziemiela, Rich Hirsch, Drew Ross, Daniel Samos, and Donna Troestler. The year 1996 also brought us much-appreciated volunteer research and editorial assistance from Howard Schwartz. Ellen D. Goldlust-Gingrich maintained the high standard of her previous indexes for books in the series.

None of this exacting work would be possible without the financial support of many funding agencies, foundations, and individuals listed on the financial support pages in the front of this book. We continue to be especially grateful to the National Endowment for the Humanities, the National Science Foundation, and the Andrew W. Mellon Foundation for their faith in and support of the *History*. We would also like to acknowledge the support of the Gladys Krieble Delmas Foundation and the Gaylord and Dorothy Donnelley Foundation.

Among the individuals who have made donations to the *History* we especially acknowledge the generosity of founders Roger S. and Julie Baskes, William B. Ginsberg, Arthur and Janet Holzheimer, Arthur L. Kelly, Bernard Lisker, Duane F. Marble, Douglas W. Marshall, Glen McLaughlin, Kenneth and Jossy Nebenzahl, Brian D. Quintenz, David M. Rumsey, and Roderick and Madge Webster. I would also like to acknowledge the Department of Geography, College of Letters and Science, and the Graduate School of the University of Wisconsin–Madison for their long-term institutional and financial support of this project.

As in previous volumes, we are delighted to have the opportunity to thank several people at the University of Chicago Press. Penelope Kaiserlian, associate director, has continued to be one of the Project's greatest friends and trusted advisers. Alice Bennett, who has remained our copyeditor par excellence since volume 1, has improved the consistency and accuracy of the text. Robert Williams, designer, has proved once again that his versatile design for the books in the series has stood the test of time.

On the personal side, Malcolm would like to thank Margaret for her invaluable assistance and constant encouragement. My personal debts are growing too rapidly to specify, but Ros, Justin, and Jenny still weather the challenges provided by a project whose boundaries sometimes appear to exceed the available energy.

David Woodward

1 • Introduction

David Woodward and G. Malcolm Lewis

Maps are seen through many different eyes. As the historical study of maps has broadened and matured over the past two decades to extend beyond the idea of maps as ever-improving representations of the geographical world, at least three approaches have been developed and championed: the map as cognitive system, the map as material culture, and the map as social construction.[1] All three are necessary to a full understanding of how maps function in society. The way these approaches have waxed and waned has depended not only on the background and predilections of individual researchers, but also on the differing roles and meanings of maps in the various cultures that have been studied.

The emphasis on these three approaches has shifted as the *History of Cartography* volumes have appeared. In this book, which deals with the cartography of traditional African, American, Arctic, Australian, and Pacific cultures, where very few truly indigenous artifacts have been found or preserved, we would expect the cognitive and social approaches to have necessarily greater emphasis than in previous books. This introduction is meant to lay the conceptual groundwork for the chapters that follow. After addressing definitional questions–what we mean by various key words in the title of the book, such as "cartography" and "traditional"–we discuss the differences among what can be called cognitive, performance, and material cartography and explain the many instances where these categories overlap. The introduction then turns to a number of methodological problems and issues, including the problem of bias inherent in studying the maps in this book from a Western perspective, the possible omissions deriving from a diversity of approaches, the feasibility of cross-cultural comparisons, and the ways the study of maps can be made more central in ethnohistorical studies.

Definitions

In volume 1 of this *History,* maps were defined as "graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world."[2] The definition, purposely broad, was intended to set general parameters for the entire six-volume series. But in this book the very terms "map" and "cartography," with their strong Western overtones, need some elaboration. There is no cross-cultural, generally agreed definition of these terms, and none of the cultures described here apparently had a word for "map," let alone "cartography," before contact with the West. If the purpose of our definition is pragmatic rather than semantic, however, using "map" as a general term can be helpful. Although an Australian aboriginal toa, a Marshall Islands stick chart, an Inka *khipu,* and a Luba *lukasa* memory board are very different in form and function, they all depict a people's world in a way that enhances spatial understanding.

The search for "maps" in these cultures, particularly when accompanied by the idea that maps privilege the societies in which they are found, is profoundly Eurocentric. But *The History of Cartography* was born of a belief that the endeavor to understand the world by depicting it in map form should be treated in a global way and across the span of human history. By using the word "map" to cover so many different things, we are simply extending the logic of earlier volumes that called the Greek *pinax,* the Roman *forma,* the Chinese *tu,* and the medieval *map-*

1. For mapping as a cognitive system, see David Stea, James M. Blaut, and Jennifer Stephens, "Mapping as a Cultural Universal," in *The Construction of Cognitive Maps,* ed. Juval Portugali (Dordrecht: Kluwer Academic, 1996), 345–60. The map as material culture has been explored in David Woodward, ed., *Five Centuries of Map Printing* (Chicago: University of Chicago Press, 1975); David Woodward, *The All-American Map: Wax-Engraving and Its Influence on Cartography* (Chicago: University of Chicago Press, 1977); and idem, "Maps as Material Culture," in *Maps as Material Culture,* Yale-Smithsonian Reports on Material Culture no. 6 (forthcoming, 1998). The social construction of maps has been treated in J. B. Harley, "Maps, Knowledge and Power," in *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments,* ed. Denis E. Cosgrove and Stephen Daniels (Cambridge: Cambridge University Press, 1988), 277–312; idem, "Deconstructing the Map," in *Writing Worlds: Discourse, Text and Metaphor in the Representation of Landscape,* ed. Trevor J. Barnes and James S. Duncan (London: Routledge, 1992), 231–47; and Denis Wood with John Fels, *The Power of Maps* (New York: Guilford Press, 1992).

2. "Preface," in *The History of Cartography,* ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:xv–xxi, esp. xvi.

pamundi and *carta da navigare* "maps" and included them in a cartographic history.[3]

Creating a separate volume for "traditional cartography" has been a pragmatic decision based on a body of anthropological and ethnographic literature very different from the historical literature underlying volume 1. The danger is that such a division of subject matter might be thought to imply that there are two fundamentally different ways of spatial thinking: Western and "other." We prefer to characterize the differences not in terms of mental capacity or predisposition but according to the social and cultural need for maps.

The term "traditional" implies continuity, the handing down of skills over generations, rooted in longevity. Yet given the difficulties of documentation, it is almost impossible to ascertain how long this tradition has been maintained in the societies discussed here, or how continuous it has been. Likewise, if the term is used for the kind of cartography that was independent of the development of systematic topographic survey and mapmaking in Europe, it implies that one somehow "progressed" into the other.

Our motivation for using the term "traditional," despite its problems, is to convey the idea that we are dealing with a different kind of cartography that is neither inferior nor superior to that of the West. Although even "traditional" has sometimes been used pejoratively, we have preferred it to other terms that are now almost always interpreted as disparaging, such as "preliterate," "simpler," "primitive," or even "savage." The problem with such pejorative terms is that they fail to treat the maps of traditional societies on their own terms and therefore endorse the idea of traditional "inferior" cartographies "progressing" into ever more realistic modern maps. Except in the sense of the purely geometric definition of geographic data, this theory is no more true for cartography than it is for art. As early as 1937, Sorokin was at pains to document that what he called ideational culture mentalities that nineteenth-century writers had associated with primitive art devoid of skill and technique did not somehow "progress" into sensate (visual) art forms that art historians associated with the European Renaissance.[4]

Since all cultures have always been in a constant state of change, it is not possible to draw hard and fast boundaries between "traditional" and "European" cartographies or to ascertain what is truly "traditional," "indigenous," or "original."[5] Describing spatial representation in oral societies before contact with Westerners is difficult for several reasons. These include the paucity or virtual absence of extant precontact artifacts; an unwillingness or inability to recognize as maps certain types of archaeological evidence such as ceramics, textiles, petroglyphs, and pictographs, even when datable; the unlikelihood of

3. The number of artifacts that could be called maps vastly increased in the modern period, and there is a sense in which the map as a fully developed artifact did not properly exist until the medium of print made maps everyday objects. See Walter J. Ong, *Orality and Literacy: The Technologizing of the Word* (London: Methuen, 1982). For a development of this theme, see Denis Wood, "Maps and Mapmaking," in *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures,* ed. Helaine Selin (Dordrecht: Kluwer Academic, 1997), 26–31. Wood states: "Maps are permanent, graphic objects which are a very recent phenomenon with relatively shallow roots in human history" (26). These views are based on the conviction that the term "map" should be reserved for products generated in societies in which standardized, reproducible maps are widespread and that draw on them as models. Indeed, some philosophers who are otherwise critical of the notion of "representation" are willing to make an exception for such maps. Richard Rorty, commenting on work by Donald Davidson, states, "I take his point to be that we should restrict the term 'representation' to things like maps and codes–things for which we can spell out rules of projection which pair objects with other objects, and thus embody criteria of accurate representation. If we extend the notion of representation beyond such things, we shall burden ourselves with a lot of philosophical worries we need not have" (Richard Rorty, "An Antirepresentationalist View: Comments on Richard Miller, van Fraassen/Sigman, and Churchland," in *Realism and Representation: Essays on the Problem of Realism in relation to Science, Literature, and Culture,* ed. George Lewis Levine [Madison: University of Wisconsin Press, 1993], 125–33, esp. 126).

4. Pitirim Aleksandrovich Sorokin, *Social and Cultural Dynamics,* vol. 1, *Fluctuation of Forms of Art (Painting, Sculpture, Architecture, Music, Literature, and Criticism)* (New York: American Book Company, 1937), 269 ff.: "Ideational and primitive were often taken to be identical, while any competent rendering in the Visual style was regarded as a manifestation of artistic skill, maturity of technique, progress in art and in aesthetic genius. Even now many people, looking at the paintings of Indians or Eskimos or Egyptians or other ancient peoples, consider them certainly to be the result of a lack of artistic skill and as a manifestation of the primitiveness of the art of the ancients. However natural such opinions seem to be, in most cases they are wrong. The fault of such theories consists in their identification of Ideational with immature, of Visual with mature. As a matter of fact, the real situation in many cases is quite different" (269–70).

More recently, Morphy writes, in the context of the anthropology of art: "In the case of [the term 'primitive'], however, I am content to assume that the battle has been won in anthropology, if not in art history. The addition of the label 'primitive' adds nothing but confusion to the literature on the art of non-Western societies. However, the fact that the word 'primitive' was applied to these arts for so long tells us something about the European concept of art and the role it has played in the positioning of 'other cultures' in European thought, and highlights why it is so necessary that any review of the anthropology of art should begin with the definitional problem." Howard Morphy, "The Anthropology of Art," in *Companion Encyclopedia of Anthropology,* ed. Tim Ingold (London: Routledge, 1994), 648–85, esp. 648. For a general discussion of the notion of "progress" in cartographic history, see Matthew H. Edney, "Cartography without 'Progress': Reinterpreting the Nature and Historical Development of Mapmaking," *Cartographica* 30, nos. 2–3 (1993): 54–68.

5. See J. C. H. King, "Tradition in Native American Art," in *The Arts of the North American Indian: Native Traditions in Evolution,* ed. Edwin L. Wade (New York: Hudson Hills Press, 1986), 64–92, esp. 65. For further clarification on the meaning of "traditional" and other terms associated with oral culture, see the helpful book by Ruth H. Finnegan, *Oral Traditions and the Verbal Arts: A Guide to Research Practices* (London: Routledge, 1992), 7–8 and passim.

there being an evidential record of maps that are part of a performance; and the difficulty of interpreting oral traditions as history.

The issues raised by the inclusion in this book of maps with forms and functions very different from those in previous books of the *History* can perhaps best be explained by referring to table 1.1. This table distinguishes between internal spatial concepts or mental constructions of spatial ideas and the expression or manifestation of these concepts either in performance or in the construction of a record of spatial knowledge in the form of material artifacts.[6] We can thus speak in terms of "cognitive or mental cartography," "performance or ritual cartography," and "material or artifactual cartography," and the next three sections explain what each means in the context of this book.

Cognitive Cartography

In volume 1 of this *History* Brian Harley wrote:

> There has probably always been a mapping impulse in human consciousness, and the mapping experience–involving the cognitive mapping of space–undoubtedly existed long before the physical artifacts we now call maps. For many centuries maps have been employed as literary metaphors and as tools in analogical thinking. There is thus also a wider history of how concepts and facts about space have been communicated, and the history of the map itself–the physical artifact–is but one small part of this general history of communication about space.[7]

A "general history of communication about space" would be based on the vast literature of spatial cognition and behavior in psychology, philosophy, anthropology, geography, and now artificial intelligence.[8] Spatial constructs are keys to the physical, social, and humanistic understanding of the world. Human activities relevant to cartography include reducing the complexity and vastness of nature and space to a manageable representation; wayfinding or navigating from one point to another; spatial reckoning of generalized distances and directions (as in an awareness of the cardinal directions); visualizing the character of local places; articulating spatial power and control related to territoriality; and constructing spatial views of real and imagined worlds. The mental constructions of such spatial ideas are sometimes selectively described as "mental maps." This is an intuitively attractive term and has been the subject of many recent studies, but it can mean at least two quite different things.

On one hand, the term is used to mean an image of the environment held in the mind to aid wayfinding or spatial orientation. This may be an image one remembers from having seen a physical map, or it may be con-

Table 1.1 Categories of Representations of Non-Western Spatial Thought and Expression

Internal (Inner Experience)	External (Processes and Objects That Realize or Externalize the Internal Experience)	
Cognitive Cartography (Thought, Images)	Performance Cartography (Performance, Processes)	Material Cartography (Record, Objects)
Organized images such as spatial constructs	*Nonmaterial and ephemeral*	*In situ*
	Gesture	Rock art
	Ritual	Displayed maps
	Song	
	Poem	*Mobile comparable objects*
	Dance	Paintings
	Speech	Drawings
		Sketches
	Material and ephemeral	Models
	Model	Textiles
	Sketch	Ceramics
		Recording of "performance maps"

6. This internal/external distinction is used in a similar sense described by Sorokin in his classification of world systems of culture. He writes, "The elements of thought and meaning which lie at the base of any logically integrated system of culture may be considered under two aspects: the *internal* and the *external.* The first belongs to the realm of inner experience, either in its unorganized form of unintegrated images, ideas, volitions, feelings, and emotions; or in its organized form of systems of thought woven out of these elements of the inner experience. . . . The second is composed of inorganic and organic phenomena: objects, events, and processes, which incarnate, or incorporate, or realize, or externalize, the internal experience." Sorokin, *Fluctuation of Forms of Art,* 55 (note 4). Sorokin goes on to say that the internal is more important for the student of culture to study, but being constrained by the material evidence, one is forced to focus on the external. Although he agrees that the external is an inextricable part of the complex of culture, it is "part of culture" only when it is serving as such a vehicle for understanding of culture.

7. J. B. Harley, "The Map and the Development of the History of Cartography," in *The History of Cartography,* ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:1–42, esp. 1.

8. For representative geographical works, see Roger M. Downs and David Stea, eds., *Image and Environment: Cognitive Mapping and Spatial Behavior* (Chicago: Aldine, 1973); Reginald G. Golledge and R. J. Stimson, *Spatial Behavior: A Geographic Perspective* (New York: Guilford Press, 1997), esp. 229–38; Robert David Sack, *Conceptions of Space in Social Thought: A Geographic Perspective* (London: Macmillan, 1980); and Michael Blakemore, "From Way-Finding to Map-Making: The Spatial Information Fields of Aboriginal Peoples," *Progress in Human Geography* 5 (1981): 1–24.

structed from one's experience of reality (such as one's neighborhood). This type of mental map is often used to give directions, to rehearse spatial behavior in the mind, to aid memory, to structure and store knowledge, to imagine fantasy landscapes and worlds, or of course to make commonplace material maps. We know, however, that many people do not visualize space in mental pictures when engaged in everyday wayfinding or giving directions.[9] Some writers have questioned the value of using terms such as "image," "pictures in the head," and "mental map" to describe complex mental processes.[10]

The other main use of the term "mental map" or "cognitive map" is to denote physical artifacts recording how people perceive places. This category includes maps researchers draw from data about subjects' place preferences, as in Gould and White's *Mental Maps*.[11] Or in some cases subjects themselves may draw their cognitive or affective view of their environment. In both instances we are dealing with a physical object, not a mental image.

Nevertheless, for want of a better phrase, the term "mental cartography" is sometimes used in this book to refer to the maps that many of these groups apparently carry in their heads as mnemonic devices. A good example concerns the Pacific Islanders. In only one island group in Micronesia, the Marshall Islands, have material artifacts traditionally been made for the purpose of remembering and teaching navigation skills in the Pacific Ocean. Clearly, inhabitants of other island groups have had a similar need to navigate the thousands of miles between the island groups, yet these needs are met not with graphic artifacts but with a "mental cartography."[12]

Performance Cartography

If mental constructs can be metaphorically called "maps," there are occasions in many societies when a performance also fulfills the function of a map. Referring again to table 1.1, a performance may take the form of a nonmaterial oral, visual, or kinesthetic social act, such as a gesture, ritual, chant, procession, dance, poem, story, or other means of expression or communication whose primary purpose is to define or explain spatial knowledge or practice. Or the performance may include a more material, but still ephemeral, demonstration such as a drawing or model in the sand.

Not all our authors agree on whether oral-kinesthetic expressions qualify as maps. For example, for Australian Aborigines, Peter Sutton has used this distinction as a key reason to be cautious about identifying some icons as kinds of maps, in that they "arise principally as display or performance rather than as explanation or record."[13] Similarly, for Mesoamerica, where many more map artifacts survive than from oral cultures, Barbara Mundy mentions the circumambulation ritual still carried out in hundreds of Mexican communities, only to point out that this performance is not a map but "an oral litany of boundary sites committed to memory."[14] On the other hand, Eric Silverman points out in the chapter on Mela-

9. In an experiment described by Michel de Certeau, residents of New York described the layouts of their apartments, and these descriptions fell into two distinct types, which the researchers C. Linde and W. Labov called the "map" and the "tour." The first is of the type, "The girls' room is next to the kitchen." The second, "You turn right and come into the living room." Only 3 percent of the descriptions turned out to be of the "map" (or, we might say, the "mental map") type. The vast majority of New Yorkers thought in terms of sequential narrative rather than visualizing their apartments as a map. De Certeau extends the argument in terms of one of the differences between medieval and Renaissance cartography, pointing out that the "itinerary map" is more characteristic of the Middle Ages. For de Certeau, the development from itinerary to map is central to the difference between premodern and modern mapmaking. An intermediate "itinerary map"–obviously based on linear directions–first appears; eventually the modern map removed traces of its earlier itinerary sources. Michel de Certeau, *The Practice of Everyday Life*, trans. Steven F. Rendall (Berkeley: University of California Press, 1984), 118–22.

10. Yi-Fu Tuan, "Images and Mental Maps," *Annals of the Association of American Geographers* 65 (1975): 205–13. Tuan concluded that such terms "have tended to become vague entities that do not correspond to psychological reality" (213). A recent hypothesis by Couclelis suggests that there is more likely to be a complex relation of various elements aiding in direction giving and wayfinding. These elements include preconceived schemata, verbal directions, and cognitive maps, of which one component is not necessarily basic or privileged over another. See Helen Couclelis, "Verbal Directions for Way-Finding: Space, Cognition, and Language," in *The Construction of Cognitive Maps*, ed. Juval Portugali (Dordrecht: Kluwer Academic, 1996), 133–53. The term "cognitive map" originated with the psychologist Edward Chance Tolman, who used it to explain how rats react to the stimulus of whole environmental fields rather than local landmarks in wayfinding. See Tolman's "Cognitive Maps in Rats and Men," *Psychological Review* 55 (1948): 189–208. Cognitive psychologists have since been engaged in what has been called the "imagery debate" about how visual imagery is processed in the brain, excellently summarized by Stephen M. Kosslyn, *Image and Brain: The Resolution of the Imagery Debate* (Cambridge: MIT Press, 1994). The argument centers on whether depictive or propositional representation is responsible for mental images. A depictive representation is made up of a pattern, say the letter *A* or (in our context) a map, whereas a propositional representation of the letter might consist of the description "two symmetrical diagonal lines that meet at the top and are joined roughly halfway down by a horizontal line." At issue is not whether people experience visual mental images; it is generally agreed that they do. Neither is there disagreement that a depiction needs a propositional component to be interpreted. Kosslyn states that the issue is whether "visual mental images rely on depictive representations (which are in turn interpreted by other processes), or whether they are purely propositional representations" (6). After reviewing extensive neurological experiments, he concludes there is good evidence that image representations are depictive on the grounds that the human visual cortex includes "topographically mapped areas" to record such information (405–7).

11. Peter Gould and Rodney White, *Mental Maps*, 2d ed. (Boston: Allen and Unwin, 1986).

12. Ben Finney, "Traditional Navigation and Nautical Cartography in Oceania," pp. 443–92 below.

13. See p. 365 below.

14. See p. 220 below.

nesian maps that the Iatmul of the middle Sepik River map the landscape orally through chains of paired, polysyllabic names that are chanted and sung on ritual occasions. And Neil Whitehead relates how the dances of the Barasana in the Vaupés region of Colombia enact the interconnection between persons and the cosmos in which the path of celestial bodies is replicated through the annual cycle of ritual and dance in a longhouse representing the celestial vault.[15]

Material Cartography

A spatial representation may also be a permanent or at least nonephemeral record created or placed in situ, as in rock art, maps posted as signs, or maps embodied in shrines or buildings. Or the representation may take the form of a mobile, portable, archivable record. This category of material cartography, which comprises most artifacts we normally think of as "maps," includes models, ceramics, drawings, paintings, textiles, descriptions or depictions of performances, and in situ records.[16]

Despite the frequent image of the history of cartography as an antiquarian field, the study of maps as physical artifacts–as material culture–has been astonishingly neglected, perhaps on the mistaken grounds that technical studies do not illuminate the wider social history of cartography. This is unfortunate, since technology is rooted in society, cannot be separated from its influences, and often sheds light on broader social issues. One of the fundamental purposes of this book is to present the material evidence of traditional cartography–to describe the map corpus in a way that approaches the maturity of other fields that address issues of material culture, such as art history, ethnography, and industrial history. Wherever the evidence has permitted, we have attempted to reconstruct the fabric and format of maps and the methods of their creation. We hope that in some cases we have also been able to move beyond the bare statement of how maps were made. This approach of course is fully compatible with recent studies of material culture, which go beyond explaining process.[17]

Overlaps and Inconsistencies

There are several instances where the categories of cognitive, performance, and material cartography overlap. This overlap is most obvious where map artifacts are used during a performance. For example, Thomas Bassett describes how memory boards known as *lukasa,* covered with beads and cowrie shells, are used to teach initiates about the origins of Luba kingship in the Kabongo region of the Democratic Republic of Congo. The *lukasa* is read or sung to remember the journeys of a king, the location of sacred lakes, trees, spirit capitals, and migration routes. The content changes according to the king being praised, the singer's knowledge of royal history, and the political circumstances of the performance.[18] In this sense the performance is not the map but an interpretation of it. Likewise, the Comanches of western Texas prepared for raids into northern Mexico between about 1830 and 1845 by assembling a bundle of sticks, each marked with notches to represent days. A map was drawn on the ground illustrating every landmark to be encountered on the journey for the day represented by the notched stick.[19]

The evidence for mapping as performance–dances, dreamings, sandpainting ceremonies–is less complete than for material maps and is subject to greater errors in interpretation. Although such performances were observed and recorded in some traditional societies in the recent past, we do not know what proportion of performance maps were too sacred to have been witnessed by outsiders. Earlier examples were doubtless unobserved or misreported.

Many of the societies examined in this book assigned preeminence to performance, privileging process over product, particularly where permanence of the artifact might be a disadvantage in societies where maps were designed to grasp the ever-changing rhythms of nature and territory. Thus, in the Inuit context, Rundstrom describes his conversation with an Inuk elder: "[He] told me that he had drawn detailed maps of Hiquligjuaq from memory, but he smiled and said that long ago he had thrown them away. It was the act of making them that was im-

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15. See pp. 426 and 316 below.

16. Bruno Latour makes much of this ephemeral/portable distinction. See his "Drawing Things Together," in *Representation in Scientific Practice,* ed. Michael Lynch and Steve Woolgar (Cambridge: MIT Press, 1990), 19–68, esp. 19–26 and 56. Latour, writing from the standpoint of the history of modern Western science, makes a distinction between informal ephemeral maps and permanent, mobile inscriptions using an example from the expedition of La Pérouse in which the explorer meets with the inhabitants of Sakhalin and tries to learn from them whether Sakhalin is an island or a peninsula. An older man draws a map of his island on the sand, but another picks up one of La Pérouse's notebooks to draw the map again with a pencil. Latour points out that the difference between the two maps is that one was ephemeral and one was brought back to Europe. The power and influence of the mobile map was far greater when viewed in the context of ensuing European colonial policy and as it became further inscribed through the medium of print (24–25). See Jean-François de Galaup, comte de La Pérouse, *The Journal of Jean-François de Galaup de La Pérouse, 1785–1788,* 2 vols., ed. and trans. John Dunmore, Publications of the Hakluyt Society, 2d ser., nos. 179–80 (London: Hakluyt Society, 1994–95), 2:289–98.

17. David Woodward, "Maps as Material Culture" (note 1). The conference for which this paper was prepared, the Sixth Yale-Smithsonian Seminar on Material Culture, brought together anthropologists, cartographers, historians of cartography, art historians, and historians of design at the Cooper-Hewitt Museum, New York, in March 1993 and was the first to address the issue of maps as material culture.

18. See pp. 32–33 below.

19. See pp. 128–29 below.

portant, the recapitulation of environmental features, not the material objects themselves."[20] Likewise, in the case of the Nazca geoglyphs, Clarkson notes the extensive overlapping of the geoglyphs and says it "raises an interesting and in many ways important question of why certain areas of the pampa look like a chalkboard used for many different lessons but never erased between each lesson. Was the act of construction as or more important than the recognizability of individual geoglyphs?"[21]

Given the fluid nature of the categories of cognitive, performance, and material cartography, we have assiduously avoided drawing a hard line between "map" and "nonmap" in table 1.1. The "mapness" of an artifact depends in great degree on the social or functional context in which it is operating. Our concern in this book is less with constructing inclusive and exclusive criteria for what might be considered maps and more with shedding light on how certain members of society represent and codify spatial knowledge. Thus, in this introduction we have carefully avoided defining terms such as "protomap" used by some of our authors, letting the context of their use and the authors' individual definitions illuminate the meaning intended.[22]

Any definition that ignores either the function of maps or their role as social constructions fails to account for the fact that maps are far more than wayfinding devices; they have enhanced the prestige, power, and respect of those members of society who have controlled their making and use for religious and political ends. Maps are frequently used to establish social position–to gain respect through a display of knowledge–certainly a motivation behind many shamanistic rituals among such widely different groups as the Khoisan in Namibia, the Chukchi in Siberia, the Tukano and Desana in the Amazon, the Inuit and Ojibwas in Canada, and the Barasana in Colombia.

The oral "map" lies at the center of the definitional controversy. Whether a list of places is arranged in topographical or artificial order is certainly significant in the study of mental processes. Jerome S. Bruner suggests an experiment designed to help us understand how an individual represents the world. Individuals would be asked to name the fifty states of the Union. If the order is "Alabama, Alaska, Arizona . . ." the supporting mental construct is inferred to be listlike. If the order is "Maine, New Hampshire, Vermont . . ." the supporting representation is spatial and, we could say, moves toward a "maplike" representation.[23] Whether the "Maine, New Hampshire" approach would be called a "map" by our authors is debatable.

Possible conflicts in definition are not new with this book. In the chapter on Egyptian cartography in volume 1 of the *History of Cartography*, for example, such lists of place-names are not mentioned. Yet Goody describes as "an elementary kind of map" taxation scenes on the southern and northern entrance walls of a Theban tomb listing the dues paid to the Vizier Rekhmirēᶜ (in the reign of Thutmose III, ca. 1450 B.C.) by various towns lying to the south and north of Thebes, not in random order, but according to their topographical and cardinal positions.[24] Similarly, no mention is found in the medieval chapters of volume 1 of the prevalent processional "beating of the bounds" ceremony to confirm parish boundaries in England, which could be thought of as a kind of "performance map."[25]

It is also important to realize that the significance of elements of graphic representation (ideas such as points, lines, and areas) varies considerably, not only from society to society but also between individuals within a group. For example, the concept of a line–whether signifying a boundary, a pathway, or some connection between two geographic elements in the landscape–is so basic to modern Western cartography that "we take it for granted, as given in reality. We see it in visible nature, between material points, and we see it between metaphorical points such as days or acts."[26] Among the people of the Trobriand Islands of Papua New Guinea, however, there is no indication that lines are conceived as connecting point with point during a journey, and hence repre-

20. Robert A. Rundstrom, "A Cultural Interpretation of Inuit Map Accuracy," *Geographical Review* 80 (1990): 155–68, esp. 165. And see also Rundstrom's "Expectations and Motives in the Exchange of Maps and Geographical Information among Inuit and *Qallunaat* in the Nineteenth and Twentieth Centuries," in *Transferts culturels et métissages Amérique/Europe, XVIᵉ–XXᵉ siècle*, ed. Laurier Turgeon, Denys Delâge, and Réal Ouellet (Sainte-Foy, Quebec: Presses de l'Université Laval, 1996), 377–95.

21. Persis Banvard Clarkson, "The Archaeology of the Nazca Pampa: Environmental and Cultural Parameters," in *The Lines of Nazca*, ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 115–72, esp. 171.

22. The importance of context for definitions is well illustrated by the following anecdote. A docent for the Washington, D.C., version of the Cooper-Hewitt Museum's exhibition "The Power of Maps" was overheard explaining to a young visitor about a bundle of sticks from the Marshall Islands, bound together by twine with shells hanging from it–what we know as a "stick chart." The youngster was puzzled and asked why this was a map. "Because it's in this exhibition," the docent replied.

23. Jerome S. Bruner, "On Cognitive Growth," in *Studies in Cognitive Growth: A Collaboration at the Center for Cognitive Studies*, ed. Jerome S. Bruner et al. (New York: John Wiley,1966), 1–29, esp. 7, and Jack Goody, *The Domestication of the Savage Mind* (Cambridge: Cambridge University Press, 1977), 110.

24. Goody, *Domestication*, 107–8.

25. Volume 1 of *The History of Cartography* is *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987).

26. Dorothy Lee, "Lineal and Nonlineal Codifications of Reality," in *Symbolic Anthropology: A Reader in the Study of Symbols and Meanings*, ed. Janet L. Dolgin, David S. Kemnitzer, and David Murray Schneider (New York: Columbia University Press, 1977), 151–64, esp. 155.

senting such a relationship as a line would make no sense.[27]

On the other hand, the Yoruba of West Africa regard the line as extremely important, even associating it with civilization. In Yoruba, the phrase "this country has become civilized" literally means "this earth has lines upon its face." The verb meaning to cicatrize scars on a face also has multiple associations with marking new boundaries and opening roads through a forest, in the general sense of imposing a human pattern on the disorder of nature.[28]

Problems and Issues

In compiling this book, several problems and issues have arisen that are uniquely applicable to the maps we will be describing. These include the problem of studying these maps from a Western perspective, the problem of possible omissions deriving from a diversity of approaches, and the definitional problem of what constitutes a map. Issues arise about the feasibility of cross-cultural comparisons and the ways cartography and its history can be made more central in anthropology, ethnohistory, and even cultural geography.

THE PROBLEM OF BIAS

Many writers on culture start out by saying that studying culture is a "risky endeavor," as if this somehow exonerates them from error. This disclaimer does not, however, prevent them from proceeding.[29] Correctly interpreting the history of traditional African, American, Arctic, Australian, and Pacific cartography through modern Western eyes is, of course, impossible. The very fact that the editors have grouped such a diversity of forms of expression into one book–though we would not claim everything we illustrate is a map or is "traditional"–inevitably reveals a bias.

The artifactual evidence presented in this book has survived in diverse physical states–a spectrum ranging from forms largely independent of European influence to transcripts and copies of maps made for engraving and publication elsewhere. Contemporary annotations intended to assist understanding can only rarely be evaluated. Many artifacts are no longer extant and are known only via contemporary accounts. Inevitably, the descriptions were filtered by the circumstances in which they were recorded, and correcting for this is seldom possible. Very few truly indigenous map artifacts have passed from their native keepers into nonnative collections. Most of the material that was readily available to our authors was made during the historical encounters between Westerners and indigenous groups, where acculturation was inevitable. Hence the representativeness of these records of the total picture is difficult to judge.

A related issue is the preservation or archiving of material artifacts. Until recently, most traditional societies have preserved their culture through means other than collections of artifacts, so it is not yet clear whether the new laws passed by many governments allowing indigenous groups to reclaim their heritage and requiring museums to return artifacts will help or hinder their long-term preservation, if this indeed remains an issue. In the meantime, as the credit lines for the illustrations in this book will attest, the vast majority of traditional artifacts are preserved in repositories founded in the European image of the museum, a relatively recent concept–in its well-developed form–dating from the Renaissance. Those that are preserved have thus usually been chosen according to the values placed on them in the Western culture of connoisseurship and collecting. As they have changed hands in private collections, the artifacts have accrued an importance beyond their intrinsic aesthetic worth, to include provenance, a position cemented by their description in published exhibition or auction catalogs. As with the "great maps" of the West, a few traditional artifacts have also been repeatedly illustrated and described, and their importance has thus been canonized.

There are further difficulties with the historical record. Some prehistoric rock art may have functioned as maps, but such an interpretation is necessarily speculative. Much surviving rock art was accretive over long periods; later content was frequently added, often by people possessing little or no knowledge of the earlier cultures that had a hand in creating the images. Thus linking rock art to the culture in which it originated always involves assumptions. Furthermore, much rock art undoubtedly reflects esoteric, mystical, shamanistic knowledge, and the figurative representations of this knowledge bear multiple meanings.

Another example of the difficulties of interpretation is the Walam Olum, a pictographic record described in the nineteenth century, but now lost, that some believe to be the ancient history of the Delawares (Lenni Lenape). The Walam Olum is told in the form of an epic migration story about their crossing of the Bering Strait and their journey south and eastward across North America to a

27. Lee, "Lineal and Nonlineal Codifications," 159–60. Lee elaborates: "No terms are used here which might be taken as an implication of continuity; no 'along the coast' or 'around' or 'northward.'"

28. Robert Farris Thompson, "Yoruba Artistic Criticism," in *The Traditional Artist in African Societies,* ed. Warren L. d'Azevedo (Bloomington: Indiana University Press, 1973), 18–61, esp. 35–36.

29. See, for example, Eric Mark Kramer, "Gebser and Culture," in *Consciousness and Culture: An Introduction to the Thought of Jean Gebser,* ed. Eric Mark Kramer (Westport, Conn.: Greenwood Press, 1992), 1–60, esp. 1.

homeland centered in the Delaware Valley, ending with a description of European ships arriving on the Delaware River about 1620. Some scholars date the record to the late eighteenth or nineteenth century, interpreting it as a bona fide attempt to create a unifying narrative in the face of disruption and forced migration.[30] More recently a strong case has been made that it is one of the oldest hoaxes of North America, analogous to Piltdown man in England.[31] For the Delawares, the epic may well form part of a narrative received from their ancestors and valid as such. But in the face of such difficulties of interpretation, it is best to be extremely cautious about its value in corroborating or guiding archaeological or historical research.[32]

There is, however, a concomitant problem of traditional groups' writing their own history in the absence of a historical record. The problem of bias has not dissuaded modern descendants of indigenous groups from "rewriting" and "reinterpreting" their history. For example, a recent history of Waitaha tradition has been criticized by several scholars for suggesting a longevity of settlement mythology for which there is no evidence.[33]

Even if bias is likely to be present no matter who writes the history of cartography, we are presumably not so culture bound that any attempt is hopeless. We believe the problems are mitigated somewhat by choosing a worldwide team of anthropologists, archaeologists, art historians, geographers, and historians with an intimate knowledge of the cultures and literatures they describe. This volume of the *History of Cartography* is thus the first global attempt to describe and explain traditional cartography since Bruno Adler's pathbreaking study of 1910.[34]

THE PROBLEM OF DIVERSITY OF APPROACH

Although multiple authorship is necessary for a work of this kind in which no one scholar could be expected to have a worldwide ethnographical, historical, and geographical knowledge of the cultures treated, such a plan involves a rich diversity of approach. Not only do our authors represent several fields, but there are widely varying interpretations of what constitutes a map, as our discussion of mental mapping and performance cartography in this introduction has shown. Furthermore, although we have attempted to cover the main cultures of the world, there have inevitably been omissions and inconsistencies owing to the extremely sparse literature on some topics and the lack of specialists familiar with artifacts that could be interpreted as maps.[35] Other inconsistencies include the varying emphasis on "modern" maps drawn by indigenous groups for ethnographical study or for their own land claims. Similarly, some authors discuss at length maps drawn for Europeans during colonial contact, whereas others mention them only sporadically. Perhaps the most serious lacuna is the absence of separate chapters on celestial and cosmographical cartography for many of the cultures discussed, particularly in North America, like those in the books devoted to Islamic and Asian traditional cartography (volume 2, books 1 and 2). Differences in approach are therefore perhaps more marked in this book than in previous volumes, but when these essays are viewed together they provide a multiplicity of insights into precontact mapping and a richer texture than a more regimented encyclopedic attempt could possibly have produced.

THE ISSUE OF CROSS-CULTURAL COMPARISONS

By grouping traditional cartographies in volume 2 of the *History*, we are making the assumption that some kind of comparison between the maps of different cultures is desirable and will eventually be feasible. If all maps require some knowledge of their cultural context before we can

30. For example, David McCutchen, trans. and annotator, *The Red Record, the Wallam Olum: The Oldest Native North American History* (Garden City Park, N.Y.: Avery, 1993); Joe Napora, trans., *The Walam Olum* (Greenfield Center, N.Y.: Greenfield Review Press, 1992); and *Walam Olum; or, Red Score, the Migration Legend of the Lenni Lenape or Delaware Indians: A New Translation, Interpreted by Linguistic, Historical, Archaeological, Ethnological, and Physical Anthropological Studies* (Indianapolis: Indiana Historical Society, 1954).

31. David M. Oestreicher, "The Anatomy of the Walam Olum: The Dissection of a Nineteenth-Century Anthropological Hoax" (Ph.D diss., Rutgers University, 1995), and idem, "Unmasking the *Walam Olum*: A 19th-Century Hoax," *Bulletin of the Archaeological Society of New Jersey* 49 (1994): 1–44.

32. The issue of the reliability of oral traditions as history is complex and controversial. See, for example, Victor W. Turner, "Symbols in African Ritual," in *Symbolic Anthropology: A Reader in the Study of Symbols and Meanings*, ed. Janet L. Dolgin, David S. Kemnitzer, and David Murray Schneider (New York: Columbia University Press, 1977), 183–94, and Jan Vansina, *Oral Tradition as History* (Madison: University of Wisconsin Press, 1985). Peter Nabokov has recently addressed the issue for North American Indians in "Native Views of History," in *The Cambridge History of the Native Peoples of the Americas*, vol. 1, *North America*, 2 pts., ed. Bruce G. Trigger and Wilcomb E. Washburn (Cambridge: Cambridge University Press, 1996), pt. 1, 1–59.

33. For example, Tipene O'Regan, "Old Myths and New Politics: Some Contemporary Uses of Traditional History," *New Zealand Journal of History* 26 (1992): 5–27.

34. Bruno F. Adler, "Karty pervobytnykh narodov" (Maps of primitive peoples), *Izvestiya Imperatorskago Obshchestva Lyubiteley Yestestvoznaniya, Antropologii i Etnografii: Trudy Geograficheskago Otdeleniya* (Proceedings of the Imperial Society of the Devotees of National Sciences, Anthropology and Ethnography: Transactions of the Division of Geography) 119, no. 2 (1910).

35. For example, there is a chapter covering Papua New Guinea, but not the western part of New Guinea, Irian Jaya (now part of Indonesia). Cartographic elements in the rock art of southern Africa are treated, but not the indigenous cartography of Madagascar. In South America, Brazil and the Andes are emphasized, but not the native mapping traditions in Argentina, Chile, and Uruguay.

extract their meaning, comparing maps implies no less than comparing cultures.

Such a question has been occupying anthropologists and geographers since Franz Boas in 1896. George Peter Murdock describes the Cross-Cultural Survey started in 1937 at Yale, which was based on the conviction that all human cultures, despite their diversity, fundamentally have a great deal in common, and that these common aspects are susceptible to quantitative analysis. Such a program of study required a systematic cataloging and categorizing of cultural characteristics–a global database from which hypotheses could be constructed and conclusions drawn.[36] The criticism of such an approach is that it could not account for the local nuances in culture or the widely different contexts in which cultural practices take place, despite the enormous amount of useful fieldwork accomplished and data collected.

Since maps made by the cultures in this book are usually constructed from local knowledge, semantic systems, and materials, it is difficult to write about them using a Western vocabulary that attempts to analyze them structurally in terms of building blocks of graphic elements of points, lines, and color. This approach neglects the reasons the works were created, reasons that are almost always local.[37] Far more fruitful is a semiotic approach that bears these local contexts in mind. Thus Geertz writes:

> If we are to have a semiotics of art (or for that matter, of any sign system not axiomatically self-contained), we are going to have to engage in a kind of natural history of signs and symbols, an ethnography of the vehicles of meaning. Such signs and symbols, such vehicles of meaning, play a role in the life of a society, or some part of a society, and it is that which in fact gives them their life. . . . This is not a plea for inductivism–we certainly have no need for a catalogue of instances–but for turning the analytic powers of semiotic theory, whether Peirce's, Saussure's, Lévi-Strauss's, or Goodman's, away from an investigation of signs in abstraction toward an investigation of them in their natural habitat–the common world in which men look, name, listen, and make.[38]

Reversing the Marginalization of Maps

In the preface to volume 1, the editors pointed out that the history of cartography "occupies a no-man's-land among several paths of scholarship."[39] For the maps introduced in this book (both as material artifacts and as metaphors for encoding spatial understanding), it could more forcefully be said that their significance has not been adequately recognized by anthropologists, ethnographers, cultural historians, and cultural psychologists in discussions of the differences between European and non-European cultures.

In particular, maps, mapmaking, and map use within well-studied traditional societies have not received much attention from cultural anthropologists. Whether this reflects a low awareness of "map" among field anthropologists or the marginal position of spatial representation within the societies they have studied is not clear. The general impression is that terrestrial maps were more significant in hunting societies than among collectors, pastoralists, or cultivators. This difference may have been a function of the extent of the territories covered, the repeated use of relatively easy natural routes, and the spatial nature of the search for prey. It is uncertain whether the global evidence now available is sufficiently representative to test such tentative hypotheses at a worldwide scale.

Much of what is known about maps and mapmaking in traditional societies is derived from the kinds of sources widely used by historians: museum, archival, and special collections, early printed books of travel, and official publications of many kinds. Somewhat surprisingly, therefore, historians, even ethnohistorians, have rarely used extant maps as evidence.

Historians of exploration and discovery have been particularly remiss in this respect. For better or worse, explorers often based strategic decisions on maps supplied by peoples whose territories they were passing through, sometimes with unfortunate consequences. Whether these problems resulted from misinformation or misreading can be a fascinating question. Other than those with a special interest in maps made in traditional societies, even historians of cartography have seemingly been unaware of the significance of these maps. They have made surprisingly few attempts to analyze the processes involved, recognize diagnostic characteristics on the resulting maps, or consider the consequences either for contemporary map users or for the general history of cartography. With very few exceptions, archaeologists seem to have been blind to the possibility that maps made within traditional societies

36. George Peter Murdock, "The Cross-Cultural Survey," *American Sociological Review* 5 (1940): 361–70. Murdock's system grew into the Human Relation Area Files (HRAF), whose collection of cultural information of nearly one million pages at Yale University is accessible through a consortium of academic agencies. The collection is being systematically examined for evidence of the nature, evolution, and processes of spatial symbolic behavior at the State University of New York, Buffalo. See Ezra B. W. Zubrow and Patrick T. Daly, "Symbolic Behavior: The Origin of a Spatial Perspective," paper prepared for a conference at the McDonald Institute and Corpus Christi College, Cambridge, United Kingdom, September 1997.

37. Kenneth A. Rice, *Geertz and Culture* (Ann Arbor: University of Michigan Press, 1980), 190.

38. Clifford Geertz, *Local Knowledge: Further Essays in Interpretive Anthropology* (New York: Basic Books, 1983), 118–19.

39. "Preface," xv (note 2).

during the historical period might reveal sites, trails, even boundaries in ancestral prehistoric societies.

Why have maps been so clearly marginalized? Perhaps they are trivial, gross oversimplifications of the world that often stand in the way of our understanding of it. Alfred Korzybski's dictum, "A map is not the territory," has been echoed by many writers.[40] But *all* ways of knowing the landscape–speaking, writing, singing, painting–wear their own veils of representation. The medium tends to take on a life of its own beyond the message, so that it is not always possible to separate the representation from the represented. Indeed, Korzybski's dictum is now sometimes quoted only to overturn it.[41] In a society where the map sometimes *is* the territory, and where we have created a "thicket of unreality which stands between us and the facts of life," to quote Daniel Boorstin, it is surely all the more important to understand the medium that is being mistaken for reality.[42]

Another reason may account for the marginalization of maps in cultural studies. Anthropologists, historians, and psychologists interested in culture have not always appreciated the spatial manifestations of human behavior. Many of the artifacts illustrated in this book have thus not been recognized as conveying spatial information. Examples include the ceramics and textiles discussed in the chapter on Andean spatial representation, the symbolic codes in the shields of the Trobriand Islanders in Papua New Guinea, the *lukasa* memory boards of the Luba of the Kabongo region of central Africa, or the toas of the Lake Eyre region of south-central Australia.

A case could surely be made–and we hope this book of the *History of Cartography* will make it–that an indigenous culture's maps afford evidence of its ways of cultural worldmaking. The map is found at the interface of the secular and the spiritual, it deals with the spatial worldviews of societies (in the sense of both landscape and world order), and it often reflects a society's view of its history and its origins. The map is at the juncture of performance and artifact, of the visual and the aural, of the static and the dynamic. It sheds light on such deeply ingrained and universal human needs as wayfinding and feeling "in place." Maps have acted as versatile and essential tools for visual thinking about the world at global, continental, national, and local scales. They have shaped scientific hypotheses, formed political and military strategies, formulated social policy, and reflected cultural ideas about the landscape, and they have been agents of social and political power. They have also communicated, explained, and preserved information essential to the survival of cultures. With such attributes, it might seem that the maps in this book provide an evocative picture of how indigenous peoples view and represent their worlds. They illuminate not only questions of material culture but the cognitive systems and social motivations that underpin them.

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40. Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics,* 4th ed. (Lakeville, Conn.: International Non-Aristotelian Library, 1958), 750. The theme has been taken up by S. I. Hayakawa, *Language in Thought and Action,* 3d ed. (New York: Harcourt Brace Jovanovich, 1972), 27–30.

41. David Turnbull, *Maps Are Territories, Science Is an Atlas: A Portfolio of Exhibits* (Geelong, Victoria: Deakin University, 1989; reprinted Chicago: University of Chicago Press, 1993).

42. For a recent discussion of this issue, see Geoff King, *Mapping Reality: An Exploration of Cultural Cartographies* (New York: St. Martin's Press, 1996), 78–102. King quotes Boorstin from Daniel J. Boorstin, *The Image: A Guide to Pseudo-Events in America,* 25th anniversary ed. (New York: Atheneum, 1987), 3.

Traditional Cartography in Africa

2 · Cartographic Content of Rock Art in Southern Africa

TIM MAGGS

Africa has an unassailable claim, based on the fossil and archaeological evidence, to be considered the cradle of humankind and of culture. Much of the current debate on the emergence of anatomically modern humans and of modern modes of behavior, including the origins of art, likewise centers on the African evidence. Although little evidence of early art has yet been forthcoming from tropical Africa, in southern Africa, defined here as south of the Zambezi and Cunene Rivers (fig. 2.1), rock art has been dated to at least twenty-five thousand years ago. This places the origins of African rock art in the same age range as the oldest art anywhere in the world.

In southern Africa, a significant change took place in the Stone Age sequence about thirty thousand years ago, leading to what is known as the Later Stone Age. This cultural phase, though not closely similar to the European Upper Paleolithic, is nevertheless similarly associated with painting and engraving on rock. Little can yet be said about the art of the earlier millennia, but the past five thousand years certainly saw an extensive production of images on the rocks. These images include paintings, which occur in all areas of the subcontinent where the local geology and geomorphology has allowed the formation of caves and rock-shelters, and also engravings, which are found in many of the drier central and western areas where there are suitable rock outcrops. Where this art can be linked to particular groups of people, it is almost always to Khoisan hunter-gatherers, a group popularly, though often derogatorily, called Bushmen or San by others.

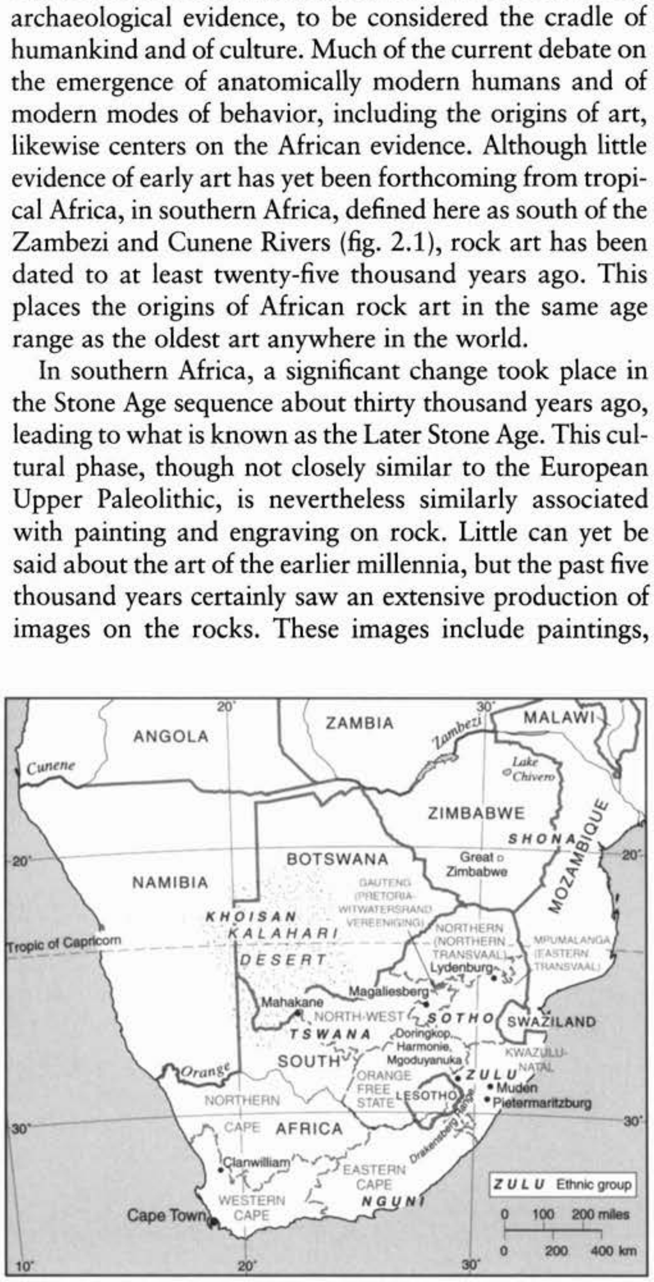


FIG. 2.1. REFERENCE MAP OF SOUTHERN AFRICA. This map shows the location of places mentioned in the text.

Interpretation of southern African rock art has proceeded through the twentieth century with a series of wide pendulum swings. The most important advance has come in the past two decades with the pioneering work of Vinnicombe, Lewis-Williams, and others. They have combined meticulous study of the art itself, the findings of modern anthropological research on the last surviving hunter-gatherers of the Kalahari, and an intense reworking of the nineteenth-century ethnography, recorded mainly by the Bleek family from surviving hunter-gatherers of the Cape Province.[1]

There is little direct link between the ethnography, both nineteenth- and twentieth-century, and the rock art. Precious little is recorded on what the communities who actually created the rock art thought about it. In fact most of the ethnography has come from areas where there is little or no rock art, while the best-known art is from areas where little or no ethnography was recorded before the demise of hunter-gatherers. It has therefore been difficult to understand the art and the motivation behind it. The extensive nineteenth-century records were largely incomprehensible (they were relegated to the category of mythology) until recent anthropological studies shed light on the cosmology of surviving Kalahari hunter-gatherers.

Central to the new paradigm is the role of shamanistic religion, now known to have characterized Khoisan

1. The first major works in this new paradigm of research were Patricia Vinnicombe, *People of the Eland: Rock Paintings of the Drakensberg Bushmen as a Reflection of Their Life and Thought* (Pietermaritzburg: University of Natal Press, 1976), and J. David Lewis-Williams, *Believing and Seeing: Symbolic Meanings in Southern San Rock Paintings* (London: Academic Press, 1981). There is now an extensive literature, particularly by Lewis-Williams and his students and colleagues.

hunter-gatherer societies. The art is considered to reflect this religion to a large extent, including the mystical experiences and visions of the shaman during trance ceremonies. This interpretation would clearly deny the art an essentially cartographic nature unless cartography is defined broadly to include cosmographical subjects.

An earlier generation of rock art researchers, mainly amateurs with a great deal of field experience in finding and recording rock art, did consider a few examples of the art as depicting landscape features. In general these researchers were operating within a nontheoretical paradigm developed between the 1950s and 1970s in reaction to the hyperdiffusionism of Henri Breuil and others who saw southern African art as the creation of offshoots from Mediterranean "civilizations."[2] Examples where the rather literal interpretations of this approach have given way to more complex interpretations in keeping with the shamanistic paradigm are included below (see plate 1 and fig. 2.4). Although the current climate of interpretation would therefore argue against elements of the art representing actual landscape features, there are certain aspects that appear to be involved with spatial understanding at a cosmological level, and these will be discussed below.

In addition to the Stone Age culture, two other lifestyles reached southern Africa within the past two thousand years, before the advent of European colonialism. Pastoralists of Khoisan origin occupied parts of the drier west and southwest, while Bantu-speaking agriculturists with a metal technology covered the east wherever rainfall was adequate for crop production. Archaeologists are still not in agreement on whether the pastoralists contributed anything at all to rock art. The categories of images most likely to have been done by pastoralists—handprints and dot patterns—currently are not interpreted spatially, so this category of the art need not concern us here. Rock art by the agriculturists, however, though still little known and researched, has a dominant cartographic theme and therefore needs to be covered in some detail.

Some paintings, notably of the "late white" series, are attributed to agriculturist societies. These images, widespread in southern Africa and as far north as Tanzania, are the work of many different communities but are linked by being mostly white or yellow-white finger paintings with a major human and animal theme.[3] However, the more common images associated with agriculturist communities, and those that are predominantly of a cartographic nature, are pecked or scratched engravings done on exposed rock outcrops close to the archaeological remains of settlements of these people. The close proximity of the buildings to the engravings, and the fact that they reflect the same ground plan, allows for detailed comparison as well as dating. Because the settlement patterns are those that characterized these communities in the past few centuries before the imposition of colonial rule, we are able to place most engravings in the past five hundred years, although the arrival of agriculturists in southern Africa is dated more than a thousand years earlier.

The hunter-gatherer art, widely scattered in many thousands of sites, is a rich graphic resource, though in the present context there are only a few elements relevant to cartography. On the other hand, the agriculturist engravings, much rarer and limited to a few areas, are centrally concerned with understanding the spatial elements of major importance to the community.

The Hunter-Gatherer Art

This art is essentially figurative in content; the vast majority of images represent humans, animals, or therianthropes (figures combining human and animal characteristics). In earlier decades of research, a few claims were made that individual examples of rock art might be a form of map.[4] These were usually compositions with lines sometimes linking other motifs, including figures. Authors writing before about 1980 tended to regard these lines as paths or rivers. Within the current shamanistic framework of interpretation, however, such compositions would be regarded as more metaphysical than physical in nature.

This shift in interpretation is well illustrated by the scene known as "Fight and Flight," from Clanwilliam in the western Cape (plate 1). In 1979 this was considered to be a straightforward depiction of a fight between two hunter-gatherer groups, one trapped in a rock-shelter from which a few individuals had managed to escape, their routes being shown as lines.[5] By 1990 several discrepancies in this interpretation were noted. For example, one of the peripheral figures holds a coil of the line, indicating it represents something less conventional than a footpath. Furthermore, the line the attackers stand on joins up with the bow and head of one of the other group. Recent reviewers point to ethnographic evidence that in the hunter-gatherer religion healing was regarded

2. See, for example, Henri Breuil, *The White Lady of Brandberg*, rev. ed., vol. 1 of *The Rock Paintings of Southern Africa* (Paris: Trianon Press, 1966), esp. 9–15.

3. Frans E. Prins and Sian Hall, "Expressions of Fertility in the Rock Art of Bantu-Speaking Agriculturists," *African Archaeological Review* 12 (1994): 171–203.

4. Some examples can be found in Harald L. Pager, *Ndedema: A Documentation of the Rock Paintings of the Ndedema Gorge* (Graz: Akademische Druck- u. Verlagsanstalt, 1971), esp. 325–26 and fig. 212, and D. Neil Lee and H. C. Woodhouse, *Art on the Rocks of Southern Africa* (Cape Town: Purnell, 1970), esp. 139–48.

5. R. Townley Johnson, *Major Rock Paintings of Southern Africa: Facsimile Reproductions*, ed. T. M. O'C. [Tim] Maggs (Cape Town: D. Philip, 1979), 63–64 and pl. 67.

FIG. 2.2. PORTION OF BAMBOO MOUNTAIN PANEL. This is an elaborate scene of mounted hunter-gatherers returning to their camp. The panel's left side, illustrated here, covers the camp, which is depicted in a realistic way. To the left, however, are a mystical rain animal and four humans that have shamanistic attributes (forward-bent posture, bleeding noses, raised hair, fly whisks). The scene is therefore not just a record of an actual event. Original from the southern Natal Drakensberg, painted panels removed in sections to the Natal Museum, Pietermaritzburg, in 1910.
Length of entire panel: 250 cm. By permission of the Natal Museum, Pietermaritzburg (site no. 29929CB 44; acc. nos. A2a, A2b, A2c, A3, A4; detail 1980/94/24).

as a fight, often involving arrows, between evil spirits and the shaman in trance. In this painting, the figure to the left of the central set is impaled by five white arrows, each having an exaggerated notch with a red dash below it, a feature not found on the arrows used by these people. The painting is now seen as dealing with concepts of trance performance and mystical potency rather than a physical conflict.[6]

Having said this, we can still recognize elements of spatial patterning in the composition, even though the current interpretation would place this in metaphysical rather than physical space. A topographical feature, the rock-shelter, is represented. The artist carefully selected a natural hollow in the rock face to represent the shelter, then outlined the hollow with a broad stripe of paint, an unusual combination of graphic and relief techniques. Although it might be controversial to classify this painting as a cosmographical map, elements of such are certainly present.

Several compositions include spatial elements of activities such as dancing, hunting, and honey collecting (scenes with ladders, forms interpreted as honeycombs, and dots representing bees).[7] The last period of the art in the Natal Drakensberg range, dated to the mid-nineteenth century by the presence of horses and guns, includes detailed scenes of activity. This was a period of extreme stress when the last hunter-gatherers of the mountains were reacting to colonial expansion by raiding settlers' livestock. Figure 2.2 shows an encampment with women and children and is a detail from a larger panel where riders are driving presumably stolen horses and cattle toward the camp.[8] This type of composition is perhaps the closest to a geographical map that can be found in the hunter-gatherer art. Yet even in this scene there are elements that show it is at least partly concerned with cosmological rather than geographical space. Just to the left of the encampment is a large hippopotamus-like creature, interpreted as a rain animal, being led toward thecamp by four humans; a mystical activity performed by shamans in trance.

Other types of composition in which lines play a major role have been similarly interpreted in recent years. A thin red line often flanked by white dots links a variety of figures in some of the most complex compositions among the South African paintings, such as the Linton panel.[9] In these compositions the figures include humans, some with animal (particularly antelope) features such as hoofs, as well as animals. Most important among the latter are the eland, which the hunter-gatherers believed was a particularly powerful source of the mystical potency the shaman needed to carry out his spiritual duties in trance.

Lewis-Williams has argued that "whatever the specific meaning of the line and its dots, it clearly links depictions throughout the panel. Even though the panel is not a coherent, recognizable 'scene,' it is a conceptual unity bringing together the real world of daily life and the spirit

6. J. David Lewis-Williams and Thomas A. Dowson, "Through the Veil: San Rock Paintings and the Rock Face," *South African Archaeological Bulletin* 45 (1990): 5–16, esp. 5–6, and Royden Yates, John Parkington, and Tony Manhire, *Pictures from the Past: A History of the Interpretation of Rock Paintings and Engravings of Southern Africa* (Pietermaritzburg: Centaur, 1990), 52.

7. Aron David Mazel, "Distribution of Painting Themes in the Natal Drakensberg," *Annals of the Natal Museum* 25 (1982): 67–82, and Harald L. Pager, "The Magico-religious Importance of Bees and Honey for the Rock Painters and Bushmen of Southern Africa," *South African Bee Journal* 46 (1974): 6–9.

8. Vinnicombe, *People of the Eland*, 43–44 and figs. 24–26 (note 1).

9. J. David Lewis-Williams, *The World of Man and the World of Spirit: An Interpretation of the Linton Rock Paintings* (Cape Town: South African Museum, 1988), 2, 12–13. This important panel was removed from the Eastern Cape Drakensberg and is housed in the South African Museum, Cape Town.

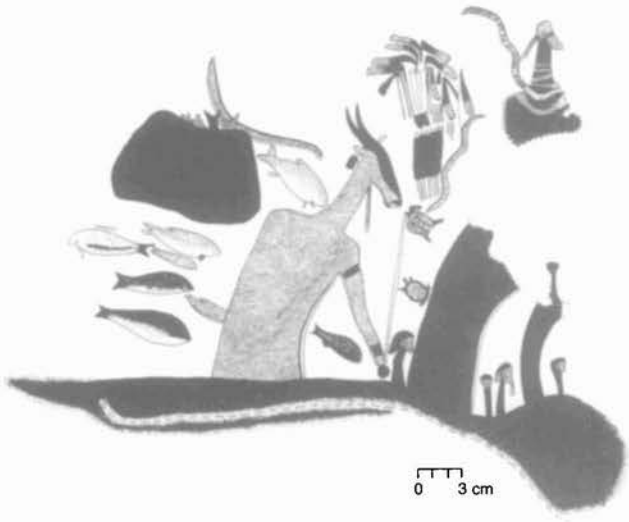


FIG. 2.3. ROCK SURFACE AS CONTEXT. Example of several figures emerging from a natural crack in the rock that has been outlined in black paint. Other aspects linked to trance include the antelope-headed human, bleeding nose, fly whisks at top, and water creatures symbolic of the cold, underwater sensation felt by the shaman in trance.
Eastern Cape Drakensberg. From J. David Lewis-Williams and Thomas A. Dowson, "Through the Veil: San Rock Paintings and the Rock Face," *South African Archaeological Bulletin* 45 (1990): 5–16, esp. 8 (fig. 3A). By permission of the San Heritage Centre, University of the Witwatersrand, Johannesburg.

FIG. 2.4. PAINTING WITH TREES AND OVALS. This detail of the left half of a large composition shows a combination of trees, ovals, and streams of flecks with figures and an animal hide. Current research interpretation argues against the earlier landscape interpretation, suggesting instead that this painting is concerned with mystical potency. Watercolor copy by Elizabeth Goodall, based on a tracing of the original wall painting.
Size of the entire original: 122.5 × 227.5 cm. Robert McIlwaine National Park, Lake Chivero, Zimbabwe. From Elizabeth Goodall, "Rock Paintings of Mashonaland," in *Prehistoric Rock Art of the Federation of Rhodesia and Nyasaland,* ed. Roger Summers (Salisbury, Southern Rhodesia: National Publications Trust, 1959), 3–111, esp. pl. 8 (p. 17). By permission of the National Museums and Monuments, Harare.

world that shamans enter through the activation of potency."[10] These rock art panels were not composed like Western illustrations but appear to have accumulated over time with additions by subsequent artists. "A complex panel is the distillation of many religious experiences and insights."[11]

Another cosmological aspect of space that is evidently featured in certain types of rock paintings concerns the "route" the shaman takes during trance. The sensations accompanying trance typically include coldness, looking down a tunnel or vortex, and hallucinations about the scale of oneself and one's surroundings, as well as corporeal detachment and out-of-body travel. The shaman may feel that he is traveling underwater or underground through a tunnel in the rock to reach the spirit world. Lewis-Williams and Dowson have argued that the rock-shelter's walls, with their paintings, were in a sense a "painted veil" the shaman felt he passed through during trance.[12] This sensation may be illustrated by paintings that make use of natural cracks, hollows, and other irregularities in the rock face. Such paintings often show figures, or even rows of figures, emerging from or entering the rock through such features (fig. 2.3). The figures may be human or animal and in some are an amalgam of different creatures such as the therianthropic eland-headed human, reflecting the shaman's belief that he could become an animal in trance, or serpents with ears and tusks that weave in and out of the rock face. Such paintings, which incorporate natural features of the rock, are widespread in South Africa. In a cartographic context, it is significant that the artists could, and on occasion did, incorporate natural facets of the rock canvas to represent "landscape" features, even though this was a cosmic rather than a natural landscape.

The rock paintings of Zimbabwe are generally accepted today as broadly reflecting the same hunter-gatherer cosmology as the art farther south. They do, however, differ from the southern paintings in that they have several elements that were for many years interpreted as landscape features. Cloudlike or linear arrangements of flecks were seen as vegetation or water, while oval forms tightly nested

10. Lewis-Williams, *World of Man,* 13. See also Thomas A. Dowson, "New Light on the 'Thin Red Line': Neuropsychology and Ethnography" (B.Sc. honors thesis, University of Witwatersrand, 1988).

11. Lewis-Williams, *World of Man,* 13.

12. Lewis-Williams and Dowson, "Through the Veil" (note 6).

together like sausages in a packet were seen as boulders on the granite hills so characteristic of Zimbabwe's rock art regions.[13] Figure 2.4 is part of a large painted panel on two sides of a boulder that incorporates these elements as well as trees and human and animal figures, making it easy to interpret as a scene of figures in a natural landscape. The trunk of one tree even bends around the top of an oval as if this were indeed a boulder.

Yet researchers are far from unanimous about the interpretation of these features. One recent suggestion is that the clustered ovals may represent the spatial divisions or exploitation territories associated with hunter-gatherer bands as known today from the Kalahari. If this is accepted, then the oval compositions would indeed be maps, even though the suggestion is that "these images are elaborations of exploitation territories, and have become metaphorical 'maps' of journeys made by trancers in states of altered consciousness."[14]

The principal current researcher on Zimbabwe rock art, Peter Garlake, however, dismisses a landscape interpretation for these characteristic features. He argues that both ovals and flecks represent not so much aspects of visual reality as different aspects of mystical potency. He sees a system within the paintings where the oval compositions are the key symbol representing the seat of potency. These are linked with the flowing shapes of flecks, which indeed often emerge from ovals, flowing toward and around other compositions. They are particularly associated with trees but cannot be interpreted merely as leaves. The flecks "seem to be a means of delineating a force that permeates nature and landscape."[15] Such compositions are not landscapes, but like the other aspects of hunter-gatherer art mentioned above, they appear to give graphic and spatial dimensions to cosmological concepts.

The Agriculturist Engravings

Unlike the hunter-gatherers, whose cosmology has only recently begun to be understood by academics, the agriculturist societies of southern Africa have been intensively studied since the late nineteenth century, and they are covered by an extensive literature. Whereas the hunter-gatherer way of life has been extinguished in all but the dry Kalahari region, most of southern Africa's population today is descended from the earlier agriculturist communities. It is therefore ironic that while the hunter-gatherer art is internationally well known, that of the agriculturists has seen little research until the past few years.

The practice of engraving is not generally considered to have been a feature of these Bantu-speaking communities, and therefore there is little direct ethnographic information on the images and the context in which they were made. Most of our understanding of them must be reconstructed by comparing them with other archaeological evidence and examining the social fabric of these societies as it is known from anthropological research. Our recent experience in the field has been that, although local people often recognize the images as representing the kinds of homesteads their ancestors lived in, they have no personal knowledge about who made them or why. The only specific case on record is from the Erskine site, near Muden in Natal, where in 1956 an archaeologist found two boys making and playing with engraved homestead plans. These boys, about six and eight years old, used larger and smaller pebbles, representing cattle and calves, which they moved in and out of the stock pens of the engraved buildings like counters in a board game. Their father said he had made similar engravings as a child, and that even then there were older generations of engravings on this site.[16]

Agriculturist engravings are far more restricted in distribution than hunter-gatherer art. For a start, they are limited to the eastern half of the subcontinent where there is enough summer rain to grow the tropical crops that were the staple food of these communities. But even within this region, the engravings are limited to particular areas, often quite small, as the distribution is known at present, and sometimes widely separated (fig. 2.5). Even at this early stage of research, it is apparent that these areas share two features that seem to be essential to the occurrence of such engravings. First, they are all characterized by grassland vegetation or are in savanna marginal to grassland. Second, they occur only near precolonial stone structures.

Broadly speaking, there are two contexts in southern Africa where agriculturist communities built extensively in stone. Stone walls occur on sites of the Great Zimbabwe tradition, where they were used to enhance the status and prestige of the ruling Shona aristocracy. This type of building is not reflected in the engravings. More common and widespread is the use of stone as an ordinary building material by smaller-scale, subsistence agriculturist communities. Earlier agriculturists remained

13. See Leo Frobenius, *Madsimu Dsangara: Südafrikanische Felsbilderchronik*, 2 vols. (1931; reprinted with new material, Graz: Akademische Druck- u. Verlagsanstalt, 1962), 1:16, 23–25 and related figures, and Elizabeth Goodall, "Rock Paintings of Mashonaland," in *Prehistoric Rock Art of the Federation of Rhodesia and Nyasaland*, ed. Roger Summers (Salisbury, Southern Rhodesia: National Publications Trust, 1959), 3–111, esp. 60–76.

14. Andrew B. Smith, "Metaphors of Space: Rock Art and Territoriality in Southern Africa," in *Contested Images: Diversity in Southern African Rock Art Research*, ed. Thomas A. Dowson and J. David Lewis-Williams (Johannesburg: Witwatersrand University Press, 1994), 373–84, esp. 384.

15. Peter S. Garlake, *The Hunter's Vision: The Prehistoric Art of Zimbabwe* (Seattle: University of Washington Press, 1995), 105.

16. B. D. Malan, "Old and New Rock Engravings in Natal, South Africa: A Zulu Game," *Antiquity* 31 (1957): 153–54.

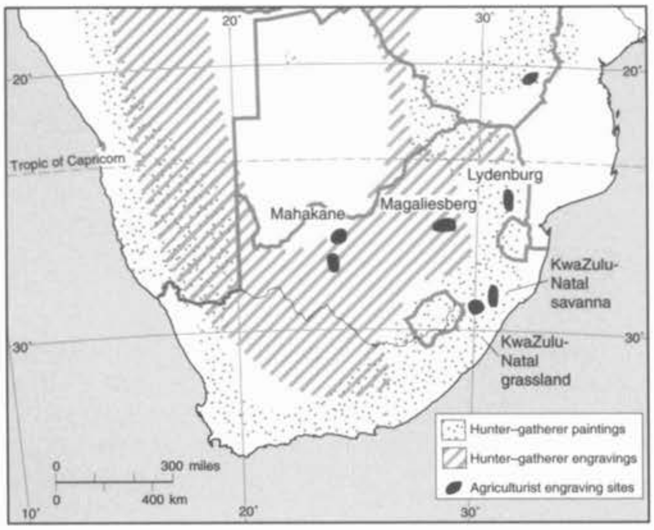


FIG. 2.5. ROCK ART DISTRIBUTION IN SOUTHERN AFRICA. This map illustrates the main areas of hunter-gatherer paintings and engravings in southern Africa, as well as areas where substantial numbers of agriculturist engravings have so far been recorded. Several other sites are known in addition to those marked here, and so this type of art is probably much more widely distributed. For example, several apparent homestead engravings from eastern Zimbabwe may well be of this type.

essentially in savanna areas where timber was plentiful and could be used as a building material. In later centuries, and particularly after about A.D. 1500, expansion took place into grassland areas where little or no timber was available, and therefore stone became an important substitute building material. Higher population densities in some savanna areas bordering on grasslands also led to the adoption of stone at this time, presumably because timber became scarce. These marginal savannas tend to support a low density of woody vegetation and are easily converted to grassland with heavy exploitation.

Local building styles reflecting cultural differences were translated from softer materials into stone, with their distinctive architectural patterns retained. In some cases it was only the stock pens that came to be built in stone. Other communities took to building complex courtyard patterns and walled roads, and some went as far as building hemispherical, corbelled stone huts.[17]

It is with this building in stone that the engravings are inextricably linked. Some communities of stone builders took to engraving, and present evidence suggests that none who continued to use the softer materials of earlier centuries engraved. The known engravings are all within a few hundred meters of ruined stone walls, and some are even on rocks incorporated into walls.[18]

This intimate link between engraving and building stone walls has led to the suggestion that building in stone provided a stimulus for engraving, perhaps because the

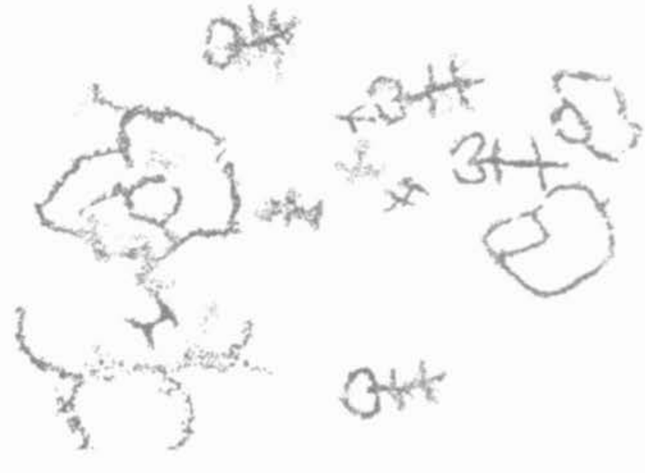


FIG. 2.6. ENGRAVING FROM MAHAKANE, NORTHERN CAPE. This engraving is one of the very few that represents livestock (in this case horned cattle) associated with the ground plans of buildings. The stylized, overhead view of the animals is also unusual.
By permission of Tim Maggs.

stone went through several processes before the wall was complete.[19] It sometimes had to be quarried, then it had to be carried to the building site, piled up, and carefully placed in a suitable position on the wall under construction. The patinated surfaces of the stones inevitably sustained bruises and scratches that show as prominent pale markings against the darker weathered surfaces. Some individuals, particularly children, might have experimented by making deliberate peck or scratch marks and patterns in this readily available and nonresistant graphic medium.

This procedure may help explain why engraving developed in widely separated areas of southern Africa about the time that stone became a major building material, but it does not explain the nature of the engravings themselves. For this we need to examine their subject matter and the societies in which they were created.

Like the mid-twentieth-century boys at Muden, the en-

17. T. M. O'C. Maggs, *Iron Age Communities of the Southern Highveld* (Pietermaritzburg: Council of the Natal Museum, 1976).

18. R. H. Steel, *Late Iron Age Rock Engravings of Settlement Plans, Shields, Goats and Human Figures: Rock Engravings Associated with Late Iron Age Settlements of Olifantspoort Site 20/71 circa A.D. 1500–1800, Rustenburg District, TVL (Sites 77/71 and 78/71)* (Johannesburg: University of the Witwatersrand Archaeological Research Unit, 1988), esp. 1–2 and figs. 2 and 3; Revil J. Mason, *Origins of Black People of Johannesburg and the Southern Western Central Transvaal, AD 350–1880* (Johannesburg: R. J. Mason, 1986), esp. 477–78; and T. M. O'C. Maggs, "Neglected Rock Art: The Rock Engravings of Agriculturist Communities in South Africa," *South African Archaeological Bulletin* 50 (1995): 132–42.

19. T. M. O'C. Maggs and Val Ward, "Rock Engravings by Agriculturist Communities in Savanna Areas of the Thukela Basin," *Natal Museum Journal of Humanities* 7 (1995): 17–40, esp. 19.

FIG. 2.7. CLASSIC ZULU HOMESTEAD. A downhill entrance and the presence of an outer wall or fence (*itango*), as well as a central cattle pen surrounded by huts, identify this nineteenth-century drawing as representing a classic Zulu homestead.
From Josiah Tyler, *Forty Years among the Zulus* (Boston: Congregational Sunday-School and Publishing Society, 1891), facing 41.

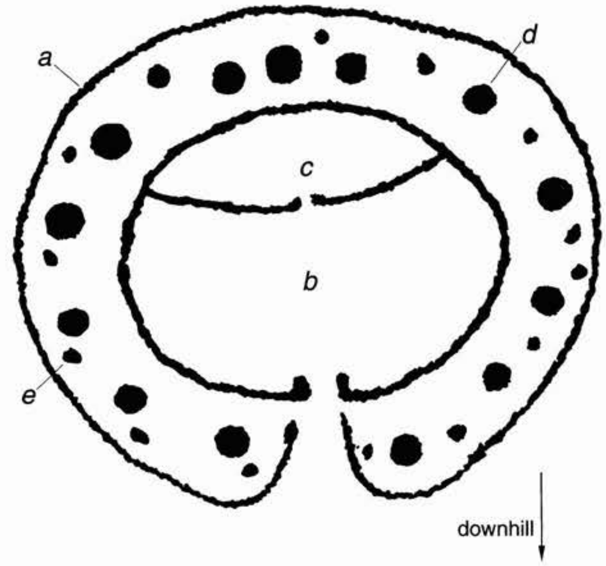


FIG. 2.8. ENGRAVING OF ZULU HOMESTEAD FROM ERSKINE. Engravings from KwaZulu-Natal savanna areas such as this one illustrate several features of the Zulu homestead: (a) the outer wall (*itango*); (b) cattle pen with downhill entrance; (c) calf pen built at the uphill end of the cattle pen; (d) huts circumscribing the cattle pen; (e) granaries (*nqolobane*) beside or behind the huts of married women.
After T. M. O'C. Maggs, "Neglected Rock Art: The Rock Engravings of Agriculturist Communities in South Africa," *South African Archaeological Bulletin* 50 (1995): 132–42, esp. fig. 4 (p. 135).

gravers generally concentrated on roughly pecking out the ground plans of homesteads. Very seldom were these elaborated with figures of the humans and domesticated animals that lived in them. The only recorded site whose engravings include numbers of animals is in the Mahakane area of the northern Cape. Among these are some highly stylized cattle seen from above and placed among images of buildings (fig. 2.6). In none of the known areas was it the custom to combine details such as figures or buildings viewed in elevation with the plans of settlements–a practice found widely among cartographic-type images from subsistence agriculturists in other parts of the world.[20] Indeed the only recorded buildings in elevation are from one site near Lydenburg, eastern Transvaal, where there are examples of concentric semicircles that represent hemispherical huts.[21]

The ground plan images range in complexity from simple circular forms to detailed representations of particular styles and, in some areas, clusters of homesteads.[22] The circle is the basis of agriculturist settlement patterns comprising the primary structures of cattle pen and domicile or hut (fig. 2.7). Other structures, including divisions of these two or courtyards, tend to have curved walls, often abutting a primary structure. Rectangular forms were introduced only through colonial and missionary contact, so engraved rectangular plans can be dated after the nineteenth-century arrival of such influence.

Regional building styles largely influence the more detailed engravings. In the KwaZulu-Natal region, where stone walls were used only for the cattle pen central to each family homestead, most images are simple circles. In the lower-lying, marginal savanna areas, where the Zulu homestead pattern was the norm, engraved pens tend to have their entrances facing down the slope of the rock face to reflect the strict downhill orientation of these homesteads (fig. 2.8). In neighboring grassland areas, where the archaeological evidence shows just as strict an

20. Catherine Delano Smith, "Cartography in the Prehistoric Period in the Old World: Europe, the Middle East, and North Africa," 1:54–101, esp. 66–67 and fig. 4.8, and idem, "Prehistoric Cartography in Asia," vol. 2.2 (1994): 1–22, esp. 6, both in *The History of Cartography*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–).

21. Egbert Cornelis Nicolaas van Hoepen, "A Pre-European Bantu Culture in the Lydenburg District," *Argeologiese Navorsing van die Nasionale Museum* 2 (1939): 47–74, esp. 70 and 73.

22. I use the term "homestead" in preference to "house" to denote the basic residential unit of an agriculturist family. This was most often a circular cattle pen with a small opening, surrounded by huts.

FIG. 2.9. KWAZULU-NATAL STONE SETTLEMENT RUINS. This aerial photograph shows a large stone settlement from about the eighteenth century with a row of nine cattle pens opening uphill. The settlement is surrounded by a wide ring of paved hut floors and other features.
Size of the settlement (including houses and stores not shown here): ca. 150 × 235 m; size of the row of circular stone ruins: ca. 16 × 140 m. Mgoduyanuka, Bergville District, KwaZulu-Natal. Photograph by the University of Natal, Department of Survey, Flight 220/1/161. By permission of the Natal Museum, Pietermaritzburg (site no. 2829CB 6).

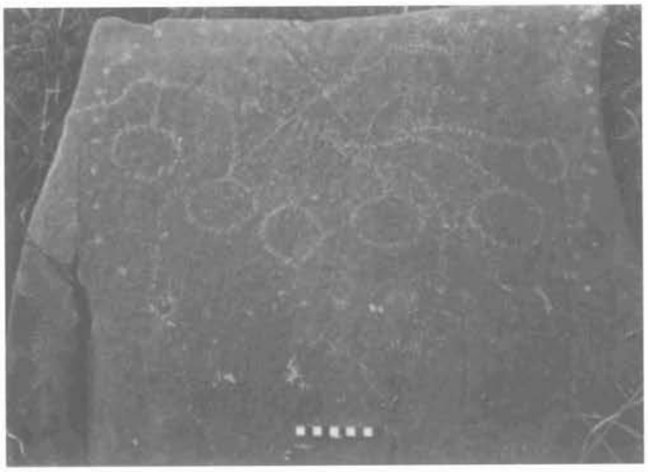


FIG. 2.10. KWAZULU-NATAL ROCK ENGRAVING. This is an engraving of a large homestead with six cattle pens opening up the slope of the rock, linked by paths and ringed by huts.
Width of the engraved rock: ca. 76 cm. Hattingvlakte, KwaZulu-Natal. By permission of the Natal Museum, Pietermaritzburg (site no. 2829DD 19; acc. no. 1988/1/5).

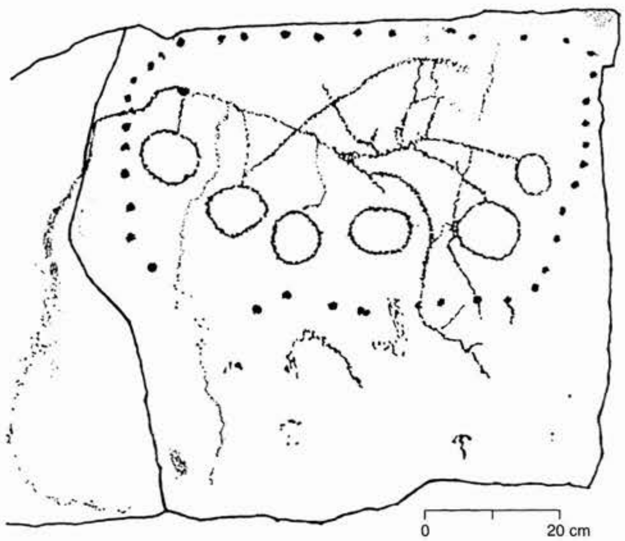


FIG. 2.11. LINE DRAWING OF KWAZULU-NATAL ROCK ENGRAVING (FIG. 2.10).
By permission of Tim Maggs.

uphill entrance orientation of the stone pens, the engravings likewise have entrances facing up the rock face.[23]

Sometimes the entrances have paths leading from them, then curving down the sides of the rock until they reach the ground, as if the path leads to a watering point for the cattle on the valley bottom. Both the entrance orientation and the paths indicate that the engravers perceive the rock canvas as a three-dimensional model of the landscape. Southern Bantu-speaking people have favored relatively elevated settlement locations on hilltops, spurs, or level plateaus on the sides of valleys for nearly a thousand years, rather than building in valley bottoms like their ancestors of the first millennium A.D. This cultural attachment to prominent landscape features, which appears to be part of the belief system rather than the result of practical necessity, has allowed engravers to exploit the natural shape of the rock to express their ideal location for habitation sites. This is true not only of the Nguni-speaking communities that made the engravings in KwaZulu-Natal, but also the Sotho-speaking communities of engravers farther north.[24]

In the most complex settlement pattern known from precolonial KwaZulu-Natal stone ruins, several homesteads were apparently amalgamated, creating a row of up to nine cattle pens placed along the contour of a hill slope (fig. 2.9), with an oval ring of huts and smaller structures around them. Although this domestic pattern is not reflected in the ethnographic record (it became extinct about the beginning of the nineteenth century), it is accurately preserved in the rock engravings. Figure 2.10 shows a detailed engraving that includes the network of cattle paths emerging from the uphill entrances, joining one another, cutting through the surrounding ring of huts, and descending the slope of the rock as if going to a valley bottom stream (compare fig. 2.11).

Relatively few engraved compositions cover areas larger than a single homestead, but there are examples where several homesteads are linked by paths. Such cases

23. Maggs and Ward, "Rock Engravings by Agriculturist Communities," esp. 23–25 (note 19), and Maggs, "Neglected Rock Art," 135–36 (note 18).

24. Maggs, "Neglected Rock Art," 140–41.

FIG. 2.12. NATURAL SURFACE OF ROCK AS TOPOGRAPHY. The engraver has used the natural occurrence of a smaller rock on top of a larger flat one to illustrate a group of homesteads, positioned on the lower, gentler slopes of a hill and linked by paths.
Size of the engraved rock: ca. 132 × 124 cm. Harmonie, KwaZulu-Natal. By permission of the Natal Museum, Pietermaritzburg (site, no. 2829DC 21; acc. no. 1994/5/34).

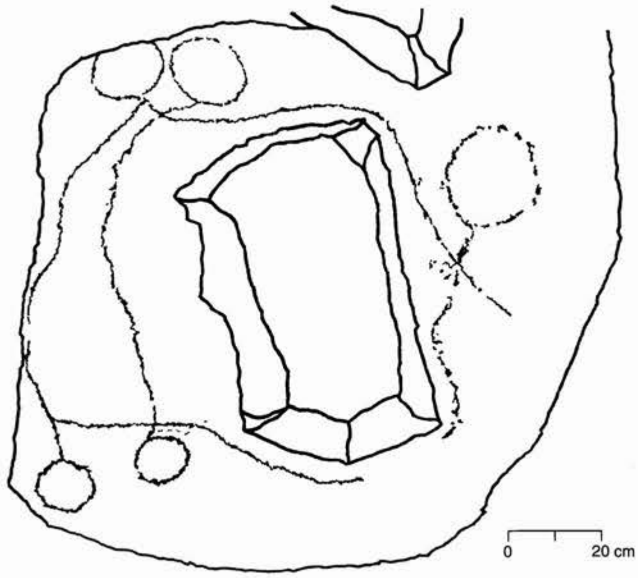


FIG. 2.13. LINE DRAWING OF THE NATURAL SURFACE OF ROCK AS TOPOGRAPHY (FIG. 2.12).
By permission of Tim Maggs.

make particular use of the chosen rock surface, treating its natural features as models of topography. Figure 2.12 is an extreme example where a small cuboidal rock sitting on a larger flat rock provides a model of a steep hill with gentler lower slopes surrounding it (compare fig. 2.13). The engraver has placed circular homesteads on this surface, linking them with a network of paths.

Today among many Nguni-speaking rural communities (including Zulu) there is a tendency for homesteads to form loose clusters in the landscape. These groups are typically kinship based, the male heads of each household being closely related. This agnatic clustering is almost certainly reflected in the archaeological record, where both stone ruins and engravings show groups of homesteads.[25]

Although precolonial Nguni societies had clearly developed concepts of geographical units larger than the homestead cluster, including a nested series of political units up to the total kingdom, there is as yet little evidence of any graphic representation of such units. An engraving such as figure 2.14, where sinuous lines extend over three adjacent boulders (see also fig. 2.15), might be an attempt to illustrate a district with the cattle paths converging on a focal point, which could be the local political leader's homestead. But such interpretation is little more than speculation.

Farther north, in the Magaliesberg and northern Cape, engravings reflect the Tswana pattern of settlements still in use during the nineteenth century. Habitation was far more concentrated in these communities, where there were towns of up to twenty thousand inhabitants. Such towns were made up of a number of wards, each a ring of courtyard dwellings around a central cluster of stockpens. The engravings associated with these settlements show only one or two such wards, however, rather than the large aggregations that characterized major political units.[26]

In the Lydenburg area of the eastern Transvaal, extensive stone settlements were built by communities identified as northern Sotho based on ceramics and oral tradition. Numerous circular homesteads, up to one hundred in a settlement, were linked with stone-walled roads and surrounded by stone agricultural terraces. Situated on hills or spurs, some settlements extended at least three kilometers. Again, most of the associated engravings show only a single homestead or a small group, but several are more extensive. The largest examples cover whole boulders several meters in extent, with up to forty homesteads and complex networks of linking roads (fig. 2.16). These are both the largest and the most complex agriculturist engravings yet recorded from the region, but they are clearly of the same genre as the others (see figs. 2.10, 2.12, and 2.14 above). In terms of cartographic coverage, there is again no indication of an attempt to represent a

25. W. D. Hammond-Tooke, "In Search of the Lineage: The Cape Nguni Case," *Man*, n.s. 19 (1984): 77–93, and T. M. O'C. Maggs et al., "Spatial Parameters of Late Iron Age Settlements in the Upper Thukela Valley," *Annals of the Natal Museum* 27 (1985–86): 455–79.

26. Compare Steel, *Rock Engravings*, fig. 13, with Mason, *Origins of Black People*, 359, fig. 149a (both note 18); see also Maggs, "Neglected Rock Art," figs. 12 and 13 (p. 137) (note 18).

FIG. 2.14. MEANDERING PATTERN OF LINES ACROSS THREE BOULDERS. Since lines normally denote cattle paths in agriculturist engravings and at least one circle is included, the composition may depict paths crossing three hills.
Size of the three adjacent rocks: ca. 320 × 210 cm. Ngudlantaba 1, KwaZulu-Natal. By permission of the Natal Museum, Pietermaritzburg (site no. 2829DD 59; 1994/5/10).

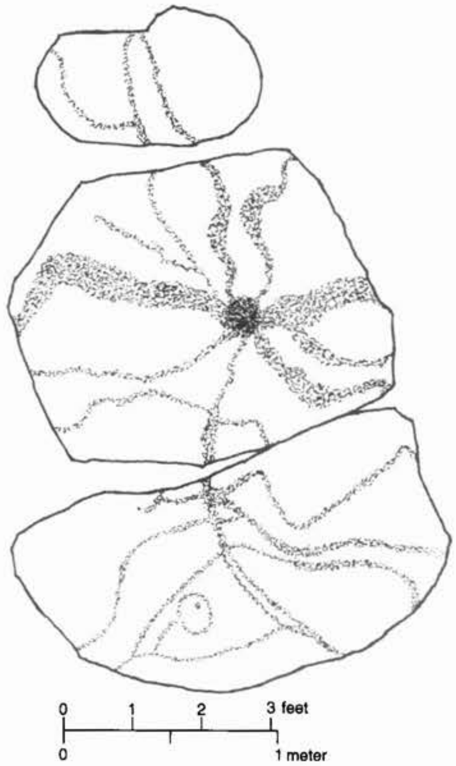


FIG. 2.15. LINE DRAWING OF MEANDERING PATTERN OF LINES ACROSS THREE BOULDERS (FIG. 2.14).
By permission of Tim Maggs.

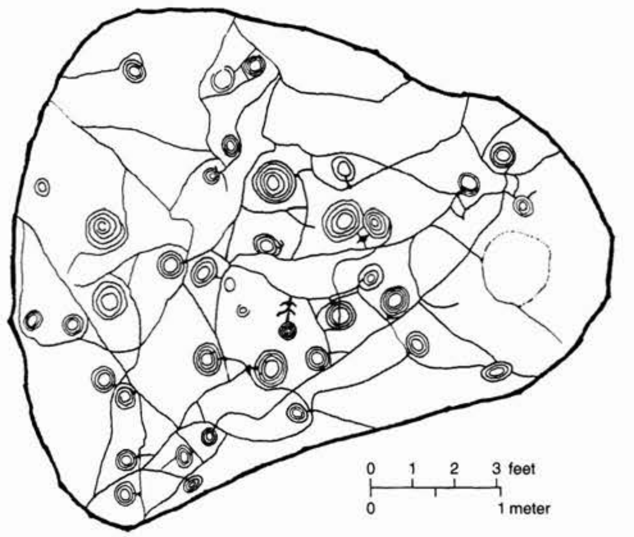


FIG. 2.16. LYDENBURG DISTRICT AGRICULTURIST ENGRAVING. This boulder is covered with engravings of circular homesteads and linking roads, some of which extend to where the boulder meets the ground, as if the paths were going down to a valley bottom stream. Such examples represent three-dimensional models of the large local settlements, each on its own hill.
Size of original: ca. 4.5 × 4 m. Lydenburg District, eastern Transvaal. By permission of Tim Maggs.

spatial concept wider than the single settlement (albeit a large one) on a hill.

Although in each of the areas described above individual images reflect the style of building in some detail, the engravings are not accurate representations of particular buildings. This is clearly seen in the larger compositions, where the irregularities of the specific rock surface provide a ready-made model of a hill on which the images were placed (fig. 2.17). Homesteads and paths were postioned as they might be on an actual hill, yet the whole composition does not resemble one of the neighboring settlements more than another. The engravings are in effect simplified and idealized images of the built environment rather than actual plans.

Engravings differ consistently from real buildings in another important respect: they neglect those aspects of the settlement associated with women and their economic role. In these southern Bantu-speaking societies, the female sphere was concerned with crop production and the domestic outer circumference of the homestead, whereas the male sphere related to livestock, especially cattle, which occupied the center of the homestead. Field systems, even those defined by stone terraces, are apparently absent from the engravings. The all-important granaries appear in only a few KwaZulu-Natal images, and even the domestic huts are shown in only a few cases (see fig. 2.8 above). By contrast, the cattle pens and the paths or walled roads used by cattle are the focus of most engravings.[27] Returning to the case of the two young en-

27. Maggs, "Neglected Rock Art," esp. 139–40 (note 18), and Maggs and Ward, "Rock Engravings by Agriculturalist Communities,"

gravers at Muden, we may conclude that engraving was essentially pursued by males, and perhaps by youthful males.

Why should young males, or indeed any category of people in this kind of society, be so concerned with images of their built environment? To understand this we need to examine the cosmology of these societies, which were strongly patrilineal and had complex kinship systems. The family cattle herd not only was of economic importance but symbolized the family itself, including deceased generations. Mediation with the spiritual world was through the deceased male ancestors of the household head. The social and religious order was strongly reflected in the layout of each homestead, which therefore served as a map of both the physical and the cosmological structure of the community living there. In this context an image of the settlement pattern, especially an idealized representation, would be the best possible way to express in graphic terms the cosmology of the engraver.

Conclusion

Rock art studies in southern Africa have so far given little consideration to cartographic representation or content. At the present stage of research it seems there are no images that can be classified as terrestrial maps in the sense that they represent an actual part of the land surface. There are also no substantial claims that any rock art can be interpreted as celestial maps.

This is not to suggest that the concept of representing actual spatial arrangements of things and features of the landscape in graphic form was completely unknown in these communities. It seems that the ability to create ad hoc sketch maps on the ground was practically universal and was certainly familiar to people of this region. Likewise, a nineteenth-century hunter-gatherer was able to provide the information for the ethnographer W. H. I. Bleek to create a reasonably accurate map of the informant's home territory.[28]

The rock art of hunter-gatherers and agriculturists in southern Africa had very different concerns, but both were expressions of their communities' cosmology. Natural landscape evidently played a negligible part in the hunter-gatherer art. Where spatial understanding appears to have influenced composition, it is a metaphysical rather than physical space: the realm of the shaman in trance during communal ceremony.

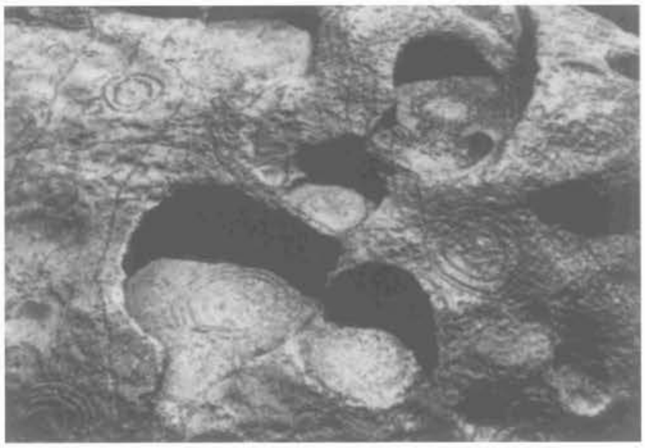


FIG. 2.17. ROCK ENGRAVING REFLECTS TOPOGRAPHIC PREFERENCE. Both Nguni and Sotho societies preferred to situate their homesteads on flat, elevated sites rather than in valley bottoms or on lower slopes. This engraving clearly reflects this practice. The circles representing homesteads are placed on level surfaces toward the top of the rock, and there are connecting paths that avoid steep routes toward them.
Total length: 1.44 m. From T. M. O'C. Maggs, "Neglected Rock Art: The Rock Engravings of Agriculturist Communities in South Africa," *South African Archaeological Bulletin* 50 (1995): 132–42, esp. fig. 22 (p. 141). By permission of Tim Maggs.

The agriculturists' engravings seem to have been a relatively inconsequential part of their culture. Only some of the communities that took to building in stone produced these images, most of which were pecked on outcrops outside the settlements. Engraving was evidently a male pursuit, and it may have been largely the work of youths, to judge by the ethnographic evidence and the crudeness of most examples. The apparently mundane images of homestead plans are, however, not just a child's picture of a house. In them we can see selectivity and emphasis on the central circle of the homestead–the stock pen where cattle were sacrificed to the ancestors to ensure the continuity and well-being of the family.

esp. 25 and figs. 9–11 (note 19).

28. P. J. Schoeman, *Hunters of the Desert Land*, 2d rev. ed. (Cape Town: Howard Timmins, 1961), and Janette Deacon, "'My Place is the Bitterpits': The Home Territory of Bleek and Lloyd's /Xam San Informants," *African Studies* 45 (1986): 135–55, esp. fig. 1.

3 • Indigenous Mapmaking in Intertropical Africa

THOMAS J. BASSETT

> Although [they are] also known for their mapmaking skills, the cartography of the peoples of Africa is less well known than that of the Indians [of North and South America].[1]

Our knowledge of African mapmaking has substantially improved since Bruno Adler's seminal survey of non-Western cartographic traditions in 1910. This is particularly true for North African mapmaking, which emerged out of ancient Egyptian civilizations and Islamic cultures.[2] However, our understanding of sub-Saharan mapmaking remains comparatively weak (see fig. 3.1 for a reference map of Africa). The historiography is particularly scanty. When maps of Africa do receive attention, the focus is almost exclusively on European maps of the continent.[3] The dearth of studies of indigenous African mapmaking may be explained by a number of factors that have collectively served to marginalize the indigenous cartographic record.

First is the ethnocentric and pejorative view that Africans did not have the cognitive ability to make maps the same way Europeans did. This was Adler's perspective when he wrote, "We are all the more surprised that the Negroes do not draw well considering the delicate wood and metal carvings of which they are capable. . . . This lack of cartographic abilities leads us to impute that they have less intelligence than they do sharp eyesight, hearing, and a sense of smell."[4] Though decreasingly explicit, similar assumptions tend to have persisted until fairly recently. This chapter seeks to chart a less Eurocentric course by drawing attention to how African peoples have mapped their worlds. Even so, the deliberate emphasis placed on graphic representations is in itself a Western bias.[5]

Another reason indigenous mapmaking has not received the scholarly attention it deserves is the transfer of European mapmaking traditions to Africa during the colonial period. Metropolitan and colonial states, professional societies, and commercial mapmakers produced maps to aid in the colonization and subsequent control of conquered lands and peoples.[6] The subsuming of indigenous African mapmaking by European maps helps to explain why the sign systems illustrated in this chapter failed to develop and spread beyond their local settings.[7]

A third factor behind the meager historiography is that restricted definitions of "map" have excluded a range of processes and artifacts from serious study. Even if

This chapter could not have been written without the contributions of many individuals who provided references, illustrations, and critical comments at various stages of its preparation. In particular I thank Daniel Ayana, Edmond Bernus, Donald Crummey, Jim Delehanty, Henry Drewal, Kimbwandáende Kia Bunseki Fu-Kiau, Christraud Geary, Christian Jacob, Manfred Kropp, Jamie McGowan, Philip Porter, Labelle Prussin, Allen Roberts, Mary (Polly) Nooter Roberts, Charles Stewart, Jeffrey C. Stone, Taddesse Tamrat, Claude Tardits, and Jan Vansina.

1. Bruno F. Adler, "Karty pervobytnykh narodov" (Maps of primitive peoples), *Izvestiya Imperatorskago Obshchestva Lyubiteley Yestestvoznanya, Antropologii i Etnografii: Trudy Geograficheskago Otdeliniya* (Proceedings of the Imperial Society of the Devotees of National Sciences, Anthropology, and Ethnology: Transactions of the Division of Geography) 119, no. 2 (1910), esp. 177.

2. A. F. Shore, "Egyptian Cartography"; S. Maqbul Ahmad, "Cartography of al-Sharīf al-Idrīsī"; and Svat Soucek, "Islamic Charting in the Mediterranean," all in *The History of Cartography*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:117–29, vol. 2.1 (1992): 156–74 and 263–92, and James A. Harrell and V. Max Brown, "The World's Oldest Surviving Geological Map: The 1150 B.C. Turin Papyrus from Egypt," *Journal of Geology* 100 (1992): 3–18.

3. Youssouf Kamal, *Monumenta cartographica Africae et Aegypti*, 5 vols. in 16 pts. (Cairo, 1926–51), facsimile reprint, 6 vols., ed. Fuat Sezgin (Frankfurt: Institut für Geschichte der Arabisch-Islamischen Wissenschaften, 1987); John McIlwaine, *Maps and Mapping of Africa: A Resource Guide* (London: Hans Zell Publishers, 1997); Jeffrey C. Stone, ed., *Maps and Africa: Proceedings of a Colloquium at the University of Aberdeen, April 1993* (Aberdeen: Aberdeen University African Studies Group, 1994); R. V. Tooley, *Collectors' Guide to Maps of the African Continent and Southern Africa* (London: Carta Press, 1969); and [Oscar] I. Norwich, *Norwich's Maps of Africa: An Illustrated and Annotated Carto-bibliography*, bibliographical descriptions by Pam Kolbe, 2d ed., rev. and ed. Jeffrey C. Stone (Norwich, Vt.: Terra Nova Press, 1997).

4. Adler, "Karty pervobytnykh narodov," 186 (note 1).

5. Personal communication, Labelle Prussin, 22 February 1995. Also see Labelle Prussin, *African Nomadic Architecture: Space, Place, and Gender* (Washington, D.C.: Smithsonian Institution Press, 1995), 34–37.

6. Jeffrey C. Stone, *A Short History of the Cartography of Africa* (Lewiston: E. Mellen Press, 1995), and Thomas J. Bassett, "Cartography and Empire Building in Nineteenth-Century West Africa," *Geographical Review* 84 (1994): 316–35.

7. Denis Wood, "The Fine Line between Mapping and Mapmaking," *Cartographica* 30, no. 4 (1993): 50–60.

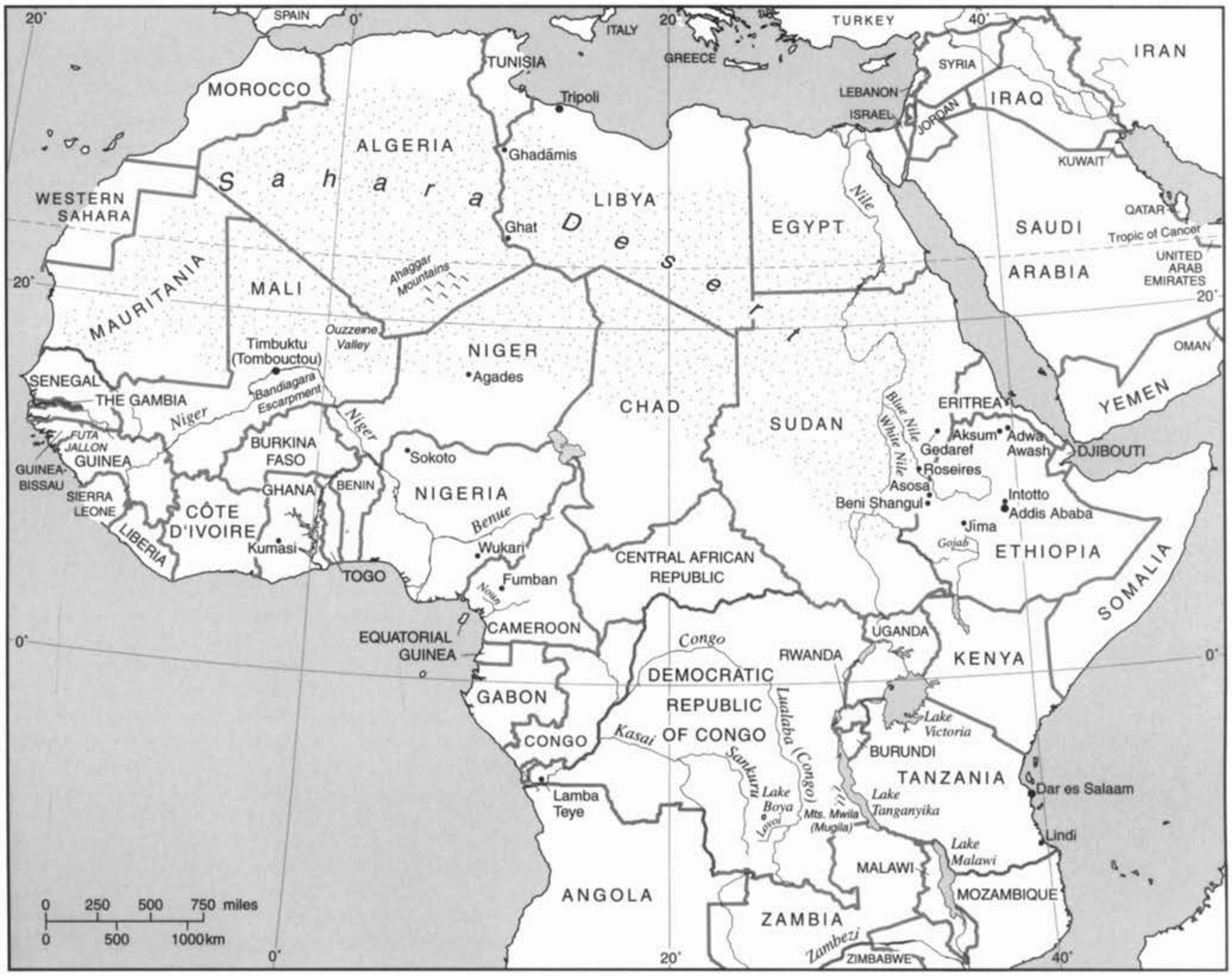


FIG. 3.1. REFERENCE MAP OF INTERTROPICAL AFRICA.

we employ the most general definition of a map as "a graphic representation of the geographical setting,"[8] we are bound to exclude the bulk of what may be justifiably called mapmaking in the African context. Examples of mapmaking that are excluded by this definition are mnemonic maps, body art (scarification, tattoos), the layout of villages, and the design and orientation of buildings. Here we view maps as social constructions whose meaning lies as much in their making as in the interpretation of constituent elements. The approach considers the making as well as the product. Just as art produces meaning by stimulating thought rather than by simply symbolizing the ideas of the individual or group that made it,[9] maps influence the social situations in which they are created.

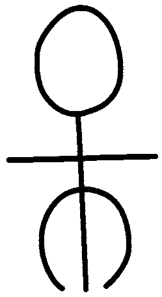
Given the extraordinary diversity of African cultures and societies, one can only point to examples of mapmaking as illustrating what is clearly a cross-cultural creative activity. Thus the rest of this chapter is organized to provide an overview of the range of maps one might encounter in the historical record. By no means does it pretend to be an exhaustive study. Rather, one of its principal objectives is to encourage further research and analysis of this understudied subject.

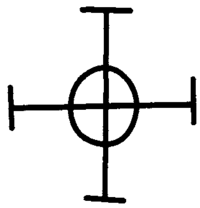
Cosmographic Maps

Graphic representations of a divine spatial order are expressed in a variety of schematic maps in which cardinal directions and geometric forms (crosses, diamonds, circles) are characteristic features. The power of these in-

8. Arthur H. Robinson et al., *Elements of Cartography*, 6th ed. (New York: Wiley, 1995), 9.

9. Jean Laude, *African Art of the Dogon: The Myths of the Cliff Dwellers* (New York: Viking, 1973), 21, 30, 45, and Allen F. Roberts, "Tabwa Tegumentary Inscription," in *Marks of Civilization: Artistic Transformations of the Human Body*, ed. Arnold Rubin (Los Angeles: Museum of Cultural History, 1988), 41–56, esp. 51.





FIGS. 3.2 and 3.3. DOGON ROCK PAINTINGS. On the left is the *aduno kine* or cosmographic map of the "life of the world." The cardinal directions are represented by the torso and arms of the sign painted on cave walls. North is at the top. The rock painting on the right shows the cardinal directions and illustrates the moment in the Dogon creation myth when the god Amma stretched a ball of clay in four directions to form the earth.
Left, after Marcel Griaule, "L'image du monde au Soudan," *Journal de la Société des Africanistes* 19 (1949): 81–87, esp. 81 (fig. 1A). Right, after Marcel Griaule and Germaine Dieterlen, *Signes graphiques soudanais*, L'Homme, Cahiers d'Ethnologie, de Géographie et de Linguistique 3 (Paris: Hermann, 1951), 21 (fig. 40A).

scriptions lies in their mixing of sacred orientations with the spatial patterning of everyday life, such as in the layout of living and work spaces, the control over resources, or the political geography of dynastic rule. Rock art provides some of the earliest examples of mapmaking by African peoples. Although the motivations and meanings of most paintings and engravings remain unclear,[10] we have sufficient evidence to believe that some images functioned as territorial signposts and cosmographical maps.[11]

According to Marcel Griaule, maps of the Dogon cosmos are represented in graphic signs painted by goatherds in caves on the Bandiagara escarpment in Mali.[12] Griaule interprets the sign known as the *aduno kine* or the life of the world (*vie du monde*) as representing the Dogon universe (fig. 3.2). The egg-shaped head signifies the "celestial placenta," while the legs refer to the "terrestrial placenta."[13] The torso and arms form a cross representing the cardinal directions. Griaule shows how this graphic representation is reproduced in the ground plan of the large house, in the layout of residential quarters, and in the plans of entire villages. Within the house itself is the hearth, which "derives its living flame from the celestial fire that came from the fire purloined by the smith. When the house is correctly sited, that is to say, is open to the north, the pot on the fire indicates the same point, the stones indicating east and west, while the wall, the third support for the pot, marks the south."[14] This orientation toward a divine spatial order as codified in the *aduno kine* is replicated in other patterns of everyday life such as in the layout and cultivation of fields, weaving designs, and where men and women sleep.[15] This repetitive patterning of the cosmological order at ever-expanding scales is also found in other African societies. For example, Blier shows how cosmological truths shape the spatial patterning of everyday life in her study of Batammaliba architecture in northern Togo and Benin, where "the direction of openings and the positioning of parts often

10. Thomas A. Dowson and David Lewis-Williams, "Diversity in Southern African Rock Art Research," in *Contested Images: Diversity in Southern African Rock Art Research*, ed. Thomas A. Dowson and David Lewis-Williams (Johannesburg: Witwatersrand University Press, 1994), 1–8, and Whitney Davis, "The Study of Rock Art in Africa," in *A History of African Archaeology*, ed. Peter Robertshaw (London: James Currey, 1990), 271–95, esp. 284–85.

11. For example, landscape features depicted in Khoisan rock art from the Brandberg, Namibia, are believed to represent the natural resources of a group's *n!ore* or "exploitation space"; see Andrew B. Smith, "Metaphors of Space: Rock Art and Territoriality in Southern Africa," in *Contested Images: Diversity in Southern African Rock Art Research*, ed. Thomas A. Dowson and David Lewis-Williams (Johannesburg: Witwatersrand University Press, 1994), 373–84, esp. 383–84. The paintings are thought to represent the out-of-body travel of shamans in trances during which they drew power from the land and its beings. Thus the images are metaphors of such journeys and at the same time represent a group's construction of its social identity through its control over the natural resources of a territory; Whitney Davis, "Representation and Knowledge in the Prehistoric Rock Art of Africa," *African Archaeological Review* 2 (1984): 7–35, esp. 23–24, 28.

12. Marcel Griaule's writings on the Dogon have been the subject of considerable scholarly debate and have been described as a "contested *oeuvre*" (James Clifford, "Power and Dialogue in Ethnography: Marcel Griaule's Initiation," in *Observers Observed: Essays on Ethnographic Fieldwork*, ed. George W. Stocking [Madison: University of Wisconsin Press, 1983], 121–56, esp. 124). For example, some anthropologists who work among the Dogon find little evidence of a coherent set of myths and beliefs ordering daily life as presented by Griaule. This has led one critic to label Griaule's work on Dogon cosmology an "intercultural fiction," the product of his personal research agenda and his informants' propensity to present a harmonious view of their culture (Walter E. A. van Beek, "Dogon Restudied: A Field Evaluation of the Work of Marcel Griaule," *Current Anthropology* 32 [1991]: 139–67, esp. 152–53 and 165). Similar to the contemporary debate in the history of cartography around the notion of a "true" or "accurate" map (J. B. Harley, "Deconstructing the Map," *Cartographica* 26, no. 2 [1989]: 1–20), some ethnographers refuse to label Griaule's oeuvre either true or false. Rather, like maps, ethnographies are widely viewed as "textual constructions" that express "a complex, negotiated, historically contingent truth specific to certain relations of textual production." The present discussion of Dogon cosmography should therefore be read as paraphrasing the "dialogical enterprise in which both researchers and natives are active creators, or, to stretch a term, authors of cultural representations" (Clifford, "Power and Dialogue," 125, 126, and 147).

13. Marcel Griaule, "L'image du monde au Soudan," *Journal de la Société des Africanistes* 19 (1949): 81–87, esp. 81.

14. Marcel Griaule, *Conversations with Ogotemmêli: An Introduction to Dogon Religious Ideas* (Oxford: Oxford University Press, 1965), 91–98, quotation on 94.

15. Marcel Griaule and Germaine Dieterlen, "The Dogon," in *African Worlds: Studies in the Cosmological Ideas and Social Values of African Peoples*, ed. Cyril Daryll Ford (London: Oxford University Press, 1954), 83–110, esp. 94–103.

FIG. 3.4. KONGO COSMOGRAM SHOWN IN A CERAMIC STELE FROM A VILLAGE CEMETERY IN LAMBA TEYE, DEMOCRATIC REPUBLIC OF CONGO. The end points of the diamonds portray the position of the sun in its four phases (dawn, noon, sunset, and midnight). They also indicate the cardinal directions with north at the top.
From Robert Farris Thompson and Joseph Cornet, *The Four Moments of the Sun: Kongo Art in Two Worlds* (Washington, D.C.: National Gallery of Art, 1981), 84 (fig. 49).

provide a frame of reference vis-à-vis the world and larger cosmos."[16]

Cardinal directions appear to be a common feature of cosmographic maps. The daily east-west passage of the sun, its relative north-south position in the annual cycle, and the location of stars in the night sky all offer reference points for delineating primary directions. Creation myths across cultures refer to the cardinal points, suggesting that the sky serves as a common model of cosmic order.[17] The Dogon creation myth tells of the god Amma, who created earth by flinging outward a ball of clay that stretched in four directions with north at the top and south at the bottom. The god's gesture at the end of the earth's creation is represented in rock paintings showing a cross and circle (fig. 3.3). According to Griaule, this cosmogram shows the creator with legs straddling the north-south axis and, with his torso facing south and his face looking east, stretching out his arms with the right hand pointing west, the left pointing east. Reference is made to these four principal directions in the cross-shaped *kanaga* mask as well as in a group of signs drawn on sanctuary walls at sowing time.[18]

Cardinal points also figure prominently in the Bakongo cosmogram known as the *tendwa kia nza-n'kongo* (the four moments of the sun). The Kongo cosmos is represented ideographically as a cross or diamond with circles attached at each end (fig. 3.4). The end points of the cross and diamond represent the four cardinal directions, and the circles illustrate the sun moving through its four phases: dawn, noon, sunset, and midnight. The horizontal line (*kalunga*) is interpreted in Kongo cosmology as the water above which lies heaven and below which extends earth. The daily cycle of the sun mirrors the lifetime journeys of all humans, some of whom are reborn in the Underworld and reappear as immortal spirits in the landscape.[19] Variants of the cosmogram are found in Kongo initiation and funerary art in the Democratic Republic of Congo (formerly Zaire) and in rock paintings and engravings in southeast Angola dating from 1600.[20] The striking resemblance between the Bakongo and Dogon cosmograms suggests that the order and meaning of these cosmographical maps is partly inspired by the regular movement of celestial bodies in time and space.[21]

16. Suzanne Preston Blier, *The Anatomy of Architecture: Ontology and Metaphor in Batammaliba Architectural Expression* (Cambridge: Cambridge University Press, 1987), 36.

17. Edwin C. Krupp, *Echoes of the Ancient Skies: The Astronomy of Lost Civilizations* (New York: Harper and Row, 1983), 315, and Dominique Zahan, *Le feu en Afrique et thèmes annexes* (Paris: Harmattan, 1995), 60–64.

18. Marcel Griaule and Germaine Dieterlen, *Signes graphiques soudanais,* L'Homme, Cahiers d'Ethnologie, de Géographie et de Linguistique 3 (Paris: Hermann, 1951), 14, 19–22. The *kanaga* masks are illustrated in Kate Ezra, *Art of the Dogon: Selections from the Lester Wunderman Collection* (New York: Metropolitan Museum of Art, 1988), 26–27 (figs. 11–12) and 68–69, and Laude, *African Art of the Dogon,* figs. 84 and 98 (note 9).

19. Kimbwandàende Kia Bunseki Fu-Kiau, "Ntangu-Tandu-Kolo: The Bantu-Kongo Concept of Time," in *Time in the Black Experience,* ed. Joseph K. Adjaye (Westport, Conn.: Greenwood Press, 1994), 17–34, and Robert Farris Thompson and Joseph Cornet, *The Four Moments of the Sun: Kongo Art in Two Worlds* (Washington, D.C.: National Gallery of Art, 1981).

20. Thompson and Cornet, *Four Moments,* 44–46.

21. The religious significance of cardinal directions is also evident in the orientation of ritual acts. Among the Yoruba, Drewal notes that di-

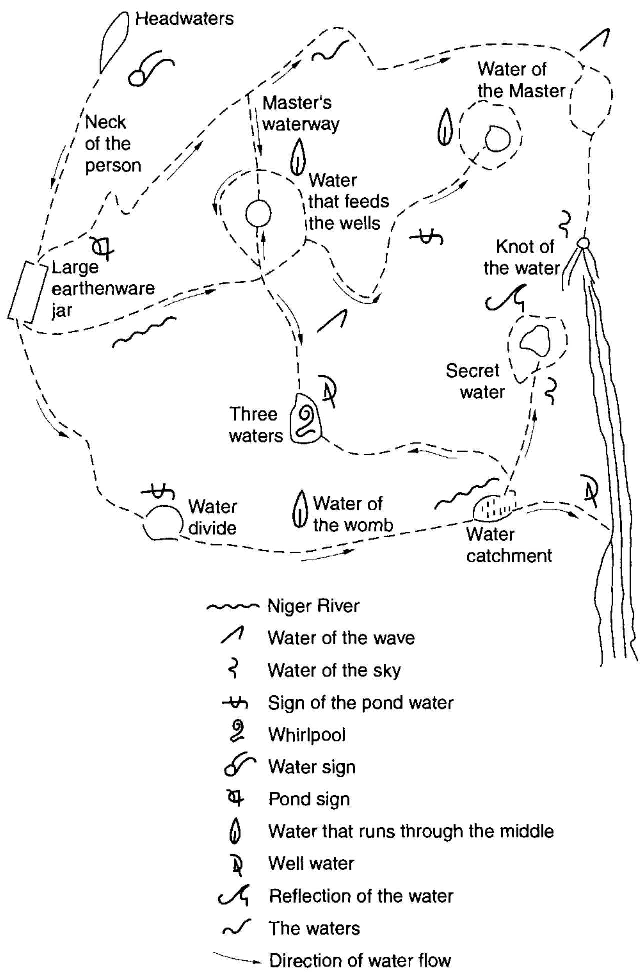


FIG. 3.5. MAP OF THE MYTHIC WATERS DRAWN BY BOZO ELDERS (MALI). The map is drawn to instruct children on the power and properties of water as transmitted by the ancestors. The ground map shows ponds, wells, and the Niger River.
After Marcel Griaule and Germaine Dieterlen, *Signes graphiques soudanais,* L'Homme, Cahiers d'Ethnologie, de Géographie et de Linguistique 3 (Paris: Hermann, 1951), 86 (fig. 11).

The discourse function of mapmaking is more explicit among the Bozo fishing people of the Niger River basin in Mali, who drew maps of the surface and underground flow of water as a means of controlling this vital resource. At the beginning of each new year, elders assembled the children of their community in a public place to demonstrate how their ancestor, Marourou, learned about the properties and creative powers of water. In this outdoor classroom, the children drew graphic signs on the ground representing different types of water and learned about their nature and linkages with each other. Figure 3.5 is a map of the mythic waters reproduced by Griaule based on information provided by two informants from the village of Dya. The process of mapmaking appears to have been as important as the knowledge conveyed in the map itself. At one point in the ritual reenactment, each child stood on the sign that the elder believed corresponded to his or her character. This gesture signified that "the waters of today's and future worlds will be controlled by people."[22]

A distinctive form of schematic mapping is found in Ethiopian manuscripts dating from the eighteenth and nineteenth centuries. The circle maps center on the ancient kingdom of Aksum, which flourished in the northern province of Tigray during the first seven centuries of our era.[23] The circular form of these maps is reminiscent of maps produced within the Islamic and ancient Greek traditions, which are known to have strongly influenced Ethiopia. It also echoes the concentric circular form of the Abyssinian royal court.[24]

Five versions of this map are known to exist, two of them in the manuscript titled Kebrä Nägäst.[25] The maps consist of three concentric circles with Aksum in the center of the innermost circle inside a quadrangle (fig. 3.6, upper half). The middle circle is divided into eight sections showing the cardinal and intermediate directions written in the Ge'ez script of Amharic. The outer circle is divided into twelve or fourteen segments and contains the names of the outlying provinces of Tigray. The example shown in figure 3.6 was copied for Antoine d'Abbadie in the 1850s from an original Kebrä Nägäst.

viners face east during Ifa divination sessions and that "entrances to shrines and groves must face east, the direction from which Orunmila (Ifa) is said to have come" (Henry John Drewal, "Art and Divination among the Yoruba: Design and Myth," *Africana Journal* 14 [1987]: 139–56, esp. 147). Along the east African coast, Swahili houses typically face north, and Swahili tombs are commonly found at the northern end of mosques, which is the qibla direction in this area. See James de Vere Allen and Thomas H. Wilson, *Swahili Houses and Tombs of the Coast of Kenya* (London: Art and Archaeology Research Papers, 1979), esp. 6 and 33.

22. Griaule and Dieterlen, *Signes graphiques soudanais,* 79–81 (note 18).

23. On the Aksumite civilization, see Stuart Munro-Hay, *Aksum: An African Civilisation of Late Antiquity* (Edinburgh: Edinburgh University Press, 1991).

24. Carlo Conti Rossini, "Geographica," *Rassegna di Studi Etiopici* 3 (1943): 167–99, esp. 172; Otto Neugebauer, "A Greek World Map," in *Le monde grec: Pensée, littérature, histoire, documents. Hommages à Claire Préaux,* ed. Jean Bingen, Guy Cambier, and Georges Nachtergael (Brussels: Editions de l'Université de Bruxelles, 1975), 312–17; and idem, *Ethiopic Astronomy and Computus* (Vienna: Verlag der Österreichischen Akademie der Wissenschaften, 1979). On Greek influence on Aksum in general, see Munro-Hay, *Aksum,* 6–7; Taddesse Tamrat, *Church and State in Ethiopia, 1270–1527* (Oxford: Clarendon Press, 1972), 269–75, describes the circular arrangement of the Abyssinian court.

25. Alula Pankhurst, "An Early Ethiopian Manuscript Map of Tegré," in *Proceedings of the Eighth International Conference of Ethiopian Studies, University of Addis Ababa, 1984,* 2 vols., ed. Taddese Beyene (Addis Ababa: Institute of Ethiopian Studies, 1988–89), 2:73–88.

FIG. 3.6. TIGREAN CIRCLE MAP AND WIND ROSE COLLECTED BY ANTOINE THOMAS D'ABBADIE. Paper and ink from the Kebrä Nägäst. The cardinal and intermediate directions are shown in both maps. The sacred city of Aksum lies in the middle of the top map, and the names of the outlying provinces make up the outer circle.
Size of the original: 22.3 × 14 cm. Photograph courtesy of the Bibliothèque Nationale du France, Paris, Collection Antoine d'Abbadie, 1859 (no. 225, fol. 3).

Below the circle map in figure 3.6 is a second diagram titled "chariot of winds."[26] This wind rose or "wheel of winds"[27] contains the names of the cardinal and intermediate positions in the outer band. A multipetaled flower lies in the center with the largest petals pointing to the eight principal directions. East is at the top of the wheel.

The Tigrean maps most closely resemble the cosmographical diagrams and qibla maps of Muslim scholars, in which twelve sector divisions are common. For example, there is a strong family resemblance between the Tigrean maps and the spherical diagram of the eleventh-century scholar al-Bīrūnī that links the twelve signs of the zodiac, the four elements, and the four cardinal directions.[28] The Tigrean map also has affinities with twelve-sector qibla maps dating from the eleventh century showing the prayer direction toward the Kaʿba in Mecca from various locations.[29] The influence of wind roses, which date from antiquity, is also apparent in the geometry of these maps, particularly in the eightfold division of the inner circle.[30] The concentric circular form of Tigrean maps appears to be embedded in these diverse traditions. It is a form that lends itself to distinguishing center from periphery, believers from nonbelievers, and the known from the unknown in a hierarchical and orderly framework.[31]

One of the most puzzling aspects of the two diagrams shown in figure 3.6 is their multiple orientations. The map itself has two. The outer circle containing the names of the twelve ancient provinces of Aksum has a northerly orientation. The inner circle of four cardinal and four intermediate directions is oriented toward the west.[32] Adding to the confusion is the easterly orientation of the wind rose below the map. Further research is needed to explain these discrepancies. Interestingly, the version of the Tigrean circle map seen and redrawn by von Heuglin is oriented toward the east. He notes that this orientation

26. Personal communication, Daniel Gamachu, 12 May 1995.

27. Neugebauer, *Ethiopic Astronomy,* 186 (note 24).

28. Ahmet Karamustafa, "Cosmographical Diagrams," in *The History of Cartography,* ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), vol. 2.1 (1992), 71–89, esp. 75–80 and fig. 3.4, and Seyyed Hossein Nasr, *An Introduction to Islamic Cosmological Doctrines,* rev. ed. (Albany: State University of New York Press, 1993), 151–63.

29. David A. King and Richard P. Lorch, "Qibla Charts, Qibla Maps, and Related Instruments," in *The History of Cartography,* ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), vol. 2.1 (1992), 189–205.

30. The classic work on the ancient origins of the wind rose is Karl Nielsen, "Remarques sur les noms grecs et latins des vents et des régions du ciel," *Classica et Mediaevalia* 7 (1945): 1–113.

31. Christian Jacob, *L'empire des cartes: Approche théorique de la cartographie à travers l'histoire* (Paris: Albin Michel, 1992), 174–81. The placement of Aksum in the middle of the map also follows a time-honored ethnocentric tradition. On ancient Greek circle maps the world pivots around Delphi, where the sanctuary of the great oracle is located. On certain medieval maps, Jerusalem lies at the center to show the centrality of the Christian church to European civilization. See Germaine Aujac and the editors, "The Foundations of Theoretical Cartography in Archaic and Classical Greece," and David Woodward, "Medieval *Mappaemundi,*" both in *The History of Cartography,* ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:130–47 and 286–370.

32. Neugebauer, *Ethiopic Astronomy,* 186 (note 24), states that the inner ring of the map is in fact a wind rose. Antoine Thomas d'Abbadie, *Catalogue raisonné de manuscrits éthiopiens appartenant à Antoine d'Abbadie* (Paris: Imprimerie Impériale, 1859), similarly describes the map as "a rose of the eight principal winds, repeated below" (Bibliothèque Nationale, Paris, Manuscrits Orientaux, D'Abbadie 255, 218–19).

FIG. 3.7. TABWA WOMAN WITH BUTWA SCARIFICATION ON HER BACK. The V-shaped sign and vertical *mulalambo* line separate east from west, left from right, evil from good. The *mulalambo* line represents the north-south axis, drainage divides, and the migration paths of mythic heroes. By permission of the Museum für Völkerkunde, Berlin.

(of both the inner and outer circles) "is the same direction which the church [the Church of the Holy Virgin in Aksum] faces and to which Oriental Christians were to direct their prayers."[33] The map was attached to a chronicle given to von Heuglin by Melka Zadek, a clergyman from Adwa.

The circle map centered on Aksum is an example of how maps emerge in specific social situations with the goal of inducing some political, economic, or social change. The association of the map with the Kebrä Nägäst supports this view.[34] Kebrä Nägäst is widely translated as meaning "Glory of the Kings" and is believed to be a historical, dynasty-legitimating work. According to one interpretation, the legends and traditions that make up the book were compiled to glorify the Solomonic line of kings that ruled Ethiopia for centuries. However, a non-Solomonic dynasty of Zagwe kings ruled for more than three hundred years until 1270, when the Solomonic line was restored. More than coincidentally, it was only in the fourteenth century that the Kebrä Nägäst appears in the Ethiopic language of Ge'ez.[35] Many scholars view this translation of "Glory of the Kings" as legitimating the reemergence of the Solomonic rulers who claimed to rule by divine right. Like the Kebrä Nägäst, the map places Aksum at the center of Ethiopian Christendom. Although Aksum was no longer the center of ecclesiastical and political power, it had become enshrined in Ethiopian history as a sacred city–a second Jerusalem where the Ark of the Covenant was brought by Menelek, the son of Solomon and the Queen of Sheba.[36]

An alternative interpretation is provided by Manfred Kropp, who translates Kebrä Nägäst as "Magnificence That Brings Kings Glory," which he believes refers to possession of the Ark of the Covenant.[37] Contrary to the view that the Kebrä Nägäst is a work legitimating the restored Solomonic dynasty, Kropp considers the book "a kind of ideological pamphlet for the cause of Tigre, its dynasty, and Aksum as the centre of the Ethiopian empire–not only against the Zagwe, who were already deposed at the time the Kebrä Nägäst was written, but mostly against the Salomonides south in Shoa!"[38] The struggle between Tigre and the Salomonides is not well documented.[39] However, in either formulation, the center of power lies at Aksum, the supposed location of the Ark of the Covenant. Thus, like the Kebrä Nägäst, the circle map serves the discourse function of supporting the cause of either the Tigreans or the Salomonides, who sought to legitimate their contested authority by associating themselves with this sacred city.

Mnemonic Maps

Visual and tactile aids for retelling origin myths and other

33. Hofrath von Heuglin, "Ueber eine altäthiopische Karte von Tigreh mit Facsimile," *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 17 (1863): 379–80, esp. 379.

34. Personal communication, Taddesse Tamrat, 21 September 1994.

35. The earliest edition of the Kebrä Nägäst was written in Coptic during the sixth century A.D. An Arabic translation appeared in the first half of the fourteenth century. It was during the early fourteenth century that the Kebrä Nägäst was translated into Amharic, "the 'speech of Abyssinia'": E. A. Wallis Budge, trans., *The Queen of Sheba and Her Only Son Menyelek (I)*, 2d ed. (London: Oxford University Press, 1932), xv–xviii.

36. Munro-Hay, *Aksum*, 264 (note 23).

37. Manfred Kropp, "Zur Deutung des Titels 'Kəbrä Nägäśt,'" *Oriens Christianus* 80 (1996): 108–15.

38. Manfred Kropp, personal communication, 8 September 1996.

39. Donald Crummey, personal communication, 7 November 1996.

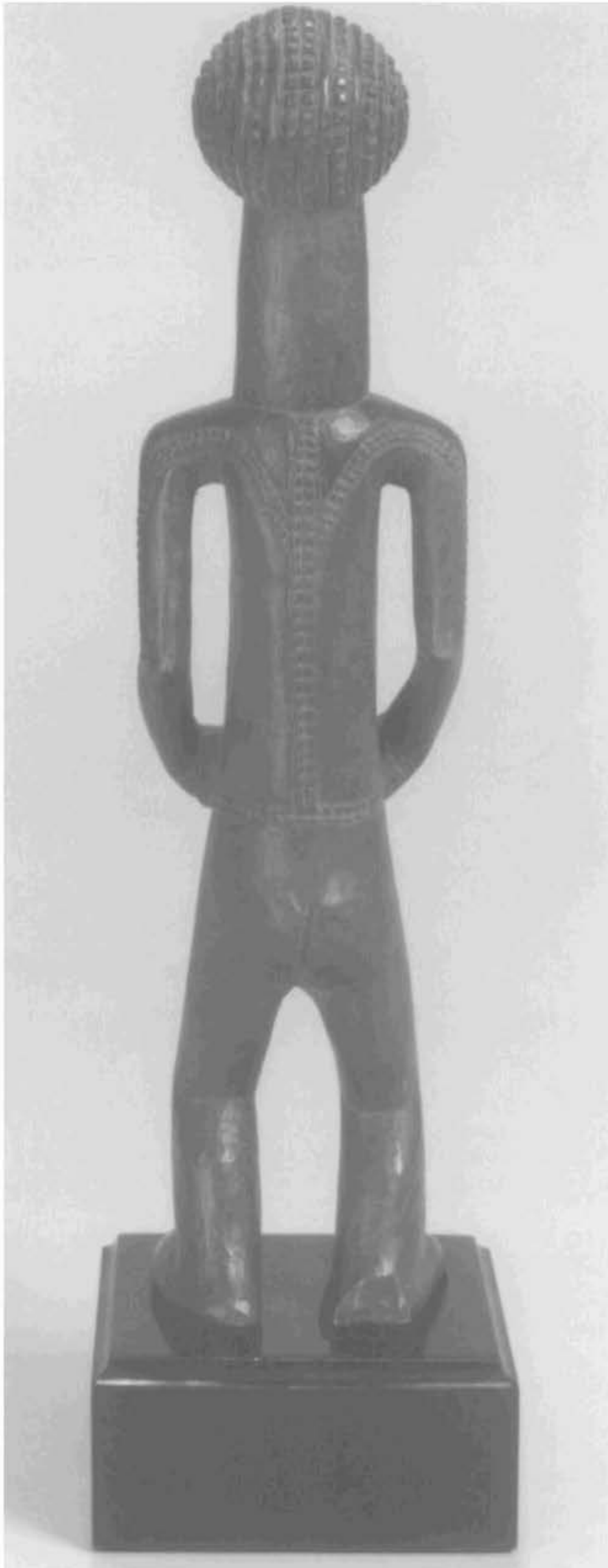


FIG. 3.8. TABWA ANCESTRAL FIGURE SHOWING *MULALAMBO* LINE AND V-SHAPED PATTERN. Carved wood.
Size of the original: 26.4 × 6.6 cm. Photograph courtesy of the University of Michigan Museum of Art, Ann Arbor, gift of Helmut Stern (1987/1.157.1).

stories of historical cultural importance take the form of maps in some societies. Among the Tabwa of southeastern Democratic Republic of Congo, the migration path of mythical ancestral heroes is inscribed in the skin of initiates to the Butwa society (fig. 3.7) and represented in wood sculpture (fig. 3.8). Initiates receive a V-shaped scarification on the back or chest or both during the last stage of the initiation process. A second line of "tegumentary inscription" cuts through the V and follows the midline of the body. This second line is given the name *mulalambo,* which also refers to the horizon line or "back" of Lake Tanganyika to the east of the Tabwa, to the Mwila drainage divide to their west, and to the Milky Way galaxy and Orion's Belt in the night sky. According to Allen F. Roberts, the V-shaped sign and perpendicular *mulalambo* line separate east from west and left from right. Left has negative associations (deception, corruption) while right carries positive meanings (strength, integrity). "The Butwa V-shaped inscription, then, reinforces this recognition of opposed forces as well as the perfected state of being that leads both the individual and society to positive fulfillment."[40]

The Tabwa, like many other Bantu peoples of central and southern Africa, possess a common origin myth in which a celestial hunter follows the Milky Way southward in pursuit of game. During the Southern Hemisphere's dry season, the galaxy is oriented north-south. Roberts suggests that the *mulalambo* line represents a north-south axis along which the Tabwa migrated to their present location during the sixteenth through eighteenth centuries. Tabwa villages are also laid out north-south.[41]

Among the neighboring Luba peoples, mnemonic maps are used in the last two stages of initiation into the Budye society. Budye associations formed in the past around the investiture of a king and served as a check on royal authority. In the course of the four-stage initiation, members learn about the principles and spiritual precepts of Luba kingship. During the third or *lukala* stage, initiates are taken into a meetinghouse where elders draw wall maps showing the dwelling places of the guardian spirits of Luba kingship and the migration paths of the initiates' ancestors.[42] The white-lined maps on black walls

40. Roberts, "Tabwa Tegumentary Inscription," 48 (note 9).

41. Allen F. Roberts, "Passage Stellified: Speculation upon Archaeoastronomy in Southeastern Zaire," *Archaeoastronomy* 4, no. 4 (1981): 26–37, esp. 30–32, and idem, "Tabwa Tegumentary Inscription."

42. Mary H. Nooter [Mary Nooter Roberts], "Luba Art and Polity: Creating Power in a Central African Kingdom" (Ph.D. diss., University of Michigan, 1991), 106–10, 115.

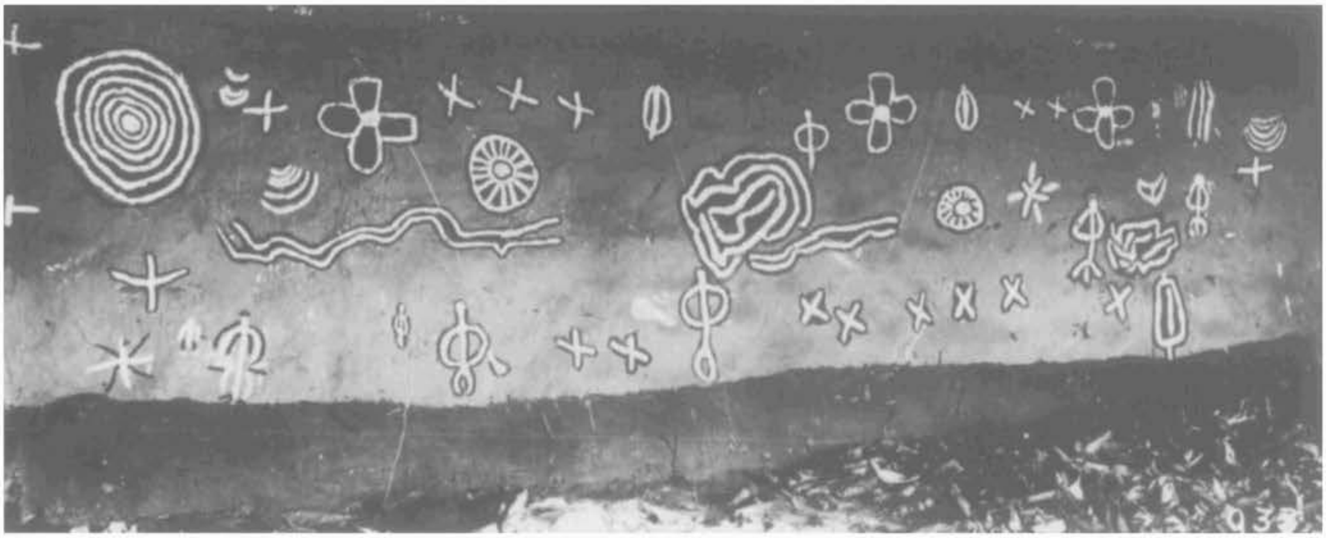


FIG. 3.9. *LUKALA* WALL MAP FROM BUDYE INITIATION CEREMONY. The map shows the location of the guardian spirits, chiefdoms, and waterways important to Luba kingship and history. Map photographed in 1898 on the Charles Lemaire expedition to the Lovoi River.

By permission of the Africa Museum, Tervuren, Belgium (E.PH. 5843, cl. 933).

cover a vast region, showing the major lakes and rivers, the location of various chiefdoms, and the abodes of important spirits (fig. 3.9). According to Burton:

> The initiate is stood before the wall, and rough maps are chalked on the wall. The whole country from the Lualaba to the Sankuru is marked, with the chief lakes and rivers, the noted abodes of spirits, and the capitals of the various chiefs. The initiate is questioned as to where each chief resides, and where each river flows, the names of the tutelary spirits of each locality, etc. In many cases the initiators are inefficient, and the whole thing becomes more or less a farce, with nothing more than a mere naming of a few of the local chieftainships, but we have seen one wall, soon after the initiation, in which although the actual scale was far from correct, yet the general lay-out of the country was intelligently executed.[43]

Early *lukala* wall maps consisted of geometric designs like the cross shapes, circles, and spirals shown in figure 3.9. Contemporary murals are less abstract. Wall maps photographed by Mary Nooter Roberts in the late 1980s typically show animals, human stick figures, musical instruments, and celestial and geographical features.[44]

In the final and most esoteric stage of Budye initiation, a mnemonic device known as the *lukasa* ("long hand") aids elders in teaching initiates about the origins of Luba kingship. The *lukasa* shown in plate 2 is typical of the Luba of the Kabongo region of the Democratic Republic of Congo, where boards are covered with beads and cowrie shells. During this last stage of Budye initiation, the *lukasa* is read or sung in praise of the king who established his residence in that particular region. The configuration of beads and shells charts the journeys of that king, the location of sacred lakes and trees, and residences that later became spirit capitals. The spirit capitals are depicted on *lukasa* by large beads and cowrie shells. Lines of beads often signify paths or migration routes, while circles of beads refer to chieftaincies. According to Reefe, the long gash in the lower right side of the board shown in plate 2 represents the upper Congo River.[45] The board's form and embellishment also signify the plan of the royal court and Budye meeting house. Different *lukasa* will contain common configurations of beads and shells, but their interpretation will vary according to the praise singer's objectives. Readings are contingent on the king being praised, the praise singer's knowledge of royal history, and the political circumstances of the performance. Thus the names of spirit capitals, lakes, and chieftaincies will change as the praise singer highlights specific elements of a royal historical geography.[46]

43. W. F. P. Burton, *Luba Religion and Magic in Custom and Belief* (Tervuren, Belg.: Musée Royal de l'Afrique Centrale, 1961), 166.

44. Nooter, "Luba Art and Polity," 108 (note 42), and Mary Nooter Roberts, "Luba Memory Theater," in *Memory: Luba Art and the Making of History,* ed. Mary Nooter Roberts and Allen F. Roberts (Munich: Prestel and Museum for African Art, 1996), 117–49, esp. 122.

45. Thomas Q. Reefe, "Lukasa: A Luba Memory Device," *African Arts* 10, no. 4 (1977): 48–50, 88, esp. 50.

46. Nooter, "Luba Art and Polity," 74–88 (note 42); Mary H. Nooter [Mary Nooter Roberts], "Fragments of Forsaken Glory: Luba Royal Culture Invented and Represented (1883–1992) (Zaire)," in *Kings of Africa: Art and Authority in Central Africa,* ed. Erna Beumers and Hans-Joachim Koloss (Utrecht: Foundation Kings of Africa, [1993]), 79–89, esp. 84–86. For further discussion of the importance of the *lukasa* in the Budye system, see Reefe, "Lukasa," and François

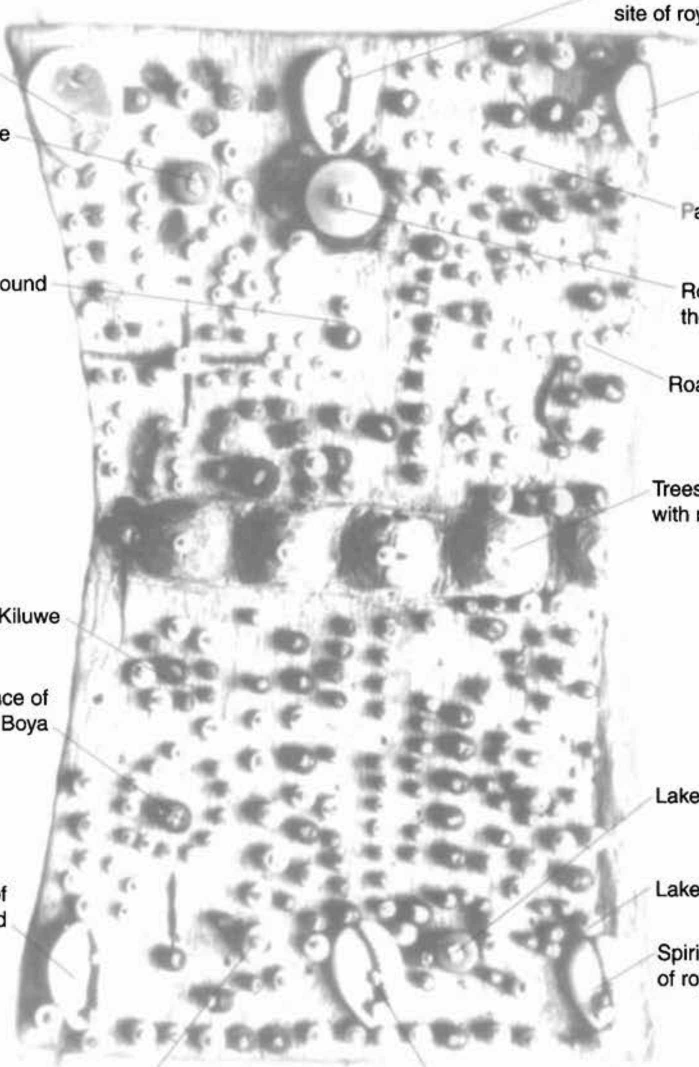


FIG. 3.10. TRANSLATION OF THE *LUKASA* IN PLATE 2. After Mary H. Nooter [Mary Nooter Roberts], "Luba Art and Polity: Creating Power in a Central African Kingdom" (Ph.D. diss., University of Michigan, 1991), 90–93.

The selective reading of a *lukasa* is tied to the rhetorical nature of the performance. One of the orator's objectives is to emphasize the importance of a particular kingship to Luba history. The *lukasa* shown in plate 2 was constructed for a Budye society in a village where Kalala Ilunga, the first Luba king, established his residence. Figure 3.10 highlights some of the historical geographical elements of Kalala Ilunga's kingship, including his father's migration to Lake Boya, where he encountered the antihero of the Luba genesis myth, Nkongolo.[47] The *lukasa*'s focus on the significance of specific localities within the Luba culture area links it with the mapmaking of other societies in which selection and omission reflect the desires of the mapmaker.

Solicited Maps

We encounter further evidence of African mapmaking in the nineteenth century in the reports of European explorers of the continent. Most of the maps recorded in these travel accounts were solicited by explorers interested in the geography of areas unknown to Europeans. The bulk of the maps produced were ephemeral ones drawn on the

Neyt, "Tabwa Sculpture and the Great Traditions of East-Central Africa," trans. Samuel G. Ferraro, in *Tabwa: The Rising of a New Moon: A Century of Tabwa Art*, ed. Evan M. Maurer and Allen F. Roberts (Ann Arbor: University of Michigan Museum of Art, 1985), 65–89.

47. Nooter, "Luba Art and Polity," 89–96 (note 42).

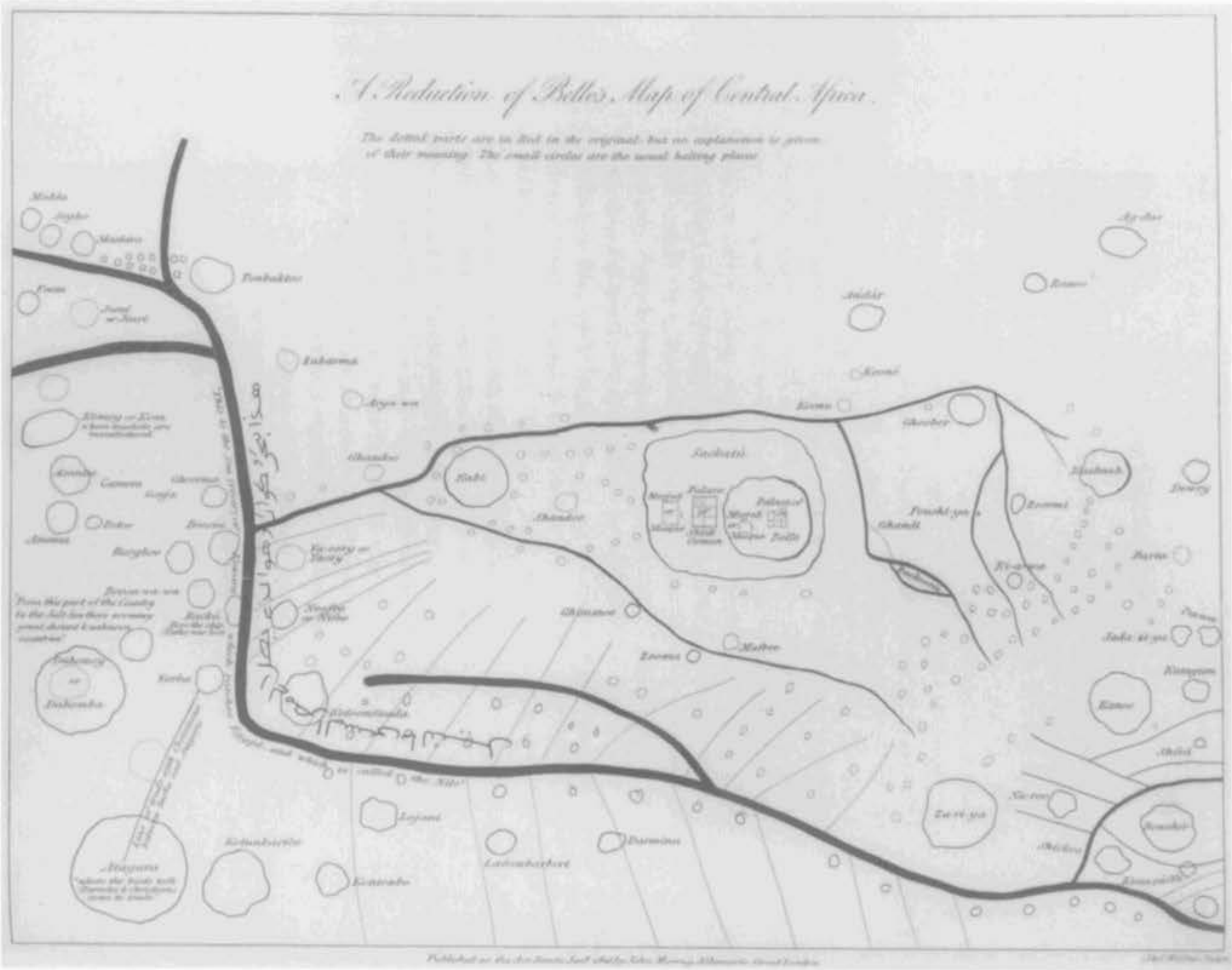


FIG. 3.11. SULTAN BELLO'S MAP OF THE NIGER RIVER'S COURSE. This "reduction" was engraved by J. and C. Walker for the publisher John Murray. Clapperton does not comment on its original state, so we have no idea of the orientation, size, and appearance of the map attributed to Bello. Under the title it is noted that "the dotted parts are in Red in the original, but no explanation is given of their meaning. The small circles are the usual halting places." From "Captain Clapperton's Narrative," in *Narrative of Travels and Discoveries in Northern and Central Africa, in the Years 1822, 1823, and 1824,* by Dixon Denham, Hugh Clapperton, and Walter Oudney (London: John Murray, 1826), 1–138 (2d pagination), facing 109.

ground in the presence of the explorer. In many instances we have only a record of the mapmaking moment in the text of the European explorer, though some of these ground maps were transcribed onto paper and reproduced in the explorers' accounts. Rarely do we find an extant original without some modification by European hands. The ability and willingness of Africans across the continent to produce maps testifies not only to their competency in mapmaking but also to Europeans' dependency on indigenous geographical knowledge for their own mapmaking.

One of the best-known examples of African mapmaking is the map given to Hugh Clapperton in 1824 by Mohammed Bello (1797–1837), sultan of Sokoto caliphate. Clapperton was interested in learning the course of the Kowara (Niger) River, whose outlet was the subject of considerable debate at this time. During one of their many meetings, the sultan "drew on the sand the course of the river Quarra, which he also informed me entered the sea at Fundah." Clapperton and Bello must have spoken at length about maps, because at their last meeting the sultan gave Clapperton "a map of the country" and requested that Clapperton send him a map of the world when he returned to England.[48] A modified version of Bello's map appears in Clapperton's published travel narrative (fig. 3.11).

48. "Captain Clapperton's Narrative," in *Narrative of Travels and*

The published version of Bello's map is distinguished by a number of features. First, Sackatú (Sokoto) is placed in the center of the map, illustrating what Harley called the "rule of ethnocentricity."[49] Second, the importance given to river systems reflects the circumstances of its making. Clapperton's inquires about the course of the Niger are answered by Bello in the map, which shows the Niger flowing from west to east. A text in Arabic and English meanders with the river and states: "This is the sea (river) of Kowara which reaches Egypt, and which is called the Nile." That the Niger and the Nile were the same river was one of many contending theories on the Niger's course at this time. Why Bello would depict the Niger's course this way is puzzling, since in an earlier meeting with Clapperton he indicated that he knew the river flowed to the Atlantic when he stated: "'I will give the King of England,' says he, 'a place on the coast to build a town: only I wish a road to be cut to Rakah, if vessels should not be able to navigate the river.'"[50] On the map, Racká (Rakah) is noted as the place where Mungo Park's boat disappeared (during his second expedition to the Niger in 1805). It is possible that the sultan was persuaded by Moorish and Arabic merchants to conceal the true course of the river from Clapperton in order to impede European entry into the region.[51] Clapperton himself commented that the reason he received so many inconsistent accounts of the Niger's course was the common view "that strangers would come and take their country from them, if they knew the course of the Quarra [Niger]." When Bello informed Clapperton that he would not be able to visit the major river ports of Youri ("Ya-oory") and Nyffee ("Noofee") to the west of Sokoto, the frustrated traveler noted, "I could not help suspecting the intrigues of the Arabs to be the cause; as, they know well, if the native Africans were once acquainted with English commerce by the way of the sea, their own lucrative inland trade would from that moment cease."[52] The suspected intrigues and withholding of information suggest that the map Bello produced might reflect his political and economic concerns about expanding European influence in the interior of Africa.

Depicted on the western part of the map are locations of historical geographical significance to Bello's ancestors, who migrated from the Futa Jallon ("Foota") and Maasina ("Mashira") regions before coming to northern Nigeria. To the east are shown the former Hausa city-states of Kano ("Kanoo"), Katsina ("Kashnah"), Zaria ("Za-ri-ya"), and Gobir ("Ghoober") conquered by Bello's father, Usuman dan Fodio, and united into the Sokoto caliphate.

In addition to the map, Clapperton obtained from Bello a manuscript on the history and geography of the West African region known as Tak-roor (Tekrur) about which Europeans had vague knowledge from the writings of al-Idrīsī, the twelfth-century Arab geographer. An extract from Bello's geography was translated and appended to the account of Denham, Clapperton, and Oudney.[53] Although Europeans such as MacQueen belittled Bello's map, noting, for example, the "rude representation" of a river, and his "inaccuracy as a geographer," others valued his mapmaking and geographical writings for their contribution to European knowledge of the political geography of the region. Heinrich Barth studied Bello's map and geography before undertaking his major exploration of North and West Africa in the early 1850s. A modified version of Bello's map appears in Elisée Reclus's world geography in his discussion of Sokoto and the Hausa states.[54]

Other examples of solicited ground maps can be found in the vast travel and exploration literature of the nineteenth century. While mapping the watershed between the Blue Nile and Awash River basins in the early 1840s, the British explorer Charles Beke solicited indigenous ground maps. On one occasion Beke was shown the (incorrect) course of the Gojab River by "Hádji Moammed Núr, a merchant . . . [who] drew its course on the ground with his stick."[55] In the 1870s the Bohemian doctor Emil Holub traveled throughout present-day southern Zimbabwe and the northern Transvaal of South Africa to pursue his interests in ethnology and natural history. On one expedition through the Marutse empire around the upper Zambezi River, he asked the ruling chief, Sepopo, to suggest a travel route to the headwaters of that great river. Holub reported that "he began to show me my proper route, by drawing a map of the Upper Zambesi and its affluents with his stick on the sand." Pleased with Holub's keen interest in his map, Sepopo summoned two individuals familiar with the area, who confirmed the accuracy of his map.[56]

Discoveries in Northern and Central Africa, in the Years 1822, 1823, and 1824, by Dixon Denham, Hugh Clapperton, and Walter Oudney (London: John Murray, 1826), 1–138 (2d pagination), esp. 89 and 109.

49. Harley, "Deconstructing the Map," 6 (note 12).

50. "Captain Clapperton's Narrative," 90 (note 48).

51. James MacQueen, "Geography of Central Africa, Denham and Clapperton's Journals," *Blackwood's Edinburgh Magazine* 19 (1826): 688–709, esp. 698–99.

52. "Captain Clapperton's Narrative," 42, 88 (note 48).

53. "Translation of an Arabic MS. Brought by Captain Clapperton," in *Narrative of Travels and Discoveries in Northern and Central Africa, in the Years 1822, 1823, and 1824,* by Dixon Denham, Hugh Clapperton, and Walter Oudney (London: John Murray, 1826), app. 12 (pp. 158–67, 2d pagination).

54. MacQueen, "Geography of Central Africa," 702 (note 51); Heinrich Barth, *Travels and Discoveries in North and Central Africa,* 3 vols. (New York: Harper, 1857–59), 3:138; and Elisée Reclus, *Nouvelle géographie universelle: La terre et les hommes,* vol. 12, *L'Afrique occidentale* (Paris: Hachette, 1887), 600.

55. Charles T. Beke, "On the Nile and Its Tributaries," *Journal of the Royal Geographical Society* 17 (1847): 1–84, esp. 44n.

56. Emil Holub, *Seven Years in South Africa: Travels, Researches, and*

During a scientific collecting trip up the Ogooué River in the French Congo (Gabon) in 1895, the British traveler Mary Kingsley asked a Fan chief about the location and conditions of villages upstream. In her witty and vivid memoir, *Travels in West Africa,* Kingsley describes one of the most memorable mapmaking scenes in travel and exploration literature.

> He took a piece of plantain leaf and tore it up into five different-sized bits. These he laid along the edge of our canoe at different intervals of space, while he told M'bo [Kingsley's guide] things, mainly scandalous, about the characters of the villages these bits of leaf represented, save of course about bit A, which represented his own. The interval between the bits was proportional to the interval between the villages, and the size of the bits was proportional to the size of the village. Village number four was the only one he should recommend our going to. When all was said, I gave our kindly informants some heads of tobacco and many thanks.[57]

Kingsley was obviously pleased by her informant's map. Her reference to its proportional representation suggests she believed it was made to scale. However, she was soon to discover that the distances between villages were much longer than anticipated.

> Now there is no doubt that that chief's plantain-leaf chart was an ingenious idea and a credit to him. There is also no doubt that the Fan mile is a bit Irish, a matter of nine or so of those of ordinary mortals, but I am bound to say I don't think, even allowing for this, that he put those pieces far enough apart. On we paddled a long way before we picked up village number one, mentioned in that chart. On again, still longer, till we came to village number two. Village number three hove in sight high up on a mountain side soon after, but it was getting dark and the water worse, and the hillsides growing higher and higher into nobly shaped mountains, forming, with their forest-graced steep sides, a ravine that, in the gathering gloom, looked like an alley-way made of iron, for the foaming Ogowé. Village number four we anxiously looked for; village number four we never saw; for round us came the dark, seeming to come out on to the river from the forests and the side ravines, where for some hours we had seen it sleeping, like a sailor with his clothes on in bad weather. On we paddled, looking for signs of village fires, and seeing them not.[58]

Overtaken by night and preoccupied with the perilous rapids of the Ogooué, Kingsley may have passed the fourth village without ever seeing it. She and her eight Galoa canoemen finally stopped late in the evening when their canoe became jammed on some rocks. They eventually made their way to a nearby island, where they discovered a village and spent the rest of the night. Kingsley is silent on whether this was village number four.

Captain Henri d'Ollone's encounter with indigenous mapmaking profoundly altered his views of the cartographic abilities of African peoples. During a border reconnaissance mission between French West Africa and Liberia in 1899–1900, d'Ollone and his compatriot Jean Hostains inquired about the distribution of ethnic groups in the dense rain forest region through which they were traveling. They asked a Pérabo man named Tooulou to draw on the ground with a charred stick the location of various cultural groups in the region. To their astonishment, Tooulou not only showed the distribution of local peoples but also drew the location of villages, mountains, and rivers within a radius of one hundred kilometers. Skeptical of the accuracy of Tooulou's map, d'Ollone and Hostains tried to trip him up over the next few days by asking him to redraw it time and again, yet he repeatedly drew the same map and refused to change any part of it when they challenged certain elements. The two Frenchmen were further astonished when other individuals stepped forward to draw ground maps showing the location of their villages. What amazed Hostains and d'Ollone was that all these maps were drawn in the thick of the tropical rain forest, where it was difficult to gain a vantage point. D'Ollone makes the important observation that this mapmaking was not simply done for the benefit of Europeans but was a common form of expressing spatial information among Africans themselves. He notes that "on two occasions I saw natives [*des indigènes*] drawing a map for others in order to indicate a location: in sum, true geography lessons!"[59]

The scene of Africans drawing ground maps to the profound surprise of Europeans is a recurring theme of the exploration literature. Ludwig Wolf, the German physician accompanying the Hermann von Wissmann expedition to the Kasai and Sankuru Rivers in the Democratic Republic of Congo, was "amazed and still full of doubt" when a notable of the Bakuba king "drew the flow of these rivers in the sand with a confident hand. And, yes, his information is entirely correct!"[60] In 1876 the French explorer of the northern Saharan desert, Victor Largeau, was taken aback by what appeared to be parallel lines on a ground map made by a Tuareg goldsmith in the town of Ghadāmis. The man drew four straight lines and noted

Hunting Adventures, between the Diamond-Fields and the Zambesi (1872–79), 2 vols., trans. Ellen E. Frewer (Boston: Houghton Mifflin, 1881), 2:174.

57. From Mary H. Kingsley, *Travels in West Africa:* Congo Français, *Corisco and Cameroons,* 5th ed. (London: Virago Press, 1982), 170.

58. Kingsley, *Travels in West Africa,* 171.

59. Henri Marie Gustave d'Ollone, *Mission Hostains-D'Ollone, 1898–1900: De la Côte d'Ivoire au Soudan et a la Guinée* (Paris: Hachette, 1901), 140–41, esp. 141 n. 1.

60. Hermann von Wissmann et al., *Im innern Afrikas: Die Erforschung des Kassai während der Jahre 1883, 1884 und 1885,* 3d ed. (Leipzig: Brockhaus, 1891), 240.

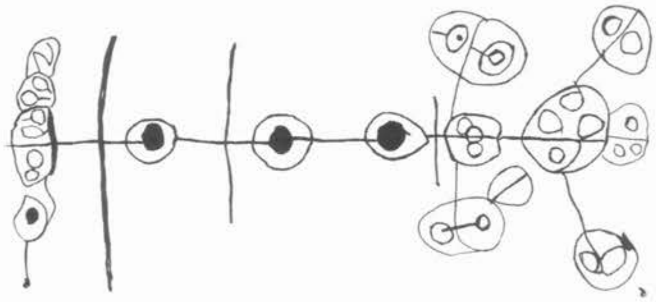
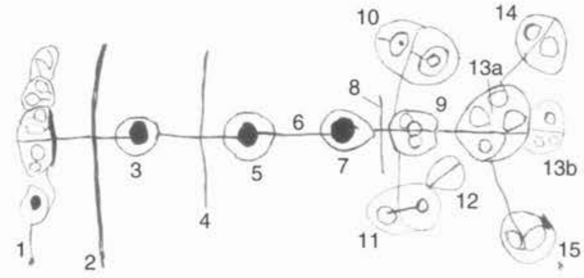


FIG. 3.12. SABATELE'S MAP OF THE MAIN CARAVAN ROUTES IN EAST AFRICA. Paper and pencil. This map with its southerly orientation traces the main caravan routes across Tanzania, with the terminus points placed at Dar es Salaam. See figure 3.13 for an explanatory diagram.
Size of the original: unknown. Current location unknown. Photograph courtesy of the Archiv Museum für Völkerkunde zu Leipzig (Neg. Af 0 1428; from the original glass plate negative).



1. "Mawopanda," Dar es Salaam
2. "Lufu," the Ruvu River, a large river frequently crossed on the main caravan road by Wanyamwezi carriers, one of whom created this map
3. "Mulokolo," Morogoro, the terminus for the central railway at the time
4. "Mgata," Makata, plain between the Uluguru and Rubeho mountains, a swamp during the rainy season
5. "Kirosa," Kilosa
6. "Balabala," the caravan road
7. "Mwapwa," Mpwapwa, the old caravan center, once the last stop on the inland march before the great alkali desert, Marenga Mkali, and hostile Ogogo
8. Mutiwe, a stream near Kilimatinde
9. Kilimatinde, a mountain
10. Kasanga
11. Kondoa-Irangi
12. Post of Kalama, in Iramba (Mkalama?)
13a. "Tobola," Tabora, with the new *boma* (enclosure/fort)
13b. "Tobola ya zamani," Old Tabora with the former *boma*
14. Ujiji on Lake Tanganyika
15. Mwanza on Lake Victoria

FIG. 3.13. EXPLANATION OF SABATELE'S MAP (FIG. 3.12).
After Karl Weule, *Native Life in East Africa*, trans. Alice Werner (New York: D. Appleton, 1909), 9, 373–75.

the relative locations of Tripoli, Ghadāmis and Ghat, the Hoggar (Ahagger) Mountains and Agades, and Tombouctou. Largeau was at a loss to explain how "the idea of meridians had found its way to this son of the Niger."[61] The parallel lines were possibly the boundaries of climates that commonly appeared on medieval European and Islamic maps.[62] Adler believed Arab merchants were responsible for the diffusion of such elements of "scientific geography" in their trans-Saharan travels.[63]

The German geographer Karl Weule was "overwhelmed" by the number of maps members of his caravan produced during a six-month research expedition through German East Africa in 1906. Between marches, he supplied his carriers with paper and pencils to see what they would draw. Figure 3.12 is the map made by a Mambwe man named Sabatele, originally from the southern shore of Lake Tanganyika near the present Tanzania-Zambia border. The map, which traces caravan routes across Tanzania, was made in Lindi at the very beginning of Weule's expedition (see figs. 3.13 and 3.14). Weule notes that Sabatele's map was oriented with south at the top, but he turned it around 180 degrees "in order to bring it into agreement with our maps."[64] Adler reproduces two additional maps Weule brought back that were made by the headman of his caravan, Pesa Mbili.[65]

In summary, solicited maps were generally ephemeral constructions produced on the ground, often, but not always, at the request of European travelers and explorers. The record indicates that these maps were made at a variety of scales. They appear in all major geographical regions of the continent and in a cross section of environments (e.g., desert, rain forest). A remarkable feature of ground maps was their cross-cultural intelligibility. Notwithstanding broad epistemological divides separating Europeans from various African cultural groups, it appears that Europeans had little difficulty in reading these maps.[66] Solicited maps demonstrate that Africans had the spatial competence and requisite sign systems to produce maps spontaneously. They also fulfilled a basic discourse function–to show relative position and direction to outsiders unfamiliar with the territory through which they were traveling. Indeed, there is evidence that African ground maps were influential in shaping the form and content of European maps of the continent.

61. Wolfgang Dröber, *Kartographie bei den Naturvölkern* (1903; reprinted Amsterdam: Meridian, 1964), 29–30.

62. Early examples of *climata* appear in the work of Ptolemy and on globes of Hellenistic Greece; see O. A. W. Dilke, "The Culmination of Greek Cartography in Ptolemy," and "Cartography in the Ancient World: A Conclusion," in *The History of Cartography*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:177–200, esp. 182–83, and 1:276–79. The tradition was later adopted in Islamic mapping; see Karamustafa, "Cosmographical Diagrams," 76 (note 28), and Gerald R. Tibbetts, "Later Cartographic Developments," in *The History of Cartography*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), vol. 2.1 (1992), 137–55, esp. 146–47.

63. Adler, "Karty pervobytnykh narodov," 177–78 (note 1).

64. Karl Weule, *Native Life in East Africa*, trans. Alice Werner (New York: D. Appleton, 1909), 373–75.

65. Adler, "Karty pervobytnykh narodov," 181–84 (note 1).

66. Jacob, *L'empire des cartes*, 63 (note 31).

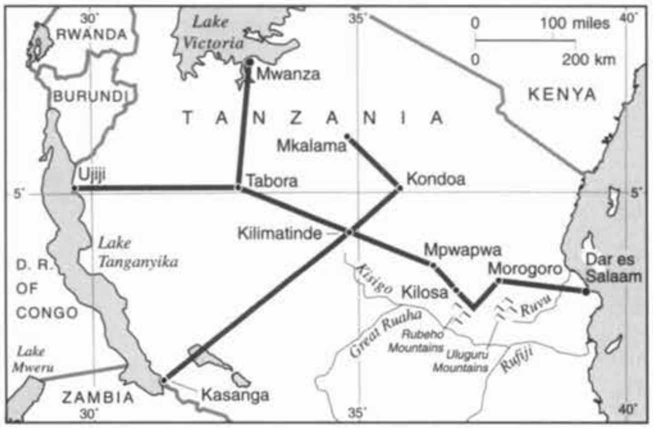


FIG. 3.14. REFERENCE MAP FOR FIGURES 3.12 AND 3.13.

African Influences on European Mapmaking

The information obtained from African informants was often incorporated into European maps. A common method was for Europeans to speak with well-traveled Africans (e.g., merchants, pilgrims, messengers), who would tell them about the settlements and topography of the areas they frequented. The information gleaned from these itineraries was then cross-checked with other sources. This was the method employed by Joseph Dupuis, the British consul to Kumasi in the Ashanti kingdom in 1820. To construct his maps of Wangara and Sudan, Dupuis relied heavily on travel guides written in Arabic script that he obtained from well-traveled Hausa and Jula merchants. These sources most often took the form of itineraries that listed the names of settlements between a starting point and a destination (e.g., Kumasi to Kong). With his informants' assistance, Depuis calculated the distance between any two points based on the number of days' march between them.[67] Depuis's "A Map of Wangara" (fig. 3.15) shows the influence of African itineraries in the linear procession of place-names.

William Desborough Cooley acknowledged the value of a map made by an elderly Arab merchant from Zanzibar when discussing the compilation of his 1853 map of the Lake Malawi region. The mapmaker was named Mohammed ben Nassúr. Cooley says nothing about the circumstances in which Nassúr's map was made, but he repeatedly refers to it as an authoritative source for his own mapmaking.[68]

Sections of Henri Duveyrier's map of the central Sahara were similarly based on ground maps he obtained during his travels in North Africa in 1860. The French geographer recounted how he gathered a number of itineraries for regions unknown to him but found some to be inconsistent. To sort things out, Duveyrier consulted with a certain Cheikh-'Othmân, "who drew in the sand a relief model of parts of the Tuareg territory that I wasn't able to explore." After further discussions with his informant, Duveyrier sketched his own map, then cross-checked it with his informant's ground map.[69] More than a third of Duveyrier's published map is based on information provided by these local sources.[70]

A century later, the French geographer Edmond Bernus asked Tuareg herders in Niger to map their dry-season grazing areas. Figure 3.16 is one of five maps published by Bernus that were initially drawn in the sand and then put on paper by Tuareg informants (see also fig. 3.17). The map's linear form reflects the pattern of relict river valleys along which Tuareg herds graze during the dry season. The small numbered circles mark the position of wells along the valley floor. Place-names are written in the

67. Joseph Dupuis, *Journal of a Residence in Ashantee* (London: H. Colburn, 1824), reproduces a number of these travel guides, with English translations (cxxiv–cxxxv), and describes his calculations (xv–xx). The name Wangara was generally associated with the gold-rich areas of West Africa. It was first mentioned in the work of al-Idrīsī, the twelfth-century Arab geographer, most likely in reference to the alluvial deposits near Bambuk in present-day Mali. Leo Africanus, in his sixteenth-century writings, also refers to a Wangara near the Hausa state of Zamfara. More than a thousand miles apart, these different Wangaras must have been confusing to early nineteenth-century Europeans, whose knowledge of West Africa remained poor. See Robin Hallett, *The Penetration of Africa: European Enterprise and Exploration Principally in Northern and Western Africa up to 1830,* vol. 1 (London: Routledge and Kegan Paul, 1965), 23n. In constructing his map, Dupuis relied on his informants' delimitation of Wangara to include "Ashantee, Dahomy, and Benin, east of the Formosa" (xci). See also Thomas J. Bassett, "Influenze africane sulla cartografia europea dell'Africa nei secoli XIX e XX," conference paper presented at La cultura dell'alterità: Il territorio africano e le sue rappresentazioni, Bergamo, 2–5 October 1997.

68. The map is titled "Map of Africa, from the Equator to the Southern Tropic, Shewing the Routes to Lake Nyassi, Moenemoezi the Muropue, the Cazembe and across the Continent, with the Discoveries of the Missionaries in Eastern Africa." William Desborough Cooley, *Inner Africa Laid Open* (1852; reprinted New York: Negro Universities Press, 1969), 54–60. Another example of African mapmaking for the benefit of Europeans seeking to fill in the blank spaces on their maps is Haïle Mariam's "Carte du royaume de Koullo." One of the few indigenous maps to be published, it was solicited by the French traveler and diplomat Guillaume Lejean during his tenure as French consul in Abyssinia under the reign of Emperor Theodore. Guillaume Lejean, "Note sur le royaume de Koullo au sud du Kafa (Notes verbales fournies par deux indigènes)," *Bulletin de la Société de Géographie de Paris,* ser. 5, 8 (1864): 388–91.

69. Henri Duveyrier, *Exploration du Sahara: Les Touareg du Nord* (Paris: Challamel Ainé, 1864), xiv–xvi. See Erwin Raisz, *General Cartography,* 2d ed. (New York: McGraw-Hill, 1948), 4–5, for a similar story of a relief model of the area between Ahaggar in the Sahara and Tombouctou being constructed by a Tuareg man. Raisz's account is undocumented and unattributed, and it is possible he is repeating Duveyrier's.

70. The title of Duveyrier's map is "Exploration du Sahara–Années 1859, 1860, 1861, Carte du Plateau Central du Sahara comprenant le pays des Touareg du Nord, le Sahara Algérien, Tunisien et Tripolitain par Henri Duveyrier" (1/3,000,000), Drawn by E. Debuisons, Paris, published/printed by Erhard (79.6 × 61 cm).

FIG. 3.15. DEPUIS'S "A MAP OF WANGARA." The map shows the influence of written itineraries in the linear procession of place-names. A good example is the string of names running northwest-southeast in the center left of the map, just east of the name "Manding." Size of the original: 42 × 49 cm. From Joseph Dupuis, *Journal of a Residence in Ashantee* (London: H. Colburn, 1824). Photograph courtesy of the Library of Congress, Washington, D.C.

tifinag script. The map's focus on hydrographic networks reflects Bernus's request to show transhumance routes. Interestingly, the orientations of the five maps vary with the position of each mapmaker in relation to different grazing areas. This illustrates the point first made by Brosset that pastoral nomads use "sectors of orientation" to situate themselves more often than they use fixed cardinal points and directions.[71] As Bernus shows, the paths along which the Tuareg orient themselves are commonly associated with physical geographic features such as streambeds, sand dunes, hills, and isolated trees in the landscape.[72]

Orientation is also determined in relation to Mecca, which devout Muslim Tuareg face five times a day while praying. Among the Kel Ahagger, east is called *elkablet*, which means "the direction of Mecca." East is also de-

71. D. Brosset, "La rose des vents chez les nomades sahariens," *Bulletin du Comité d'Études Historiques et Scientifiques de l'Afrique Occidentale Française* 11 (1928): 666–84. See also Prussin, *African Nomadic Architecture,* 35 (note 5).

72. Edmond Bernus, "La représentation de l'espace chez des Touaregs du Sahel," *Mappemonde* 1988, no. 3, 1–5; idem, "Points cardinaux: Les critères de désignation chez les nomades touaregs et maures," *Bulletin des Etudes Africaines de l'INALCO* 1, no. 2 (1981): 101–6; and idem, "Perception du temps et de l'espace par les Touaregs nomades sahéliens," in *Ethnogéographies,* ed. Paul Claval and Singaravélou (Paris: Harmattan, 1995), 41–50.

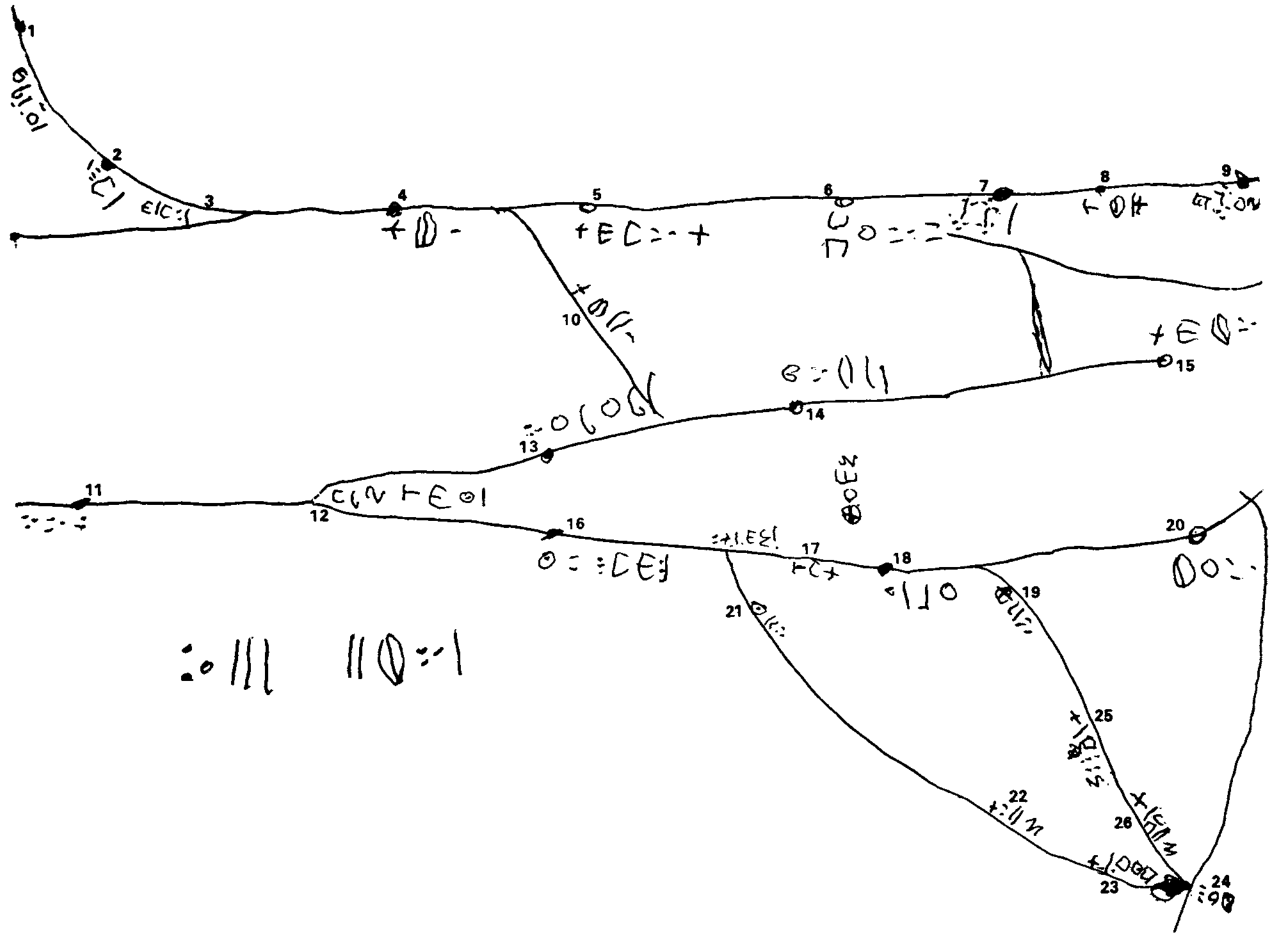


FIG. 3.16. MAP OF A TUAREG TRASHUMANCE ZONE MADE BY KILI KILU AG NAJIM AND MODIFIED BY EDMOND BERNUS. Paper and ink, original drawn in the notebook of Edmond Bernus. Orientation is north. The map covers an area 150 kilometers east-west and 90 kilometers north-south. Place-names are written in the *tifinag* script. The lines represent dry valleys, and Bernus identifies twenty-six local place-names and wells (numbers 1–26 on this figure).

Size of the original: 13.5 × 20 cm. From Edmond Bernus, *Les Illabakan (Niger): Une tribu touarègue sahélienne et son aire de nomadisation,* Atlas des Structures Agraires au Sud du Sahara 10 (Paris: ORSTOM, 1974).

noted by the word *dat-akal,* defined as "the country in front" of the person in prayer. West is defined as "the country behind" (*deffer akal*) the person praying. North and south are equally defined in relation to the person facing the sacred easterly direction. The word for north is *tezalge,* or "the left" or "the left side," while south is denoted by *aghil,* or "the right."[73] The practice of defining cardinal directions in relation to the human body facing a specific geographical feature or direction (left-right, front-back, up-down) links the Saharan Tuareg with the peoples of sub-Saharan Africa. In the central African rain forest region of Kasai, individuals commonly orient themselves in relation to the flow of rivers.[74]

The German explorer Eduard Robert Flegel had his map of the Benue River system corrected by King Abdulrahamani of Ibi during an expedition to the Benue in July 1879. Flegel wanted to visit the community of Wukari, which his map placed along the course of a river labeled Kogi-n-Kalem, but he learned from the king that no such river approached Wukari. Abdulrahamani then "slightly raised his sheepskin, which served as a throne blanket, and, with his very own finger, drew the hydrographic system for me in the sand." The king proceeded to mark points along the lines representing rivers and gave the names of the villages they represented. Flegel

73. Bernus, "Points cardinaux," esp. 103, and "Perception du temps" (note 72). For similar conventions in European languages, see Woodward, "Medieval *Mappaemundi,*" 337 (note 31).

74. Jan Vansina, personal communication, 7 August 1995.

transcribed this ground map to paper to correct his own map of the Benue River system.[75]

There are innumerable instances of Africans' providing "oral maps" to European explorers. In Jakob Erhardt's mid-nineteenth-century memoir explaining his map of eastern and central Africa showing Lake Victoria in the shape of a giant slug, he acknowledges his dependence on ivory and slave traders for geographical information along the main caravan routes between the east African coast and Lake Tanganyika. Charles Beke gave credit to his informant in the title of a schematic map of southern Ethiopia: "Map of the Countries South of Abessinia, Drawn under the Dictation of 'Omar ibn Nedját by Dr. Beke." 'Omar ibn Nedját was a Muslim merchant from Dérita who provided Beke with details on the course of the Gojab River. MacQueen similarly acknowledges the value of information provided by African informants when discussing his theories on the course of the Niger River.[76]

In summary, there is considerable evidence showing the influence of African maps on European mapmaking in the nineteenth and twentieth centuries. The examples cited here surely represent just a small number of what must have been innumerable cartographic encounters between Africans and Europeans. On the basis of this limited evidence, we can identify three major influences of African mapmaking on European maps of the continent. First, African maps were used by explorers to correct and, in significant ways, to construct their maps. This was true not only for explorers in Africa, but also for armchair geographers at home. Second, the topological nature of African maps in which location and orientation are derived from local historical and cultural (i.e., non-coordinate-based) determinations is also evident in European maps. For example, the linear form and temporal basis of indigenous mapping in which distance is measured by a day's journey on foot along a commercial or religious itinerary are represented in many European maps. Third, the place-names contained in the maps of Africans were widely transcribed onto European maps. It is ironic that African mapmaking contributed to the drawing of improved maps of the continent by Europeans who ultimately used them in partitioning Africa into colonies.

FIG. 3.17. WOMAN DRAWING A MAP IN THE SAND. This photograph taken in 1968 shows a Tuareg woman of the Kel Adagh group in the Adrar des Iforas massif (Mali) drawing a map of the Ouzzeine Valley in the sand, showing its main axis and its perpendicular branches.
By permission of Edmond Bernus, Paris.

European Influences on African Mapmaking

One of the most ambitious mapmaking enterprises emerged in the early twentieth century in the kingdom of Bamum in the grasslands of western Cameroon. Under the leadership of King Njoya (ca. 1875–1933), the people of Bamum developed their own alphabet and undertook a major topographic survey of the kingdom. There is some uncertainty whether Njoya was a self-taught mapmaker or learned to make maps from German missionaries or the cartographer Max Möisel. Nor is it certain whether Njoya himself engaged in mapmaking or whether a member of his court served as the king's cartographer. It is likely that Njoya was making maps before the German occupation and that his later work was influenced by Möisel.[77]

75. E. Robert Flegel, "Städtebilder aus West- und Central-Afrika," *Mittheilungen der Geographischen Gesellschaft in Hamburg, 1878–79*, 300–327, esp. 305–7.

76. James [Jakob] Erhardt, "Reports respecting Central Africa, as Collected in Mambara and on the East Coast, with a New Map of the Country," *Proceedings of the Royal Geographical Society* 1 (1855–57): 8–10; Beke, "On the Nile," 44 (note 55); MacQueen, "Geography of Central Africa," 702–6 (note 51).

77. Idellette Dugast and Mervyn David Waldegrave Jeffreys, *L'écri-*

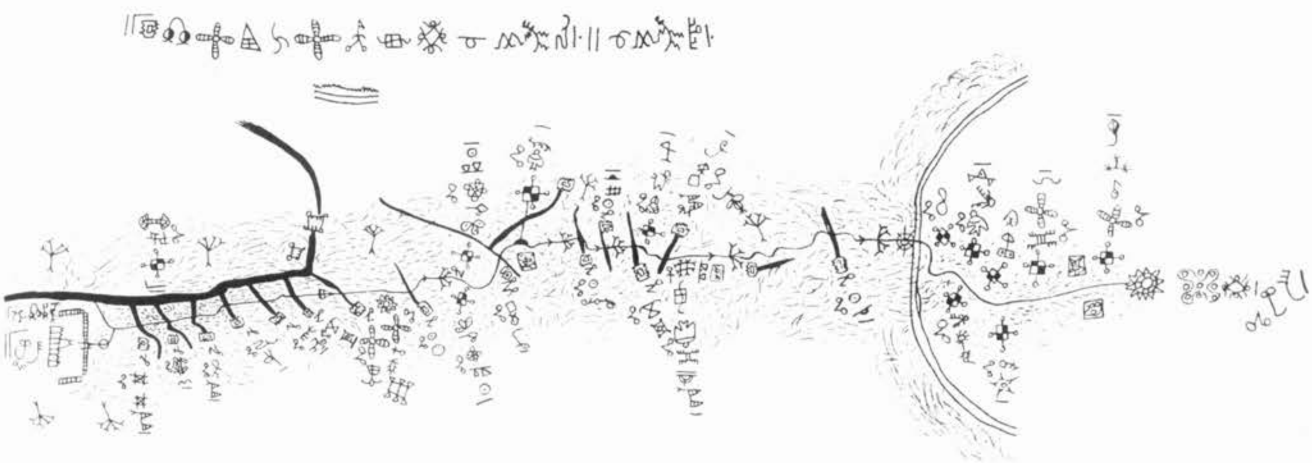


FIG. 3.18. KING NJOYA'S ROUTE MAP BETWEEN HIS FARM AND FUMBAN (1906). Paper and ink. Place-names are written in the *mbima* alphabet. Size of the original: unknown. From Bernhard Struck, "König Ndschoya von Bamum als Topograph," *Globus* 94 (1908): 206–9, esp. 208.

The earliest cartographic work attributed to King Njoya is a route map between his farmstead and the royal capital of Fumban and a plan of his farm. The route map, shown in figure 3.18, is noteworthy because it is an example of mapmaking in Bamum before European influence. It is oriented toward the southwest and shows Njoya's farm to the left and Fumban to the far right behind the arc-shaped city wall. Depicted along the route are fourteen streams identified by their names, hills represented by a treelike ideograph, and farmsteads with the names of their owners. To the left of the stream just outside Fumban, the road makes a winding path over "Evil Hill." Struck notes that the map was drawn in pencil on paper and that "the end of the route is drawn on the back side of the paper because there was not enough room on the front side." The map was presented by Njoya himself to the German missionary M. Göhring to show the location of his farm.[78]

In 1912 Njoya decided to make a map of his entire kingdom. He admired Möisel's maps of Cameroon but considered them of limited value for his own administrative needs, such as allocating land rights and resolving land disputes within Bamum.[79] To construct the map, Njoya organized a topographic survey led by twenty members of his entourage. It was organized into specialized groups: bush clearing crews, surveying teams who recorded their observations in notebooks, and servants who waited on the king and his surveyors. The king's twenty topographers supervised and checked the work of the survey crews. Dugast and Jeffreys interviewed the principal leader of the survey team, Nji Mama, who estimated that sixty individuals participated in the survey.[80]

Work began in early April 1912 and continued for close to two months. At each village in the kingdom, a guide would accompany a survey team to report the extent of village boundaries and rural domains, the names of local streams and mountains, and other pertinent information. Distances were calculated by using watches and noting the time it took to walk from one stop to the next. Njoya halted the survey at the beginning of the rainy season when travel became increasingly difficult. The expedition notebook kept by Nji Mama indicated that the topographers had made thirty stops over fifty-two days and had surveyed two-thirds of the kingdom.[81] The death of the king's mother followed by the turmoil of World War I prevented Njoya from recommencing work until 1918, when a survey of the capital city of Fumban was undertaken. The remaining third of the kingdom was surveyed in January 1920. Nji Mama and King Njoya were

ture des Bamum: Sa naissance, son évolution, sa valeur phonétique, son utilisation, Mémoires de l'Institut Français d'Afrique Noire (Centre du Cameroun), Populations, no. 4 (1950). Struck argues that Njoya was making maps at least a year and a half before Möisel passed through Bamum for the first time; Bernhard Struck, "König Ndschoya von Bamum als Topograph," *Globus* 94 (1908): 206–9. Njoya did speak with Möisel about German cartographic techniques, which probably influenced his later work. Claude Tardits believes that King Njoya was exposed to mapmaking during his visits to a German missionary school established in Bamum in 1906 (personal communication, 18 December 1995).

78. Struck, "König Ndschoya," 208, and see also Dugast and Jeffreys, *L'écriture des Bamum,* 13 (both note 77).

79. Claude Tardits, *Le royaume Bamoum* (Paris: Armand Colin, 1980), 761–69.

80. Dugast and Jeffreys, *L'écriture des Bamum,* 68–71 (note 77).

81. According to Dugast and Jeffreys, *L'écriture des Bamum,* 69 n. 2, one of the surveyor's notebooks could be seen in the collection of the Musée de l'Homme in Paris. When I went to consult this item in the Département de l'Afrique Noire in November 1995, however, it was missing from the collection of Bamum materials.

responsible for constructing the actual *lewa ngu,* or map of the kingdom.

The map of Bamum shown in plate 3 is attributed to Ibrahim Njoya. It is distinguished by its western orientation, the exaggerated size of the royal capital, and the capital's placement at its center. It is colored showing rivers in blue, mountains in green, and two black, white, and red disks signifying the rising (bottom disk) and setting sun (top disk). The rectangular shape of the *lewa ngu* is achieved by stretching the western boundary of the kingdom beyond its actual extent. The true shape of the kingdom was triangular, as Dugast and Jeffreys well illustrate.[82]

The map's form and content nicely illustrate the political use of maps. In the 1890s Njoya's rule was contested by members of his court. A siege of Fumban was finally broken only after the Fulße of Banyo came to his aid.[83] During the early twentieth century, Njoya sought to consolidate his control over Bamum through diplomacy, warfare, and collaboration with colonial authorities.[84] His maps promoted this political goal by presenting "images of rule," which effectively mask these power struggles and create a sense of unity.[85] This image is attained graphically by framing the kingdom within an extraordinarily symmetrical river system, which is itself enhanced by the quadrilateral border design. Hundreds of place-names are found along the edge of the kingdom, suggesting that the king's topographers essentially delimited the territory of Bamum by walking its perimeter. The exaggerated scale of Fumban is an emphatic statement that draws the viewer's attention to the political heart of the kingdom. The chiaroscuro of blank white spaces and dark boundary lines accentuates the image of power and unity.

The medallions and celestial signs in the map's margins not only orient it toward the west but also enhance the image of rule. The medallion on the left states, "This is where the rains begin"; the one on the right reads, "Here is where the rains end, to the right, in Bamum country." The circle at the lower right shows where the full moon rises; the crescent moon at the top shows where the new moon rises. The star closest to the crescent moon appears in the western sky at the time of day "when women prepare the evening meal." To its right is a star with a tail that signifies, "If we go to war this year, we will win." Next to the full moon at the bottom is the morning star, seen in the eastern sky by Bamum warriors as they prepared to attack their enemy.[86]

These decorative features refer on one level to the political-economic basis of precolonial Bamum, in which rain-fed agriculture and warfare were characteristic. Successful wars brought new territory and slaves into Bamum's orbit, greatly expanding the wealth and prestige of the kingdom.[87] On another level, the celestial bodies and medallions in the map's margins function as a cosmic framing device to place the kingdom within the cyclical rhythms of the heavens. These signs suggest that the sun (and other celestial elements) rises and sets over Bamum in an orderly, predictable manner. They accentuate if not celebrate the unity and integrity of the kingdom, which was in fact being undermined by colonial rule. By 1924, French authorities subdivided Bamum into administrative regions and restricted Njoya's role to judicial affairs in Fumban.[88]

An early version of this map was prepared by Njoya in 1916 when British troops temporarily occupied Bamum (fig. 3.19). It shows a well-defined territory in which all roads lead to the royal capital. Its form resembles a concentric circle with the walled city of Fumban at its center. Two outer circles are shaped by the courses of the rivers that delimit Bamum as a coherent if not symmetrical whole. The orientation is to the south, as symbolized by the rising sun on the left side of the map and the setting sun on the right. A legend is at the lower right. Njoya attached this map of his domain to a letter to the king of England in which he petitioned for British protection against Germany. In a letter to the secretary of state for the colonies, Major General C. Dobell credited Njoya himself with making the map. Njoya's map establishes his claim to rule over territory that was contested before colonial rule and was now the subject of negotiation between France and Britain. It is the product of a political

82. Dugast and Jeffreys, *L'écriture des Bamum,* 68–71 (note 77). They published the map with north at the top. Another version of the *lewa ngu* made by Ibrahim Njoya was collected by Claude Tardits in 1960–61 in Fumban. Tardits recalled that Ibrahim Njoya reproduced this map on a number of occasions to sell to Europeans. He used a master copy for a base map. The hand-drawn version Tardits collected is very similar to the one shown in plate 3, with important differences linked to its reproduction for a European audience. In many places the names of localities or physical geographical features are written in the roman as well as the Bamum alphabet. French words also appear near the medallions ("Nord," "Sud") and in the legend. The map appears to have two orientations. A westerly orientation is maintained from the original map, but a northerly one is suggested by the placement of the legend in the southeast corner. To read the legend, one must turn the map so that north is at the top. The map has also been updated from the one shown in plate 3 in that it shows new localites established by immigrant coffee growers near the Noun (Moinun) River.

83. Tardits, *Le royaume Bamoum,* 204–9 (note 79).

84. Claude Savary, "Situation et histoire des Bamum," *Bulletin Annuel* (Musée d'Ethnographie de la Ville de Genève) 20 (1977): 117–39, esp. 120–22.

85. J. B. Harley and Kees Zandvliet, "Art, Science, and Power in Sixteenth-Century Dutch Cartography," *Cartographica* 29, no. 2 (1992): 10–19; the phrase comes from Thomas Da Costa Kaufmann, "Editor's Statement: Images of Rule: Issues of Interpretation," *Art Journal* 48 (1989): 119–22.

86. Savary, "Situation et histoire des Bamum," 129 (note 84).

87. Tardits, *Le royaume Bamoum,* 130 (note 79). During the first half of the nineteenth century, the area of Bamum increased almost sevenfold as a result of King Mbouémboué's conquests.

88. Tardits, *Le royaume Bamoum,* 241–66.

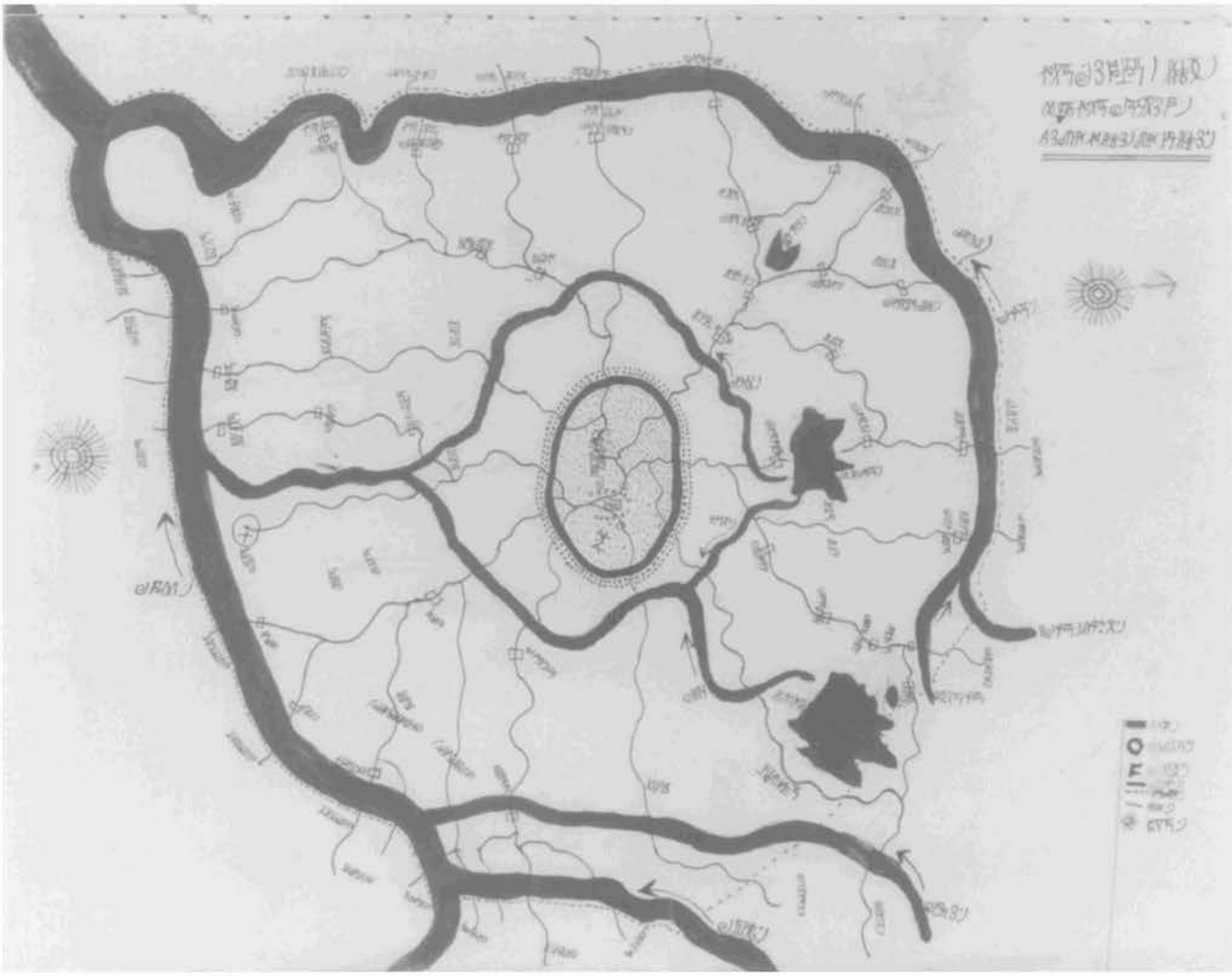


FIG. 3.19. KING NJOYA'S MAP OF HIS KINGDOM PRESENTED TO BRITISH AUTHORITIES IN 1916. South is at the top. Paper and ink.
Size of the original: 21 × 29.5 cm. Photograph courtesy of the Public Record Office, London (649/7).

transition in which Njoya used his mapmaking skills to safeguard the territorial claims of Bamum and to preserve his role as its traditional sovereign.[89]

Njoya clearly understood the power of maps, especially their practical value in administrative and diplomatic affairs. Figure 3.20 suggests that maps were also appreciated for their symbolic value in reinforcing the political status of Bamum's rulers. Inside the royal chamber, amid the emblems of authority such as the royal throne and elephant tusks, the king (or his son, the young sultan Seidou, who succeeded him in 1933)[90] sits in front of a wall map. It is a map of Cameroon, most likely one of Möisel's maps of German Cameroon. The photograph recalls seventeenth-century French and Dutch paintings in which maps and globes appear as icons of wealth, knowledge, and power.[91] Njoya's poise and his known penchant for photography suggest that this is a self-conscious

89. "Letter from Njoya, Chief of the Bamum Tribe, to H.M. the King," 2 February 1916; "Letter to Secretary of State for the Colonies, A. Bonar Law, M.P., from Major General C. Dobell, Commanding the Allied Forces, West African Expeditionary Force," 2 February 1916, Duala (both in Public Record Office, London, CO 649/7); and Savary, "Situation et histoire des Bamum," 121–22 (note 84).

90. There is some doubt who is actually pictured in the photograph. The Musée de l'Homme caption reads: "Njoya, sultan de Foumban dans son palais." However, when Christraud M. Geary, curator of the Eliot Elisofon Photographic Archives at the Smithsonian Institution's National Museum of African Art and the authority on Bamum photography, showed this image to several people in Fumban, the consensus was that it is Sultan Seidou, not Njoya (personal communication, 22 January 1996).

91. Svetlana Alpers, "The Mapping Impulse in Dutch Art," in *Art and Cartography: Six Historical Essays,* ed. David Woodward (Chicago: University of Chicago Press, 1987), 51–96; J. B. Harley, "Maps, Knowledge, and Power," in *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments,* ed. Denis Cosgrove and Stephen Daniels (Cambridge: Cam-

FIG. 3.20. KING NJOYA OF BAMUM (OR HIS SON, SULTAN SEIDOU). This picture was taken at the palace in Fumban sometime between 1917 and 1933. Note the map of Cameroon on the wall at the left.

By permission of the Musée de l'Homme, Paris (no. C-35-1217).

image in which the map is an icon of territorial and political control.[92]

The royal tapestry showing the plan of the old palace grounds of Fumban (fig. 3.21) is an example of how far mapmaking had become institutionalized in Bamum. The large stitch-and-dye hanging was made from local handspun cotton woven into narrow two-inch strips that were later sewn together. An outline of the palace ground plan was sketched on the undyed cloth and then gone over with tight stitching. After the cloth was dyed with indigo and dried, the outline was unstitched and the ground plan appeared as the undyed area of the cloth. Bamum tie-dyed tapestries were viewed as prestige objects among regional chiefs and were commonly displayed in Fumban during royal functions. With its emphasis on the locus of traditional power in the kingdom, the tapestry plan can be read as an expression of the king's political authority in Bamum. Purchased in 1933, the same year Njoya died destitute in exile, it could also be interpreted as a nostalgic mapping of an earlier political geography, before colonial rulers redrew boundaries, appointed puppet chiefs, and established new centers of power.

Another example of statecraft and mapmaking is the Ethiopian map produced in the military camp of Ras Makonnen in Adwa in 1899 (fig. 3.22). It was given to the Italian historian Carlo Conti Rossini, who presumably added the place-names and notes in Italian. The rectangular map is oriented toward the north, which Conti Rossini believed reflected European influence. He viewed the actual drawing, however, as "the first expression of

bridge University Press, 1988), 277–312, esp. 295–96; Catherine Hofmann et al., *Le globe et son image* (Paris: Bibliothèque Nationale, 1995), 56–61.

92. On Njoya's interest in photography, see Christraud M. Geary, *Images from Bamum: German Colonial Photography at the Court of King Njoya, Cameroon, West Africa, 1902–1915* (Washington, D.C.: National Museum of African Art by the Smithsonian Institution Press, 1988), and Christraud M. Geary and Adamou Ndam Njoya, *Mandou Yénou: Photographies du pays Bamoum, royaume ouest-africain, 1902–1915* (Munich: Trickster, 1985), esp. 40, 108.

Corner stones and guardhouses of the walled and fenced palace property.

Huts of the paramount wives of the ruler.

Clubhouses of the palace officials.

Garden plots of the members of the household.

Residence quarters of officials, divided into sections or "quarters."

Food storage huts, corn bins.

Private quarters of the ruler and the Queen-Mother of the dynasty.

Audience chambers.

Dwellings of the wives, female relatives, and female servants along the palace boundary.

Treasury huts, protected by the double-headed serpent emblem of the dynasty.

Shrines and ceremonial quarters.

Crosses in circles and squares indicate division of space and protective magic; traditional Tikar concepts about the perils of crossroads are incorporated in Bamum symbolism, making the cross a protective device.

Two interpretations are offered for the irregular lines outside the bounded property:
1) royal claims to vegetation and farms adjacent to the palace grounds;
2) reference to magical protection of the soil through past animal sacrifice.

FIG. 3.21. ROYAL TAPESTRY OF THE KING'S PALACE AT FUMBAN. Royal tapestry showing an idealized ground plan of the old palace grounds in Fumban in the kingdom of Bamum. The ground plan was first sketched on undyed cloth. This outline was then gone over with tight stitching before the entire fabric was dipped in indigo dye. When dry, the outlined pattern was unstitched and the ground plan appeared as the undyed portion of the cloth. A key to the pattern is shown on the right.
Size of the original: 84 × 28 cm. Photograph courtesy of the Portland Art Museum (cat. no. 70.10.81). Interpretation after Paul Gebauer, *Art of Cameroon* (Portland: Portland Art Museum, 1979), 374.

Abyssinian cartography; it deserves to be known because (if we exclude the orientation) it seems totally exempt of European influences."[93] In fact, Ras Makonnen was quite familiar with how Europeans used maps as tools for empire building. For example, he was present at a meeting in early November 1898 between Emperor Menelik and John Harrington, the British minister in Addis Ababa, at which Harrington informed Menelik of Britain's recent advances in the Sudan. Harrington's report of this meeting suggests that Ethiopian leaders appreciated the discourse function of maps.

> The news of the occupation of Gedaref was received with apparent indifference by the King and those present, viz., M. Ilg and Ras Makunan; but when I notified the occupation of Roseires, everyone's face showed signs of astonishment. "Where is that?" said the King. I showed him Roseires on the map. The King then asked M. Ilg where the 14th degree north was. When shown, the King, drawing his finger over the country contained between 14° and 2° and bounded on the west by the White Nile, said to me, "That all belongs to me."[94]

Unknown to Britain, in December 1897 Menelik had sent eighty thousand troops under Ras Makonnen to eastern Sudan with the goal of annexing the gold-rich province of Bela Shangul. Resistance was strong, but Makonnen's forces ultimately went as far north as Roseires, where he presented the local ruler with Ethiopia's flag to symbolize its new status as an Ethiopian protectorate. Like his fellow European expansionists, Menelik was "playing the game of effective occupation" (Harrington's phrase) to strengthen his country's territorial claims in anticipation of future negotiations over boundary areas.[95]

Makonnen's map shows the extent of Ethiopia's southerly expansion under Menelik until 1899. Entotto (Intotto), the initial site of Ethiopia's capital city, lies at its center. What is unusual about this map is the nearly complete omission of cities, regions, and ethnic groups to the west of Entotto. The Uabe River takes up considerable space in the southwest quadrant leading to the (dis)placement of southwestern cities to the west and northwest (e.g., Gimma [Jīma] and Caffa [Kaffe]). As Conti Rossini correctly notes, the map's silence on the western region was not a reflection of Ras Makonnen's ignorance of the area.[96] Makonnen's forces ultimately conquered the Mahdist sheikdoms of Bela Shangul (Beni Shangul), Aqoldi (Asosa), and Khomosha. For political reasons, however, the emperor Menelik wished to conceal the extent of Ethiopian advances in the Wallaga region from European ministers resident in Addis Ababa.[97] Conti Rossini believed that the suppression of geographical information on the western frontier stemmed from the emperor's prohibition. Those who dared talk about the Bela Shangul expedition would be punished by having their tongues cut out. Not surprisingly, when Conti Rossini was in Ras Makonnen's camp, "people would speak of that expedition in a subdued tone."[98]

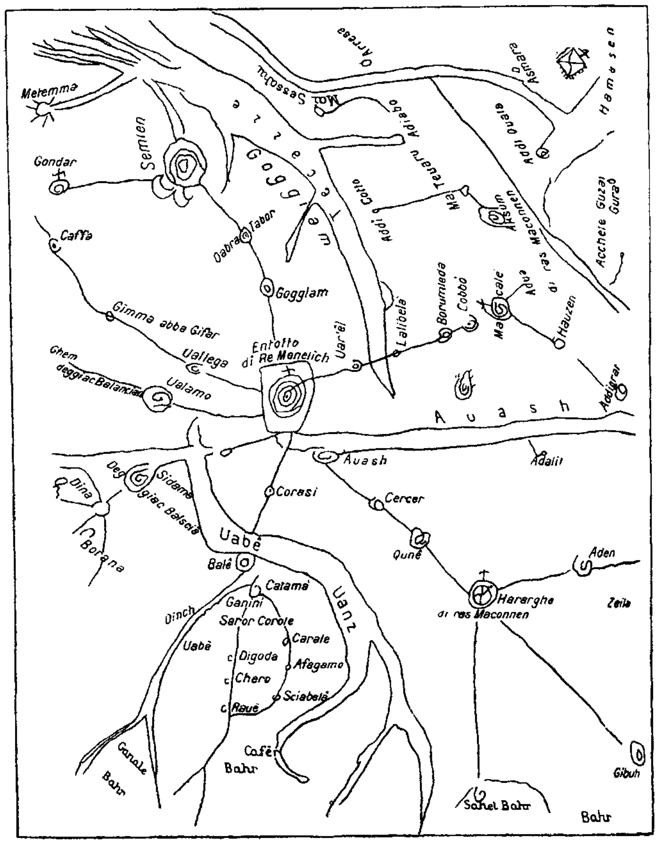


FIG. 3.22. MAP OF ETHIOPIA ATTRIBUTED TO "THE CAMP OF RAS MAKONNEN," 1899. Entotto (Intotto), an early location of Ethiopia's capital, lies at the center of the map. North is at the top.
Size of the original: unknown. From Carlo Conti Rossini, "Geographica," *Rassegna di Studi Etiopici* 3 (1943): 167–99, esp. 174 (fig. 9).

In summary, the European influences on African mapmaking are evident in the materials used (paper, ink,

93. Conti Rossini, "Geographica," 175 (note 24).

94. Quoted in Alessandro Triulzi, "Prelude to the History of a No-Man's Land: Bela Shangul, Wallagga, Ethiopia (ca. 1800–1898)" (Ph.D. diss., Northwestern University, 1980), 259.

95. Quoted in Triulzi, "Prelude," 255.

96. Conti Rossini, "Geographica," 175 (note 24).

97. Bahru Zewde, *A History of Modern Ethiopia, 1855–1974* (London: James Currey, 1991), 66, 82–83, and Triulzi, "Prelude," 253–54 (note 94).

98. Conti Rossini, "Geographica," 175 (note 24).

crayons), in the northerly orientation of some maps (e.g., Ras Makonnen's map), and in the methods employed in their construction (e.g., Njoya's topographic survey). The use of maps by African rulers as diplomatic tools also reflects European influence during the late nineteenth- and early twentieth-century partition of the continent into colonies. Other cartographic details appear to be cross-cultural, such as positioning the locus of power in the middle of the map, selecting and omitting details based on the mapmakers' goals, and the existence of sign systems capable of conveying the mapmakers' messages.

Conclusion

Given the cultural relativity of sign systems, geographical orientation, and intention, we should be careful about evaluating the mapmaking abilities and products of other peoples according to the assumptions and standards of any single tradition. The most commonly shared feature of European and African mapmaking is the social discourse function of maps. Like those of other traditional cultures, African maps are social constructions whose form, content, and meaning vary with the intentions of their makers. The variety of materials and audiences reflects the diversity of social situations in which maps were produced. Whether in the arrangement of beads and shells on a *lukasa* or in the tie-dyed cloth of Bamum, the process of selection, omission, and positioning is influenced by the mapmaker's desire to influence specific social and political situations. This discourse function means that the sign systems employed do not necessarily have to be understood by everyone. Maps may be esoteric and therefore understood by only a small group such as Budye society initiates, or they may speak to a much wider audience, as does Ras Makonnen's map. It is this variable and changing social nature of maps that links African mapmaking with other traditional cartography surveyed in this book and other volumes of *The History of Cartography*.

Traditional Cartography in the Americas

4 • Maps, Mapmaking, and Map Use by Native North Americans

G. Malcolm Lewis

Even when "map" is defined as broadly as in this volume, evidence for the existence of maps in the native Indian, Inuit, and Aleut cultures of North America is scattered, uneven, and plagued with problems of interpretation. In addition, since all cultures are in a constant state of change, it is not always possible to draw hard and fast boundaries between "Indian" and "European" cartographies or to ascertain what is truly "traditional," "indigenous," or "original."[1] This problem is shared with other chapters in this volume, but it is clearly not one that has prevented us from attempting to describe Native American ways of representing worlds and landscapes in a worldwide history of cartography. This approach springs from the conviction that such stocktaking is necessary if we are to compare how cultures deal with a fundamental human problem–relating themselves to their milieu and to the cosmos.

Precontact, Contact, and Postcontact Maps

Despite these difficulties, it is possible to recognize three broad categories of Amerindian cartography, all associated with the concept of contact with Europeans and Euro-Americans. The first stage, precontact, predates even indirect European influence and is rooted in antiquity. Evidence of maps that were made largely independent of European influence, however slender, consists of rock art and man-made structures such as mounds, representing mainly celestial and cosmographical subjects. The second stage, comprising maps made at the time of first contact with explorers, traders, soldiers, missionaries, and early settlers for a variety of exploratory, economic, and political negotiations, dates from the mid-sixteenth century to the late nineteenth, depending on region. The main sources of evidence for such maps are accounts of ephemeral maps in early literature on discovery and exploration and very few surviving artifacts on birchbark, skin, bone, and wampum. The third stage dates from the establishment of the first permanent Euro-American settlements, the development of regular trade and communications networks, and the beginnings of resource exploitation. In this category we find Indian maps made to aid communication with Euro-Americans and to satisfy their requests for information about routes, strategic relationships, and resource locations. They are the most numerous and consist mainly of terrestrial maps drawn on paper in various states of acculturation ranging from entirely native drawn, annotated originals, transcripts made

The work this chapter is based on was carried out over approximately twenty years, during which I have been helped by hundreds of individuals. I acknowledge those who in retrospect I consider to have influenced me most or provided the greatest assistance. Twenty years ago, Herman Friis and David Woodward persuaded me to take seriously my incipient interest in the maps of native North Americans. David went one stage further and helped me begin implementing that advice. At that time I also received invaluable help and encouragement from three other historians of cartography, Louis De Vorsey, Richard Ruggles, and Norman Thrower. Many individuals in innumerable institutions helped in my searches. Of these Ed Dahl, Robert Karrow, and Charles Martijn were not only responsive to my requests but spontaneous in repeatedly bringing items to my attention. Francis Jennings and Helen Hornbeck Tanner gave me valuable advice during my several visits to the Newberry Library, Chicago. Roy Macdonald, Ojibwa chief of the Whitedog Reserve, Ontario, first made me aware of the ways traditional myth so often infuses topographic reality. In recent years I have been much influenced by contacts with several relative "newcomers" to the field, in particular Barbara Belyea, Margaret Pearce, Robert Rundstrom, and Gregory Waselkov. In the incipient stages of research I was greatly assisted in Sheffield by my then research assistant, Margaret Wilkes; likewise toward the end by Jim McNeil, who carefully systematized and further researched my records. My wife, Margaret, provided invaluable secretarial assistance and independent perspective. To each of these individuals I extend my sincere thanks.

Of the many institutions to which I am indebted, two are paramount. The Hermon Dunlap Smith Center for the History of Cartography at the Newberry Library, Chicago, provided me with a prestigious North American base from which to develop my search networks, and the Department of Geography at the University of Sheffield allowed me the freedom to develop my interest with the support of members of its superb secretarial and technical staffs.

Very little of my work would have been possible without financial support, and I gratefully acknowledge grants from the British Academy, the Canadian High Commission (London), the Economic and Social Research Council and its predecessor the Social Science Research Council, the History of Cartography Project at the University of Wisconsin–Madison, the Newberry Library, the Ontario Heritage Foundation, and the University of Sheffield.

1. J. C. H. King, "Tradition in Native American Art," in *The Arts of the North American Indian: Native Traditions in Evolution*, ed. Edwin L. Wade (New York: Hudson Hills Press, 1986), 64–92, esp. 65.

by the solicitors of information, and published engraved versions.

In all these cases, it is important to remember that it was not always the map artifact itself that was the object of curiosity or significance; usually it was the process by which the artifact was made. One of the earliest described examples was the cosmographical map of 1607 observed by John Smith, showing the southern Algonquian world, a circumambient ocean, Smith's land somewhere in that ocean, and the supposed edge of the world (see figs. 4.11 and 4.12). Although the end product was modeled on the earth floor of a longhouse and may have survived only a few hours or days, much of the information content was incorporated in the performance of a three-day ceremony. In another less well known example–in this case entirely gestural–a Micmac chief brought the tips of his thumb and forefinger close together to form a nearly complete circle, then identified the joints along the circle as Quebec, Montreal, New York, Boston, and Halifax (fig. 4.10 below). The small space between forefinger and thumb signified the imminent surrounding of his band.

Ideally, the history of traditional cartography in North America would draw mainly on precontact and contact evidence. Regrettably, the problems of dating and verifying precontact evidence, the paucity of extant examples, and the ambiguity of many textual accounts necessitate the cautious use of postcontact maps that appear to be indigenous. It is difficult to determine how extant examples and historical accounts might relate to precontact maps, but they may give us a window on earlier practices. The incorporation of elements of Indian spatial information, in various forms, into maps made by Europeans is not central to this volume, but it too may provide insight into Native American mapmaking.[2]

Native Words for "Map"

As is the case with other indigenous societies, it is very unlikely that Indian and Inuit languages contained a verb or noun equivalent to "map" before the arrival of Europeans. Indigenous maps were based on different assumptions than European maps and created for different functions. They were born of experience and oral tradition, not an inscribed archival history in the Western sense. Word lists and dictionaries of Indian languages compiled after contact tended, at least until recently, to be unrepresentative of complete vocabularies, omitting many words that were not important in the contexts of Indian-European discourse. Conversely, Indian languages developed new words for embracing European categories. For example, a modern dictionary of Cheyenne gives *ho'evà-ho'xe'èstóo'o* for "map"; its root meaning is made up of the nouns for "land" and "paper."[3] Whereas land is undoubtedly a native concept, paper (and the closely associated words for "book" and "letter") is certainly not. Nevertheless, leaving aside complex etymological issues, there are major differences between language groups in the incidence of nouns for "map." In a sample of ninety-one Indian–English and French dictionaries, twenty-four (26 percent) contained entries for map, but the frequency varied significantly between language groups: Siouan 100 percent, Na-Dene and Algic 35 percent each, Iroquoian 18 percent, and Uto-Aztecan 14 percent. In a total of twenty-four Caddoan, Salishan, and Penutian language group dictionaries there were no incidences of "map." Half of the Eskimo/Inuit dictionaries had entries for "map." Some of these differences between language groups are statistically significant, but the reasons are unclear. They probably reflect such variables as the period of first contact with Europeans, the social and economic nature of the postcontact encounter, the period and purpose of dictionary compilation, and the background of the compiler.

Probably long before the arrival of the first Europeans, pictography was a continentwide mode of communication.[4] But Indian discourse did incorporate what, with ref-

2. On this subject, see the following articles by G. Malcolm Lewis: "Indicators of Unacknowledged Assimilations from Amerindian *Maps* on Euro-American Maps of North America: Some General Principles Arising from a Study of La Vérendrye's Composite Map, 1728–29," *Imago Mundi* 38 (1986): 9–34; "Misinterpretation of Amerindian Information as a Source of Error on Euro-American Maps," *Annals of the Association of American Geographers* 77 (1987): 542–63; "Indian Maps: Their Place in the History of Plains Cartography," in *Mapping the North American Plains: Essays in the History of Cartography,* ed. Frederick C. Luebke, Frances W. Kaye, and Gary E. Moulton (Norman: University of Oklahoma Press, 1987), 63–80; "La Grande Rivière et Fleuve de l'Ouest/The Realities and Reasons behind a Major Mistake in the 18th-Century Geography of North America," *Cartographica* 28, no. 1 (1991): 54–87; and "Metrics, Geometries, Signs, and Language: Sources of Cartographic Miscommunication between Native and Euro-American Cultures in North America," in *Introducing Cultural and Social Cartography,* comp. and ed. Robert A. Rundstrom, Monograph 44, *Cartographica* 30, no. 1 (1993): 98–106 (translated as "Communiquer l'espace: Malentendus dans la transmission d'information cartographique en Amérique du Nord," in *Transferts culturels et métissages Amérique/Europe, XVI^e^–XX^e^ siècle,* ed. Laurier Turgeon, Denys Delâge, and Réal Ouellet [Sainte-Foy, Quebec: Presses de l'Université Laval, 1996], 357–75). See also D. Wayne Moodie, "The Role of the Indian in the European Exploration and Mapping of Canada," *Zeitschrift für Kanada-Studien* 26 (1994): 79–93; Barbara Belyea, "Inland Journeys, Native Maps," *Cartographica* 33, no. 2 (1996): 1–16 (this will also appear as chapter 6 in *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis [Chicago: University of Chicago Press, 1998]); and idem, "Mapping the Marias," forthcoming.

3. Northern Cheyenne Language and Culture Center Title VII ESEA Bilingual Education Program, *English-Cheyenne Student Dictionary* (Lame Deer, Mont., 1976), 66, 61, and 78.

4. See Garrick Mallery, "Pictographs of the North American Indians: A Preliminary Paper," in *Fourth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, 1882–'83* (Washington, D.C.: United States Government Printing Office, 1886),

erence to a quite different culture and period, has recently been referred to as "non-cartographic structurings of space."[5] These almost certainly involved the use of landmarks and routes as references, but in the absence of authentic contact texts, we cannot be certain how. What is certain is that all Indian languages had grammatical and syntactic features enabling a speaker to refer to the locational characteristics of the situation in which a discourse took place.[6] These features were the linguistic equivalents of spatially structured pictographs.

The Importance of Cosmography

Native American spatial representations of the cosmos are set in a web of spiritual meanings that are carried over into everyday life.[7] The Oglala Sioux believe the circle is sacred because everything in nature (the sun, sky, earth, moon) except stone is round, and "stone is the implement of destruction." The circle also defines the edge of the world and the origin of the four winds. Consequently it is also the symbol of the year and of the divisions of time. Carried over into day-to-day life, the circle is employed for the Oglala Sioux tipi, camp circle, and ceremonial arrangement.[8] Sometimes the circle was an organizational concept to demonstrate the importance of the central homeland. The early nineteenth-century Crow chief Arrapooash contrasted the virtues of his people's traditional territory in the Yellowstone Valley with the deterioration in conditions that occurred as one moved away from it: to the south, barren plains, bad water, and fever; to the west, bad teeth as a consequence of a fish diet; to the north, long, cold winters and little grass for horses; and to the east, muddy drinking water and confinement to villages.[9]

Peter Nabokov stresses that cosmographical concepts (and their spatial representation) were at the very root of claims and counterclaims of land and property. He uses as an example a Kiowa medicine man named White Bird who, when hearing of complaints from United States commissioners about Kiowa raiding, responded by laying out on the floor two paper circles, one white and one blue. White Bird explained that the white paper represented the earth and the blue paper the sky, with the sun, the Great Father, going around the earth. As a medicine man who controlled the weather (rain) and had access to the "Great Father," his power rested on firmer moral ground, and he was closer to the Great Father than was the great chief in Washington.[10]

Although recognizing that the formulation of a generic American Indian cosmology is a "heuristic conceit," Nabokov has usefully summarized a number of common traits. The notion of a center, the pivot of sacred geography, is common throughout North America, particularly among the Choctaws of Mississippi, the California Yuroks, the Pueblos of the Southwest, and the Hopis of Arizona. As one stands in the center and faces the rising sun, the concept of the four directions and the four corners of the universe then becomes woven into the ceremonies and architectural layouts in both Southeast and Plains Indians. The concept of the sky dome or "celestial vault" provides a shelter for this two-dimensional system and is incorporated into the building symbolism of many groups, often with complex astronomical allusions. Linking the sky and the Underworld is the vertical axis, the zenith and the nadir, adding two more directions to the four cardinal ones, plus a seventh–the center on which one stands. All these elements and dimensions were combined into complex "whole cosmologies" depicted by cosmograms and incorporated into dwellings.[11] Thus, for example, the Pawnee earth lodge, the Seneca longhouse, or the Navajo male hogan becomes, in a very real sense, a map of the universe.[12]

Although Native American spirituality underlies many of the worldviews, one should not necessarily assume that

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4–256, esp. 157–59 (which gives several nineteenth-century cartographic examples), and idem, "Picture-Writing of the American Indians," in *Tenth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, 1888–'89* (Washington, D.C.: United States Government Printing Office, 1893), 1–822, esp. 329–57.

5. Kai Brodersen, *Terra Cognita: Studien zur romischen Raumerfassung* (Hildersheim: Georg Olms, 1995), esp. 31.

6. In linguistic theory, "spatial deixis" is the term used to subsume those features of language that refer to the locational characteristics of the situation within which an utterance takes place. It is hence linked cognitively to the egocentric structuring of maps, in which the center is enhanced and the periphery deemphasized. Every North American Indian language family possesses spatial deictic features. Of these, locative suffixes and locative directional markers are virtually universal, associated in a few cases with the use of locative prefixes, prepositions, or postpositions: Joel Sherzer, *An Areal-Typological Study of American Indian Languages North of Mexico* (Amsterdam: North-Holland, 1976).

7. See Peter Nabokov, "Orientations from Their Side: Dimensions of Native American Cartographic Discourse," in *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use*, ed. G. Malcolm Lewis (Chicago: University of Chicago Press, 1998), chap. 11.

8. J. R. Walker, "The Sun Dance and Other Ceremonies of the Oglala Division of the Teton Dakota," *Anthropological Papers of the American Museum of Natural History* 16 (1917): 51–221, esp. 160.

9. James H. Bradley, "Arrapooash," *Contributions to the Historical Society of Montana* 9 (1923): 299–307, esp. 306–7.

10. Nabokov, "Orientations," 16 (note 7), from Raymond J. DeMallie, "Touching the Pen: Plains Indian Treaty Councils in Ethnohistorical Perspective," in *Ethnicity on the Great Plains*, ed. Frederick C. Luebke (Lincoln: University of Nebraska Press, 1980), 38–53, esp. 49.

11. Nabokov, "Orientations," 15–26.

12. See, for example, Ray A. Williamson and Claire R. Farret, eds., *Earth and Sky: Visions of the Cosmos in Native American Folklore* (Albuquerque: University of New Mexico Press, 1992), esp. Paul Zolbrod, "Cosmos and Poesis in the Seneca Thank-You Prayer," 23–51, esp. 47–48; Trudy Griffin-Pierce, "The *Hooghan* and the Stars," 110–30; Alice B. Kehoe, "Clot-of-Blood," 207–14, esp. 207–9; and Von Del Chamberlain, "The Chief and His Council: Unity and Authority from the Stars," 221–35, esp. 226–29.

such spiritual manifestations always reflected a wholly indigenous or traditional Native American culture. For example, the Delaware religious prophet Neolin borrowed a Western idea of the use of the map metaphor for the Christian journeys to heaven and hell–a popular device in nineteenth-century Europe–and adapted it to his own proselytizing. He "made a map of the soul's progress in this world and the next. . . . [He] traveled from town to town, preaching and holding the map before him while he preached, from time to time pointing with his finger to particular marks and spots on it, and giving explanations."[13]

Given these layers of meaning, it is no wonder native maps were often misinterpreted by modern scholars. For example, in studying a Skiri (Pawnee) ritual object representing the heavens on tanned animal hide known as the Pawnee star chart (below, plate 7), scholars have spent much time attempting to identify actual constellations. But one must understand that the artifact was intended not primarily as a map of the heavens, but as a mnemonic device for recalling Skiri cosmology during important ceremonies.[14] Since it derived meaning only by being associated with the Big Black Meteoric Star Bundle and the Pawnee earth lodge, the Pawnee star chart must be studied in concert with those items.[15]

Rock art might seem to be a potentially rich source of original Native American maps, and some prehistoric art is visually maplike, but here too there are many problems of interpretation. Dating techniques are still being developed, and even where the archaeological record is clear, linking rock art to the culture in which it originated always involves assumptions and speculation. Furthermore, some rock art is polygenetic, with content added by people possessing little or no knowledge of the earlier culture. Since the meaning and function of rock art are not known, what appears from a twentieth-century perspective to have the form of a topologically structured map may well have been made to represent something other than a spatial arrangement. The converse is equally true, and North American rock art may well incorporate as yet unrecognized attempts to "facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world,"[16] including the mythical and cosmographical.

Since most rock art has been made by cultures no longer living within the region, modern Indians may suggest meaning and function but are almost never able to confirm them authoritatively. Their suggestions are made from modern cultural perspectives and inevitably influenced by Euro-American acculturation. This problem is exemplified by protohistoric structures of the northwestern Great Plains generally known as medicine wheels, typically consisting of a central cairn (or small circle) of stones with radiating stone lines of unequal lengths. The age and functions of these structures are debatable, but according to a twentieth-century Blackfoot Indian they commemorated the war exploits of great chiefs. He claimed that the stone lines show the direction of each expedition, their lengths indicate the relative distances covered, and the presence or absence of cairns at the end of the lines tells whether any of the enemy were killed. The Blackfoot was reporting the words of his deceased father, who could not possibly have known that in the early eighteenth century Southeast Indians, in making maps on skin for French and English colonial officials, used very similar principles.[17] Even so, his explanation of the function of medicine wheels was only one of several about which there is continuing debate. Not all are cartographic.

Access and Conservation

Extant "original" maps and contemporary transcripts are spread throughout diverse collections in Europe as well as North America in museums, map libraries, archives, private collections, and government depositories. A significant proportion of original maps probably survives in small collections. These maps, some of which are not even thought of as maps by their custodians, are rarely listed in printed catalogs or separately itemized in collection handlists or card catalogs. In addition, map artifacts have all too frequently been separated from their supporting documents.

Published accounts of mapmaking and printed facsimiles of maps are scattered through an enormous and diverse literature spanning almost five hundred years. This literature is almost never adequately indexed and for the most part is beyond the retrieval capacity of formal search procedures. Many more unpublished accounts and transcripts doubtless exist in equally scattered, difficult to anticipate, often voluminous, and almost always inadequately cataloged archival collections.

13. Anthony F. C. Wallace, *The Death and Rebirth of the Seneca* (New York: Vintage Books, 1972), 119. For a reconstruction of the Delaware prophet's map, see fig. 4.34.

14. Douglas R. Parks, "Interpreting Pawnee Star Lore: Science or Myth?" *American Indian Culture and Research Journal* 9, no. 1 (1985): 53–65, and Douglas R. Parks and Waldo R. Wedel, "Pawnee Geography: Historical and Sacred," *Great Plains Quarterly* 5 (1985): 143–76.

15. William Gustav Gartner, "Pawnee Cartography," unpublished typescript, Department of Geography, University of Wisconsin–Madison, 1992, 40.

16. J. B. Harley and David Woodward, eds., *The History of Cartography* (Chicago: University of Chicago Press, 1987–), 1:xvi (Preface).

17. Thomas F. Kehoe, "Stone 'Medicine Wheel' Monuments in the Northern Plains of North America," in vol. 2 of *Atti del XL Congresso Internazionale degli Americanisti, Roma–Genova, 3–10 Settembre, 1972* (Rome: Tilgher, 1974), 183–89, esp. 184, and Lewis, "Indian Maps," 64 (note 2).

The issue of public access to sacred Native American maps has been more intense in recent years. An unknown number of maps remain semisecretly in the custody of native people. Others, though in public or private collections, can be consulted and copied only with the permission of the group of origin. For example, although some were published in the 1970s, Ojibwa migration charts are no longer made available for public study, in accordance with Ojibwa wishes. Native American groups are often understandably unwilling to divulge or discuss the meaning of their sacred artifacts and ceremonies. The recent revelation by the Lakotas of some of the principles and practices behind their cosmographical mapping, particularly a nineteenth-century Oglala Sioux's map of the Black Hills, South Dakota, as representing a sacred enclosure, is an important exception.[18]

Historiography

North American indigenous maps were not systematically studied until the nineteenth century. At that time they began to attract the interest of German scholars such as Alexander von Humboldt and Oscar Peschel (who gave them brief mention in general histories of exploration or works in the history of geography) and Johann Georg Kohl (who in 1857 made what is considered to be one of the earliest references to the importance of Indian maps in museum collections).[19] More substantial was the treatment in Wolfgang Dröber's monograph on the maps of indigenous peoples (1903), and Bruno Adler's seminal and global work on the subject (1910) devoted ten pages to North American examples.[20]

Very few works in the first half of the twentieth century added to the treatments of Dröber and Adler, but in the 1950s there was some interest in the subject in North America in relation to archaeology.[21] Since then, and especially after 1970, the topic has received increasing, but still limited, attention from anthropologists, archaeologists, ethnographers, and geographers, often focusing on specific native maps or collections of them and tracing their influence on Euro-American exploration and mapmaking.[22]

A pioneering general contribution was Rainer Vollmar's 1981 monograph *Indianische Karten Nordamerikas*, which consisted of illustrated historical examples arranged chronologically from the sixteenth to the nineteenth century.[23] References to native maps were also

18. Ronald Goodman, *Lakoṫa Star Knowledge: Studies in Lakoṫa Stellar Theology*, 2d ed. (Rosebud, S.D.: Siŋṫe Gleška University, 1992), esp. 9–14.

19. Alexander von Humboldt, *Kritische Untersuchungen über die historische Entwickelung der geographischen Kentnisse von der Neuen Welt*, 3 vols. (Berlin: Nicolai, 1836–52), 1:297–98; Oscar Peschel, *O. Peschel's Geschichte der Erdkunde bis auf Alexander von Humboldt und Carl Ritter*, ed. Sophus Ruge (Munich: R. Oldenbourg, 1877), 215; and J. G. Kohl, "Substance of a Lecture Delivered at the Smithsonian Institution on a Collection of the Charts and Maps of America," in *Annual Report of the Board of Regents of the Smithsonian Institution . . . 1856* (Washington, D.C., 1857), 93–146, esp. 126. Other early mentions included Richard Andree, "Die Anfänge der Kartographie," *Globus* 31 (1877): 24–27 and 37–43, esp. 25 and 26; Georg M. Frauenstein, "Primitive Map-Making," *Popular Science Monthly* 23 (1883): 682–87, esp. 684–86 (translated from *Das Ausland*); Georg Friederici, *Die Schiffahrt der Indianer* (Stuttgart: Strecker und Schröder, 1907), 12; and idem, *Der Charakter der Entdeckung und Eroberung Amerikas durch die Europäer*, 3 vols. (Stuttgart-Gotha: F. A. Perthes, 1925–36), 1:159–61.

20. Wolfgang Dröber, *Kartographie bei den Naturvölkern* (1903; reprinted Amsterdam: Meridian, 1964), 63–66 and 69–73, summarized under the same title in *Deutsche Geographische Blätter* 27 (1904): 29–46, esp. 41–44; Bruno F. Adler, "Karty pervobytnykh narodov" (Maps of primitive peoples), *Izvestiya Imperatorskago Obshchestva Lyubiteley Yestestvoznaniya, Antropologii i Etnografii: Trudy Geograficheskago Otdeleniya* (Proceedings of the Imperial Society of the Devotees of National Sciences, Anthropology, and Ethnography: Transactions of the Division of Geography) 119, no. 2 (1910): esp. 64–79 and 161–71; and the abridged translation of Adler's work, H. de Hutorowicz, "Maps of Primitive Peoples," *Bulletin of the American Geographical Society* 43 (1911): 669–79, esp. 671 and 672–73.

21. For example, Delf Norona, "Maps Drawn by Indians in the Virginias," *West Virginia Archeologist* 2 (1950): 12–19; idem, "Maps Drawn by North American Indians," *Bulletin of the Eastern States Archeological Federation* 10 (1951): 6; and Robert Fleming Heizer, "Aboriginal California and Great Basin Cartography," *Report of the California Archaeological Survey* 41 (1958): 1–9.

22. Works on particular maps and groups of maps are cited in the body of this chapter. General works include Louis De Vorsey, "Amerindian Contributions to the Mapping of North America: A Preliminary View," *Imago Mundi* 30 (1978): 71–78; idem, "Silent Witnesses: Native American Maps," *Georgia Review* 46 (1992): 709–26; idem, "Native American Maps and World Views in the Age of Encounter," *Map Collector* 58 (1992): 24–29; and G. Malcolm Lewis, "The Indigenous Maps and Mapping of North American Indians," *Map Collector* 9 (1979): 25–32. Also of interest are Kevin Kaufman's introduction to *The Mapping of the Great Lakes in the Seventeenth Century* (Providence: John Carter Brown Library, 1989), 9–11; David H. Pentland, "Cartographic Concepts of the Northern Algonquians," *Canadian Cartographer* 12 (1975): 149–60; Michael Blakemore, "From Way-Finding to Map-Making: The Spatial Information Fields of Aboriginal Peoples," *Progress in Human Geography* 5 (1981): 1–24; and William C. Sturtevant, "The Meanings of Native American Art," in *The Arts of the North American Indian: Native Traditions in Evolution*, ed. Edwin L. Wade (New York: Hudson Hills Press, 1986), 23–44, esp. 37–38.

23. Rainer Vollmar, *Indianische Karten Nordamerikas: Beiträge zur historischen Kartographie von 16. bis zum 19. Jahrhundert* (Berlin: Dietrich Reimer, 1981). See also his "Kartenanfertigung und Raumauffassung nordamerikanischer Indianer," *Geographische Rundschau* 34 (1982): 302–7. For a later but much briefer general review, see G. Malcolm Lewis, "Maps and Mapmaking in Native North America," in *Encyclopaedia of the History of Science, Technology, and Medicine in the Non-Western World*, ed. Helaine Selin (Dordrecht: Klewer Academic, 1997), 592–94. For major reviews of maps and mapmaking, see G. Malcolm Lewis, "Frontier Encounters in the Field: 1511–1925," "Encounters in Government Bureaus, Archives, Museums, and Libraries: 1782–1911," "Hiatus Leading to a Renewed Encounter," and "Recent and Current Encounters," all in *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use*, ed. G. Malcolm Lewis (Chicago: University of Chicago Press, 1998), chaps. 1–4.

made in two widely read nonfiction works: a description of a Beaver Indian dream map on moosehide showing the trail to heaven in Hugh Brody's *Maps and Dreams* and reflections on Inuit maps in Barry Lopez's *Arctic Dreams*.[24] A cartobibliography has been compiled of pre-1776 Indian and Inuit maps and accounts of mapping activities, and lists have been published of native persons who drafted maps and provided sketches or descriptions of maps for the Hudson's Bay Company.[25]

In 1992 the five hundredth anniversary of Columbus's landing in the Americas focused attention on the encounter between Europeans and Native American peoples and sparked debates on the meaning of "discovery" and the ethics of European expansion. As a result, interest was aroused in presenting the culture of native peoples at the time of the Columbian encounter, including accounts of Native American wayfinding and mapping. As part of this effort, a major loan exhibition of original Indian and Inuit maps, intended to travel to various sites, was planned by J. B. Harley. Harley's death in December 1991 and logistical problems with the cost and loan policies for the exhibition led to its abandonment.[26]

Three publishing projects on North American Indian maps have progressed in parallel with this chapter. The first is a large collection of images of Indian and Inuit maps on CD-ROM compiled by the American Geographical Society Collection at the University of Wisconsin–Milwaukee.[27] The second, published in 1997, was Mark Warhus's *Another America*, the first book in English on indigenous Native American maps. Warhus reconstructs the situations in which maps were made by Native Americans.[28] Third, a series of lectures on North American and Mesoamerican Indian maps and mapmaking was given at the Newberry Library, Chicago, in summer 1993 under the title "Cartographic Encounters." A book containing these essays and several others appeared in 1998.[29]

The Columbian quincentenary stimulated discussions of the nature of the "encounter" between Europeans and Native Americans, and the difficulties in interpreting information provided in one culture and transmitted to another. Studies carried out in the 1970s and 1980s that interpreted the Indian information assimilated into Western maps tended to evaluate the contributions of native information according to Enlightenment cartographic standards. Barbara Belyea criticized many of these studies for having adopted "the assumptions and standards of European cartography as universal measures of accuracy," translating "Amerindian maps into European terms" and defining "native convention in terms of absence or failure."[30] Her views were echoed in a short monograph by Michael Bravo, who pointed out the dilemma in comparing Inuit and Western maps of using the concept of commensurability when it has not been shown that the Inuit employed a general category like scale or accuracy.[31]

24. Hugh Brody, *Maps and Dreams: Indians and the British Columbia Frontier* (London: Jill Norman and Hobhouse, 1981), 266–69, and Barry Holstun Lopez, *Arctic Dreams: Imagination and Desire in a Northern Landscape* (New York: Scribner, 1986), 286–89.

25. I prepared the detailed cartobibliography of forty-two North American Indian and Inuit maps and forty accounts of their maps and mapping from 1511 to 1775, working in the Department of Geography, University of Sheffield, between 1991 and 1993, with a grant from the Economic and Social Research Council; lists of native mappers for the Hudson's Bay Company are appendixes 9 and 10 in Richard I. Ruggles, *A Country So Interesting: The Hudson's Bay Company and Two Centuries of Mapping, 1670–1870* (Montreal: McGill-Queen's University Press, 1991), 266.

26. However, an exhibition of facsimiles was mounted soon afterward, "Cartographic Encounters: An Exhibition of Native American Maps from Central Mexico to the Arctic," sixty-two items exhibited in the summer of 1993 at the Newberry Library, Chicago, the captions of which, together with a select bibliography, were published in Mark Warhus, *Cartographic Encounters: An Exhibition of Native American Maps from Central Mexico to the Arctic* (Chicago: Hermon Dunlap Smith Center for the History of Cartography, 1993). Exhibitions incorporating original examples of Indian and Inuit maps included "Taking up the Land: The Mapping of Canada through Four Centuries," summer 1992, Canada House, London, featuring maps from the Hudson's Bay Company Archives, with a twelve-page catalog; "Mapping the Americas," fall 1992, University of Essex Exhibition Gallery, England, featuring five Indian maps, reproduced in Pauline Antrobus et al., *Mapping the Americas* (Colchester: University of Essex, 1992), 61–65; and "J. B. Tyrrell, Explorer and Adventurer: The Geological Survey Years, 1881–1898," 5 April–30 July 1993, Thomas Fisher Rare Book Library, University of Toronto, featuring one Inuit and four Chipewyan maps collected in the Northwest Territories between 1892 and 1894, one of which was reproduced in the exhibit catalog by Katharine Martyn, *J. B. Tyrrell, Explorer and Adventurer: The Geological Survey Years, 1881–1898* (Toronto: University of Toronto Library, 1993), 22. Although not primarily North American in its focus and deliberately selecting items from many cultures and periods, the well-attended and provocative exhibit "The Power of Maps," at the Cooper-Hewitt National Museum of Design, New York, in the winter of 1992–93, contained some items from traditional cultures. Unfortunately, there was no conventional catalog.

27. The *Archive of Native American Maps on CD-ROM* includes brief descriptions and catalog information and was produced in 1993 and 1994 by a team led by Sona Andrews in the Department of Geography at the University of Wisconsin–Milwaukee with a grant from the National Endowment for the Humanities. It is to appear in 1999.

28. Mark Warhus, *Another America: Native American Maps and the History of Our Land* (New York: St. Martin's Press, 1997).

29. The Eleventh Kenneth Nebenzahl, Jr., Lectures in the History of Cartography. The five lectures were G. Malcolm Lewis, "Indian and Inuit Maps: An Introductory Survey" and "The Study of Indian and Inuit Maps: Present and Future"; Elizabeth Hill Boone, "Maps of Territory, History, and Community in Mesoamerica"; Patricia Galloway, "Debriefing Explorers: Amerindian Information in the Shaping of the Delisles' Southeast"; and Peter Nabokov, "Orientations from Their Side: Cosmographies of Native America." The book containing these essays, plus several additional ones, is titled *Cartographic Encounters* (note 2).

30. Barbara Belyea, "Amerindian Maps: The Explorer as Translator," *Journal of Historical Geography* 18 (1992): 267–77, esp. 267.

31. Michael T. Bravo, *The Accuracy of Ethnoscience: A Study of Inuit Cartography and Cross-Cultural Commensurability*, Manchester Papers in Social Anthropology, no. 2 (Manchester: University of Manchester Department of Social Anthropology, 1996).

Approach

Several approaches to Native American cartography have been attempted. For example, Vollmar's approach is strictly chronological, with each artifact systematically described in the order of its presumed date. Warhus adopted a broadly historical approach. Both arrangements describe each map according to the period when it was made and trace the circumstances of its creation. The Eleventh Kenneth Nebenzahl, Jr., Lectures in the History of Cartography and the published volume arising from them examined the maps of native North Americans as seen, used, and evaluated contemporaneously and retrospectively by Europeans and Euro-Americans in a range of encounter contexts–among them discovery and exploration, scientific surveys, historical studies using maps in museums and archives, and negotiations for land.[32] Another approach could be called "formalist," in which the broad characteristics of the maps–their media, structure, methods of symbolic representation, and content–could be discussed thematically.

Since the main purpose of this chapter, and this volume, is to focus on the idea of the map as one indicator of ways cultures represent their worlds, and since the physical and historical backdrop of Indian and Inuit groups varies so much over the continent, I adopt here a mainly regional approach followed by a thematic analysis. After a general discussion of maps in rock art, which is a category with its own characteristics and issues, I discuss maps made in the cultures of the Northeast, the Southeast, the Far West, the Great Plains and Canadian Prairies, the Subarctic, and the Arctic.[33] These terms are not intended to define "culture regions" but are convenient geographical categories that have to do in part with material culture, in part with differing landscapes, and in part with historical circumstances of contact with Europeans (see fig. 4.1 for a reference map of North America).

Terrestrial Maps in Rock Art

Like that in other regions of the world, North American rock art contains images that have been interpreted as maps. Verifying these is important because, if authentic, they constitute almost the only cases of purely indigenous cartographic representation. Other media, such as bark, wood, or skin, have simply been too fragile to preserve precontact images. It is convenient to summarize in this separate section the prehistoric rock carvings, paintings, or drawings that appear to be spatial representations of the world or cosmos.[34] This section also includes cases of rock art that may have been made during the historic period after contact with Europeans; it is rarely possible to date these accurately. One of the very few examples of a possible prehistoric cartographic image not falling in the category of rock art, the description of the fragments of an engraved shell cup from Spiro, Oklahoma, dating from the Mississippian period (A.D. 900–1450), appears below, figure 4.42.

Interpreting any form of rock art is fraught with difficulties; determining cartographic content is even more so. Indeed, the very existence of maps in rock art is still in dispute. It is tempting to decide merely from visual correlation that a given image necessarily represents a world referent. But as a caveat, Catherine Delano Smith noted in the first volume of this *History*, "What appears to be spontaneous recognition of a map in fact involves three assumptions: that the artist's intent was indeed to portray the relationship of objects in space; that all the constituent images are contemporaneous in execution; and that they are cartographically appropriate. In the context of prehistoric art, it is difficult to prove that all three conditions are met."[35] In North America there have been numerous "spontaneous recognitions" of maps in rock art, often verging on ill-considered attributions. Attempts to verify these have been negligible. Quite clearly, each claim for a map in rock art must be separately assessed.

The most comprehensive review of North American rock art to date, examining published interpretations before the mid-1970s, includes content under four map-related topics: maps as rock art design, game trails, ground plans of houses or lodges, and astronomical motifs. The author of the review, Klaus Wellmann, offers the following caution:

> Largely unsupported is the claim that many rock drawings, especially those of the abstract styles, constitute maps or contour plans of nearby geographic features, or are "locators" pointing to "hidden panels." It should be noted, however, that maps were sometimes drawn by Indians, and that serious scholars have at times suggested that certain designs in rock art might be so interpreted. Yet, the emphasis is on "might," and any such explanations remain exceptional and conjectural."[36]

32. Vollmar, *Indianische Karten Nordamerikas* (note 23); Warhus, *Another America* (note 28); and Lewis, *Cartographic Encounters* (note 2).

33. I have employed, with modifications, the regional arrangement developed for the Smithsonian Institution's *Handbook of North American Indians*, ed. William C. Sturtevant (Washington, D.C.: Smithsonian Institution, 1978–), and ordered the regions chronologically with respect to earliest European contact (early seventeenth to nineteenth century).

34. "Petroglyph" is here used to mean carving in rock, "pictoglyph" a painted carving, and "pictograph" a painting.

35. Catherine Delano Smith, "Cartography in the Prehistoric Period in the Old World: Europe, the Middle East, and North Africa," in *The History of Cartography*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:54–101, esp. 61.

36. Klaus F. Wellmann, *A Survey of North American Indian Rock Art* (Graz: Akademische Druck- u. Verlagsanstalt, 1979), 18.

FIG. 4.1. REFERENCE MAP OF NORTH AMERICA. The main map shows the general location of indigenous groups discussed in this chapter. Map details on the following two pages provide additional information on indigenous groups and on place-names. The Siouan-speaking peoples of the northern Great Plains consisted of many divisions and subdivisions. The Santee or Eastern division, generally referred to as the Dakota, was made up of four subdivisions (Mdewakanton, Wahpeton, Wahpekute, and Sisseton). The Yankton and Yanktonai together formed the middle division or Nakota. The Oglala was one of four subdivisions making up the Teton, also known as the Lakota or Western Sioux.

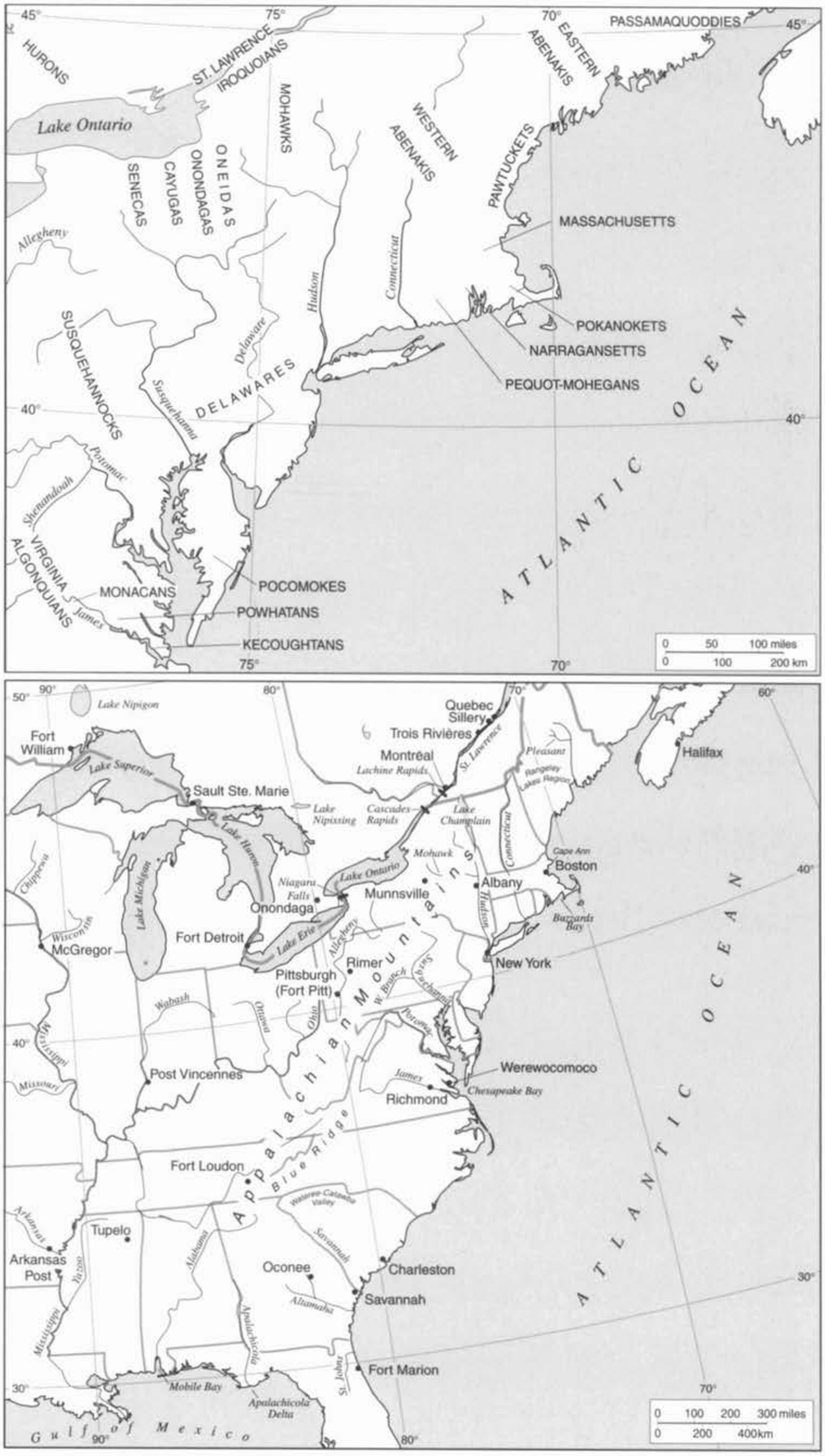


FIG. 4.1. REFERENCE MAP OF NORTH AMERICA (*cont.*). (*Insets 1 and 2*)

FIG. 4.1. REFERENCE MAP OF NORTH AMERICA (*cont.*). (*Insets 3 and 4*)

With reference to the Great Plains, for example, Wellmann states that "here and there, meandering lines and other abstract elements on certain panels have suggested maps to experienced observers since the designs appeared to correspond rather closely with the features of nearby natural formations such as the contour of a mountain range or the course of a river." The only cautionary statement was based on the unproven and perhaps dangerous assumption that the unknown artists of the four examples Wellmann cited were culturally akin to postcontact Plains Indians: "It is perhaps pertinent to note here that the specifics of place, such as tipis, villages, hills, rivers and trees do not enter into the Plains Indian paintings on skin, cloth, and paper much before the 1870s."[37]

Dating rock art is also a fundamental problem. Although there is a range of recently developed physical and chemical techniques, they have not as yet been widely applied. For example, the probable plan of an animal drive represented in a petroglyph near the Purgatoire River in southeastern Colorado (fig. 4.8, below) has been dated 450 ± 75 years B.P. by the cation-ratio varnish dating technique.[38] But no other examples are known.

Evidence of the iconic depiction of mountains has been suggested by a pictograph at Rancho El Tajo in central Baja California, identified as an iconic representation in profile of a nearby skyline (fig. 4.2). Painted in red, an upper line resembles the profile of the mountains of the Sierra de Guadalupe that would have been behind the artist, and a lower, straighter line the foreground profile of the foothills. Although aware that California archaeologists had "rejected theories ascribing cartographic representation to irregular wavy lines or similar forms found in pictograph and petroglyph sites," Mathes was convinced the there was "no question as to the intent of the artist or artists to paint a profile for in no sense can the painting be considered a mere casual wavy line, nor a straight line across an irregular surface, for the surface selected was the smoothest on the rock facing."[39] Mathes's presentation of the correlation between the rock profiles and skyline is initially convincing, but given the interpretive difficulties, caution is still necessary before coming to positive conclusions.

Another more carefully researched and reasoned example from the north-central Sierra Nevada in eastern California is also likely to leave skeptics unconvinced. It concerns a glyph that has been interpreted as a possible "trail map" linking some seventy-seven petroglyph sites (they fall mostly within 50 m of the supposed trail). It is suggested that a shaman may have incised this glyph for ritualistic use during hunting.[40]

Heizer and Baumhoff, in a review of the prehistoric rock art of Nevada and eastern California, observed that present-day Indians "disclaim knowledge of who made the petroglyphs and are unable to supply meanings of the designs." Yet, although they believe that "the petroglyphs of Nevada are not a form of communicative writing, nor are they maps," they cited with approval Schroeder's cartographic interpretation of a petroglyph on the lower Colorado River (fig. 4.4 below).[41] Later, in a detailed study of petroglyph sites in southern Nevada, Heizer in collaboration with Hester tentatively proposed that long ticked lines represented diversion fences for game in plan (fig. 4.3).[42] Although the lines are not immediately planlike in appearance, they were inferred to represent fences based on environmental and archaeological evidence.

The archaeologist Albert H. Schroeder, then of the United States National Parks Service, interpreted a petroglyph in Arizona as a map of the Colorado River (fig. 4.4). Schroeder, who had been working systematically through the area, described and interpreted the figure, which is part of a complex petroglyph panel on Mohave

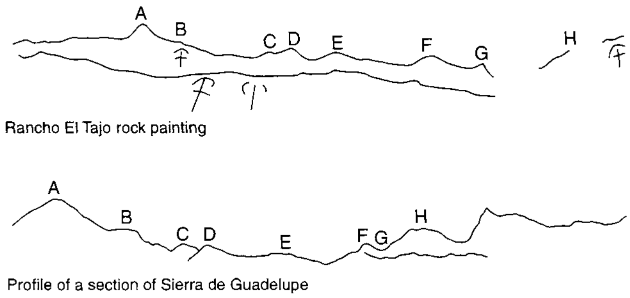


FIG. 4.2. DRAWING OF A ROCK PAINTING IN BAJA CALIFORNIA. This has been interpreted as an iconic representation of a nearby skyline, a claim that is difficult to prove or refute. From Rancho El Tajo in central Baja California. After W. Michael Mathes, "A Cartographic Pictograph Site in Baja California Sur," *Masterkey for Indian Lore and History* 51 (1977): 23–28, esp. 25 (figs. I and II).

37. Wellmann, *North American Indian Rock Art,* 131.

38. Lawrence L. Loendorf, "Cation-Ratio Varnish Dating and Petroglyph Chronology in Southeastern Colorado," *Antiquity* 65 (1991): 246–55, esp. 249 and 253 (fig. 7). The case for this being a plan of an animal drive is made in Lawrence L. Loendorf and David D. Kuehn, *1989 Rock Art Research Pinon Canyon Maneuver Site, Southeastern Colorado* (Grand Forks: University of North Dakota, Department of Anthropology, 1991), 220–26.

39. W. Michael Mathes, "A Cartographic Pictograph Site in Baja California Sur," *Masterkey for Indian Lore and History* 51 (1977): 23–28, esp. 23 and 27.

40. Willis A. Gortner, "Evidence for a Prehistoric Petroglyph Trail Map in the Sierra Nevada," *North American Archaeologist* 9 (1988): 147–54.

41. Robert Fleming Heizer and Martin A. Baumhoff, *Prehistoric Rock Art of Nevada and Eastern California* (Berkeley: University of California Press, 1962), 279 and n. 1 to appendix B on 394.

42. Robert Fleming Heizer and Thomas R. Hester, "Two Petroglyph Sites in Lincoln County, Nevada," in *Four Rock Art Studies,* ed. C. William Clewlow (Socorro, N.Mex.: Ballena Press, 1978), 1–44, esp. 2–3 and figs. 3a, 4a, and 4b.

FIG. 4.3. PETROGLYPH FROM THE LOWER WHITE RIVER VALLEY, LINCOLN COUNTY, NEVADA. The linear feature across this petroglyph, which is part of a larger composition, has been interpreted as a "drive fence" for animals. From Robert Fleming Heizer and Thomas R. Hester, "Two Petroglyph Sites in Lincoln County, Nevada," in *Four Rock Art Studies,* ed. C. William Clewlow (Socorro, N.Mex.: Ballena Press, 1978), 1–44, esp. 30 (fig. 4b). By permission of Ballena Press, Menlo Park, California.

FIG. 4.4. PART OF A PETROGLYPH PANEL ON MOHAVE ROCK ON THE LOWER COLORADO RIVER, ARIZONA. Of unknown date and culture, the panel can be interpreted as a map of the Colorado River with a transverse Indian trail, itself crossing eight mountain ranges. See figure 4.5. Photograph by Albert H. Schroeder. By permission of Mrs. Ella M. Schroeder, Santa Fe, N.Mex.

Rock on the east bank of the lower Colorado River, as shown in figure 4.5.[43]

Evaluating the interpretation in figure 4.5 is not easy and, even if Schroeder's case is accepted, placing it in its pre-Columbian cultural context is even more difficult. There are so many washes entering the Colorado River near Mohave Rock that it is difficult to identify a specific one as directly opposite or to understand why a particular one should be represented. For this reason Schroeder's interpretation is unverifiable until the petroglyph is dated and identified with a culture using the Mohave Rock site and the Indian trail crossing the Colorado River at Topock.

A few precontact petroglyphs have been interpreted as maps of very large areas. The most convincing of these purported maps is Map Rock, Idaho, so named by the earliest Euro-American settlers because it looked like a map. It is a massive block of basalt, and on its upper surface and one edge are etched several linear networks and a scatter of zoomorphic, anthropomorphic, and abstract nodes (fig. 4.6). First reported in the *Idaho Statesman* (1889) in an account of an unsuccessful search for diamonds, it was immediately assumed to be "a very fair delineation of the Snake River and its tributaries from the point occupied by the rock to the source of the river in the great Rocky Mountain chain."[44] E. T. Perkins Jr. visited it in January 1897 on behalf of John Wesley Powell, director of the United States Bureau of Ethnology, and his report furthered the interpretation of the petroglyph as a map of specific features:

> The principal motif seems to be a mapping of the Snake River Valley. The most conspicuous line being the course of the Snake River, and is readily recognizable and quite accurate, compared to the Land Office and other maps. . . . One branch rises from a spring and the other flows from a large lake, the Henry Lake of our maps. . . . At the third turn of the stream [Snake River] is a branch from the east . . . which is probably intended for the Black Foot River. . . . The locations of the various groups of circles to the south of the river correspond quite closely to the locations of the ranges of hills which do lie to the south of Snake River.[45]

A speculative interpretation of selected elements suggests it may have been made to represent the drainage, primary watershed, and selected features and characteristics in the middle and upper basins of the adjacent Snake and Salmon Rivers, in what is now southern Idaho (fig. 4.7), an area of some fifty thousand square kilometers.[46]

43. Copy of field notes made at site L:7:3 on 20 February 1951, transcribed by Albert H. Schroeder and communicated to me on 3 December 1979. The originals were deposited at the Lake Mead National Recreation Area but have since been moved.

44. *Idaho Statesman,* 9 October 1889.

45. E. T. Perkins Jr. to J. W. Powell, Washington, D.C., 14 January 1897, National Anthropological Archives, Smithsonian Institution, Washington, D.C., manuscript file 3423a. A later authority developed these ideas further with the suggestion that the zoomorphs represented "faunal features of the Shoshoni region": Richard P. Erwin, "Indian Rock Writing in Idaho," in *Twelfth Biennial Report of the Board of Trustees of the State Historical Society of Idaho for the Years 1929–30* (Boise, 1930), 35–111, esp. 109–11. In 1980 Nelle Tobias of McCall, Idaho, supplied me with an undated three-page typescript received "many years" before from J. T. Harrington of Boise, "Aboriginal Map of the Shoshone Habitat." These interpretations were used in compiling figure 4.7.

46. Other supposed maps of larger areas in rock art are few and extremely contentious. Barry Fell, *Saga America* (New York: Times Books, 1980), 285 and 289, reproduces one petroglyph supposedly depicting the coastal outline of North America and Mexico. Henriette Mertz, *Pale Ink: Two Ancient Records of Chinese Exploration in America,* 2d rev. ed. (Chicago: Swallow Press, 1972), has correlated geographical ac-

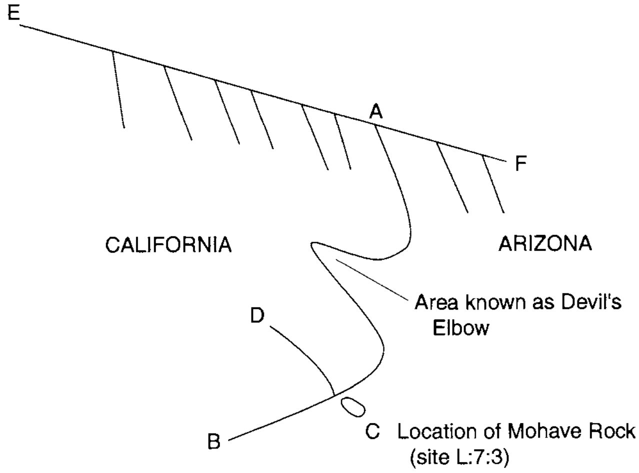


FIG. 4.5. INTERPRETATION OF MOHAVE ROCK PETROGLYPH (FIG. 4.4). According to Albert H. Schroeder, the curves of the long line (A–B) accurately represent the bends of the lower Colorado River between Topock and Mohave Rock, Arizona. The circle portrayed on the petroglyph at C is the locale of the petroglyph site, which was a campsite containing many rock chips and spalls. Unfortunately, a dam built below this area flooded the terrace between Mohave Rock and the river, so any evidence of the extent of this campsite in former times is not known.

The circle is interesting in two respects. It provides the viewer with a point of reference, and it also portrays the shape of the "sleeping circles" found at various campsites throughout the southern California desert. These circles occur in two forms–the desert pavement (small stones that literally cover the desert floor) is raked away from a circular area and piled up in a low mound around its circumference, or a number of rocks are placed in a circle one rock high on the desert floor or pavement that has been cleared. It is thought that brush was held down by these mounds or rocks to act as windbreaks.

The short line D opposite the campsite may well represent the dry wash that comes into the river on the opposite side of the L:7:3. If A is the locale of present-day Topock (judging by the river bends), the line E–F may well portray the known east-west Indian trail that crosses the river at Topock. The two lines on the right, hanging from line E–F, could represent the two north-south ranges (Black Mountains and Hualapai Mountains). Those to the left of the river could represent the north-south Chemehuevi, Sawtooth, Turtle, Old Woman, Ship, and Bullion Mountains in the California desert. (Copy of field notes made on 20 February 1951 and communicated to me on 3 December 1979.)

Rock Art of Cosmographical and Celestial Subjects

Not all worlds supposedly represented in rock art were terrestrial. It seems almost certain that some were shamanistic representations of supernatural worlds made during altered states of consciousness. Landscapes of memory, dream, and trance overlapped the landscapes of the external terrestrial world.[47] Awareness on the part of the interpreter is all-important. For example, in their otherwise naturalistic interpretation of the "animal drive" petroglyph near the Purgatoire River, Loendorf and Kuehn suggest that "the bird, protecting the lower end of the net, may represent the power of birds in shaman lore" (fig. 4.8).[48]

The least contentious examples of maps in precontact rock art are spatial representations of celestial assemblages. This is not surprising, for two reasons. First, the patterns of sun, moon, planets, and many stars and nebulae could be directly observed, and they changed in predictable, cyclical ways. Second, the celestial world was the primary concern of many, perhaps most, immediate precontact cultures in North America. In a bold attempt to trace the origins of pre-Columbian art that drew on diverse evidence from Asia, the Pacific Basin, and Australasia as well as the Americas, Terence Grieder recognized three cultural waves. Of these, the third wave was "characterized by a new preoccupation with the celestial realm and the development of orderly systems for understanding and recording its phenomena." Grieder continues, "The real world was in the heavens where the gods lived. . . . Events on earth took on meaning only by reflection from the heavens."[49] More significant in the present context, it is also the tradition in which many celestial rock art panels were made. The greatest and most studied concentration of the latter is in the Southwest, a well-established third wave culture region at the time of first contact.[50]

Since the 1950s there has been accelerating and increasingly scientific interest in the celestial rock art of the

counts in an ancient Chinese book of travels with sites in western North America. She identified Writing Rock, in Divide County, northwest North Dakota, as a marker "carved and left there by those first world map-makers" sent out by the emperor Yu (p. 121). A dominant bird figure on the rock has been seen by most as a thunderbird and thus as indicative of a late prehistoric Indian origin; see Dennis C. Joyes, "The Thunderbird Motif at Writing Rock State Historic Site," *North Dakota History* 45, no. 2 (1978): 22–25, esp. 25. Working from Mertz's speculation, Edwin Farnham claimed that the incised bird is an eagle and that, in conjunction with a disk at its tail, it was Yu's cipher. Furthermore, encoded mainly within the outline of the eagle, he recognizes a map representing the west bank tributaries of the upper Missouri River, with fifty-one incised cups supposedly indicating mountain peaks, lakes, other natural features, and cultural features including medicine wheels; these are within an area bounded by the Illinois drainage system to the southeast, the upper Platte Valley to the south, Vancouver Island to the west, and the Churchill River to the north. E. Farnham, personal communication, 1978–79.

47. David S. Whitley, "Shamanism and Rock Art in Far Western North America," *Cambridge Archaeological Journal* 2 (1992): 89–113, and David Maclagan, "Inner and Outer Space: Mapping the Psyche," in *Mapping Invisible Worlds*, ed. Gavin D. Flood (Edinburgh: Edinburgh University Press, 1993), 151–58, esp. fig. 3.

48. Loendorf and Kuehn, *1989 Rock Art Research*, 226 (note 38).

49. Terence Grieder, *Origins of Pre-Columbian Art* (Austin: University of Texas Press, 1982), 100 and 101.

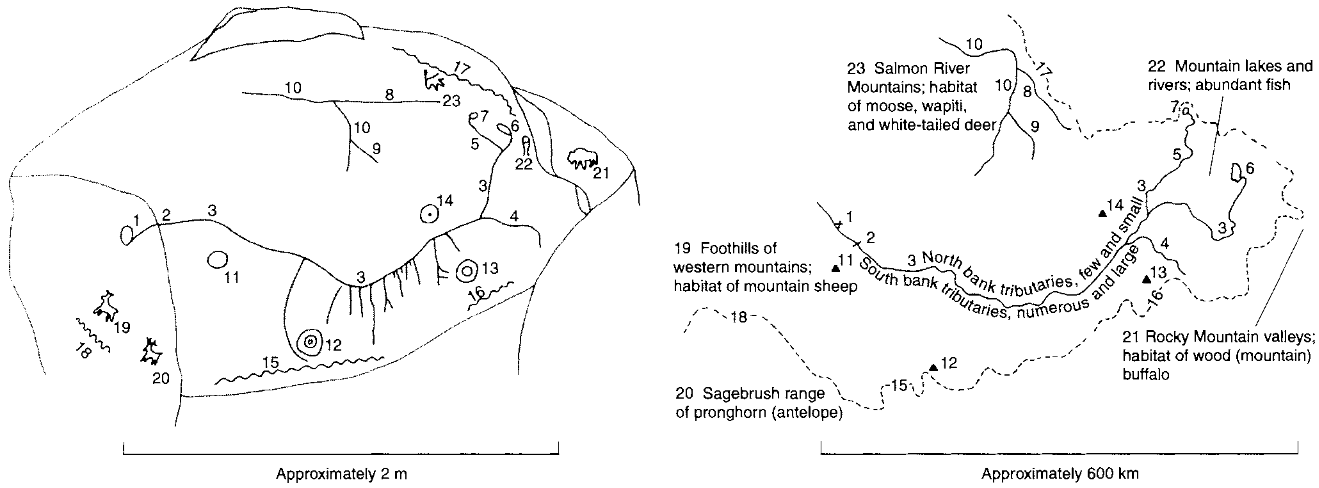
50. Grieder, *Origins of Pre-Columbian Art*, 16–17 (fig. 1).

FIG. 4.6. MAP ROCK PETROGLYPH, SOUTHWESTERN IDAHO. The block of basalt is at the base of a 150-meter-high cliff 600 meters northeast of Givens Hot Springs, Canyon County, Idaho, on the north side of the Snake River. The "map" face is oriented toward the river and slightly upstream, so that it confronts anyone traveling down the valley. It is a pecked and grooved petroglyph made up of smooth lines, wavy lines, circles, zoomorphs, anthropomorphs, and abstract figures. Although not provable, this is one of the more convincing examples of a map in rock art (see fig. 4.7).
Size of the rock: 2.2 × 1.8 × 1.5 m. Photograph courtesy of G. Malcolm Lewis. By permission of the Idaho Historical Society, Boise.

Southwest. In 1955 William C. Miller of Mount Wilson and Palomar Observatories published two very similar papers arising from a suggestion made by the English astrophysicist Fred Hoyle.[51] On 4 July 1054 Japanese and Chinese astronomers had independently observed and recorded a supernova near the star ζ Tauri. Because of an explosion, the supernova had suddenly increased so greatly in brightness that it could easily be seen in broad daylight. Theoretically it should also have been visible in southwestern North America. Miller's computations indicated that the moon there at that date was at crescent phase and at one stage was only two degrees from the supernova. Miller suggested that this close and spectacular juxtaposition was recorded in two rock art panels found in northern Arizona. A painting on the wall of a cave at White Mesa and a glyph on the walls of Chaco Canyon, a tributary of Navajo Canyon, both show a crescent in close association with a circle. In Miller's opinion there is a strong possibility that the two pictographs depict the supernova of 1054.[52] Later searches revealed that more than fifteen sites spread over western North America included representations of a crescent and a bright object juxtaposed, and according to John C. Brandt, several conditions point to an independent American Indian record-

51. William C. Miller, "Two Possible Astronomical Pictographs Found in Northern Arizona," *Plateau* 27, no. 4 (1955): 6–13, and idem, "Two Prehistoric Drawings of Possible Astronomical Significance," *Astronomical Society of the Pacific Leaflet*, no. 314 (July 1955): 1–8.

52. Miller, "Two Possible Astronomical Pictographs," 9.



1. Map Rock (site)
2. Swan Falls
3. Snake River
4. Blackfoot River
5. Henry's Fork
6. Jackson Lake
7. Henry's Lake
8. Lemhi River
9. Big Creek
10. Salmon River
11. War Eagle Mountain
12. Matterhorn
13. Bonneville Peak
14. Big Southern Butte
15. Snake-Humboldt
16. Snake-Great Salt Lake
17. Salmon-Missouri
18. Snake-Harney Basin
19. Mountain Sheep
20. Pronghorn (antelope)
21. Wood (mountain) buffalo
22. Fish
23. Moose (or wapiti or white-tailed deer)

FIG. 4.7. SPECULATIVE INTERPRETATION OF MAP ROCK. On the left is a line drawing of Map Rock (fig. 4.6) delineating and identifying selected features. On the right is a map of the corresponding area, which was occupied by Shoshones in early historical times. The interpretation is based in part on a letter from E. T. Perkins Jr. (1897) and on a typescript from J. T. Harrington (n.d.); see note 45. Features 2–10 are hydrological, 11–14 are conspicuous peaks, 15–18 are watersheds, and 19–23 are animal figures.

ing of the event: the scarcity of crescents in American Indian rock art; that the close conjunction of moon and supernova was visible only in western North America; and archaeological evidence of eleventh-century habitation near the sites.[53]

In 1989 Michael Zeilik expressed his opinion that the Chaco Canyon pictograph represents Venus rather than the supernova next to the crescent moon and noted other sites where the line of reasoning interpreting the design as the 1054 supernova seemed questionable.[54] But even those who dispute that the marks represent the supernova have assumed that they plot some kind of celestial juxtaposition.

More recently, there has been much interest in celestial subjects in both prehistoric and historic rock art of the Southwest, of which a few Navajo examples are discussed here. Astronomer Von Del Chamberlain has recognized several Navajo constellations in a rock art star panel in the Largo Canyon, New Mexico, including the First Slender One (the belt and sword of Orion), the Pleiades, Rabbit Tracks (the tail of Scorpius), and possibly Man with Legs Ajar (Corvus) (fig. 4.9). The star patterns are similar to those found on Navajo gourd rattles used in the Night Chant, sandpaintings, a star chart made by a Navajo singer for Bernard Haile, and the Mask of Black God (which traditionally bears the Pleiades on the left temple).[55] The purpose of this representation was clearly ceremonial, to capture the powers of the constellations portrayed.

The purpose of the Navajo star ceilings in the "Four Corners" region of the American Southwest is less clear. There are more than fifty recorded examples of collections of black, red, and white crosses (stars) painted on the undersurfaces of rock-shelters and cliff overhangs. Many of these crosses appear to have been repetitively stamped with tools made of wood, leather, or yucca leaves.[56] Based on a study of star ceilings in the Canyon de Chelly, northeastern Arizona, Claude Britt speculated that, although

53. John C. Brandt, "Pictographs and Petroglyphs of the Southwest Indians," in *Astronomy of the Ancients,* ed. Kenneth Brecher and Michael Feirtag (Cambridge: MIT Press, 1979), 25–38, esp. 37.

54. Michael Zeilik, "Keeping the Sacred and Planting Calendar: Archaeoastronomy in the Pueblo Southwest," in *World Archaeoastronomy,* ed. Anthony F. Aveni (Cambridge: Cambridge University Press, 1989), 143–66, esp. 144–45.

55. For a description of this star panel and a summary of the literature on Navajo constellations, see Von Del Chamberlain, "Navajo Constellations in Literature, Art, Artifact and a New Mexico Rock Art Site," *Archaeoastronomy* 6 (1983): 48–58, esp. 56–58.

56. Von Del Chamberlain, "Navajo Indian Star Ceilings," in *World Archaeoastronomy,* ed. Anthony F. Aveni (Cambridge: Cambridge University Press, 1989), 331–40, esp. 335.

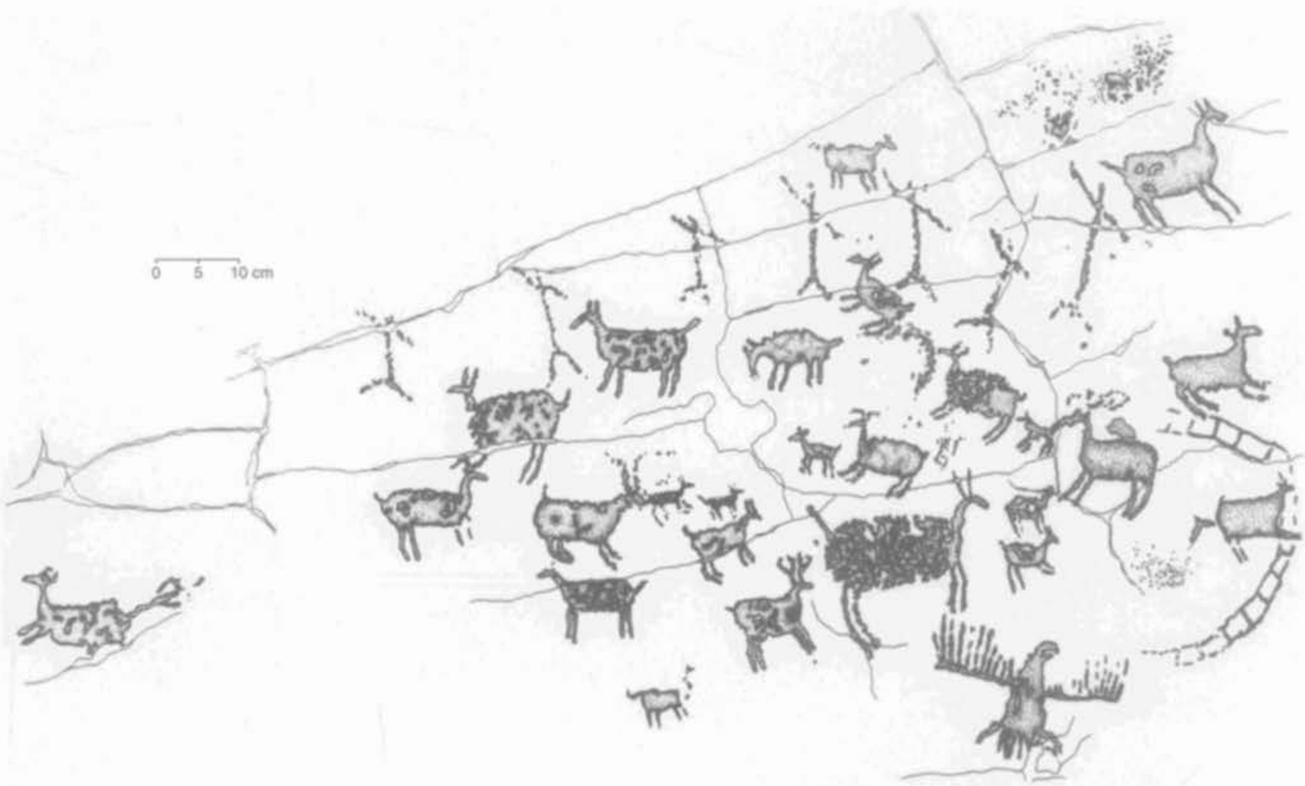


FIG. 4.8. PETROGLYPH PANEL SHOWING HUNTERS, ANIMALS, AND ENCLOSURE. Representation of an animal drive in a petroglyph in the Pinon Canyon Maneuver Site near the Purgatoire River, southeast Colorado. The ceremonial purpose of this image, which is similar to others in rock art of Europe and Asia, is suggested by the bird protecting the lower end of the net or enclosure (lower right) as representing the power of birds in shaman lore. "The humans with their outstretched arms are the herders who are driving the animals toward the net, which has been set across their pathway" (Lawrence L. Loendorf and David D. Kuehn, *1989 Rock Art Research Pinon Canyon Maneuver Site, Southeastern Colorado* [Grand Forks: University of North Dakota, Department of Anthropology, 1991], 220–26, esp. 226). Analysis of potassium + calcium/titanium ratios in the varnishes accumulating on the rock art have enabled archaeologists to date various different elements and show a change in style over time. A quadruped in this image has been dated to 450 ± 75 years B.P. By permission of Lawrence L. Loendorf, New Mexico State University, Las Cruces, N.Mex.

> primarily ceremonial, they also, to a lesser degree, serve mnemonic functions. The changing of the seasons in the past were noted by positions of the constellations in the sky. Some of these sites may have helped remind people of this use of the constellations. Each constellation has a story or legend connected with it. These star paintings could remind medicine men of the constellations and the story they depict. In this capacity, they can also be used to train apprentice medicine men.[57]

Campbell Grant agreed with Britt that it was possible to distinguish actual star patterns on the ceilings.[58] But in a much later and more cautious review of the evidence, Chamberlain concluded that the ceilings did not reveal similar star patterns so consistently present in the rock art star panel in the Largo Canyon or in other Navajo art described above. Confirmed by interviews with Navajos and Hopis, he inclined toward an interpretation of the pattern of these star crosses not as constellations, but as a symbolic protection from the danger of rockfalls from the ceilings. His arguments are convincing and underline the problems of interpreting patterns of marks as maps in rock art.[59]

NORTHEAST

Northeastern North America was home mainly to Algonquian- and Iroquoian-speaking peoples, among which there was great cultural diversity. In addition, the time and circumstances of their contact with Europeans, although among the earliest in North America, varied sub-

57. Claude Britt, "Early Navajo Astronomical Pictographs in Canyon de Chelly, Northeastern Arizona," in *Archaeoastronomy in Pre-Columbian America*, ed. Anthony F. Aveni (Austin: University of Texas Press, 1975), 89–197, esp. 104–6.

58. Campbell Grant, *Canyon de Chelly: Its People and Rock Art* (Tucson: University of Arizona Press, 1978), 218–21.

59. Chamberlain, "Star Ceilings," 339 (note 56).

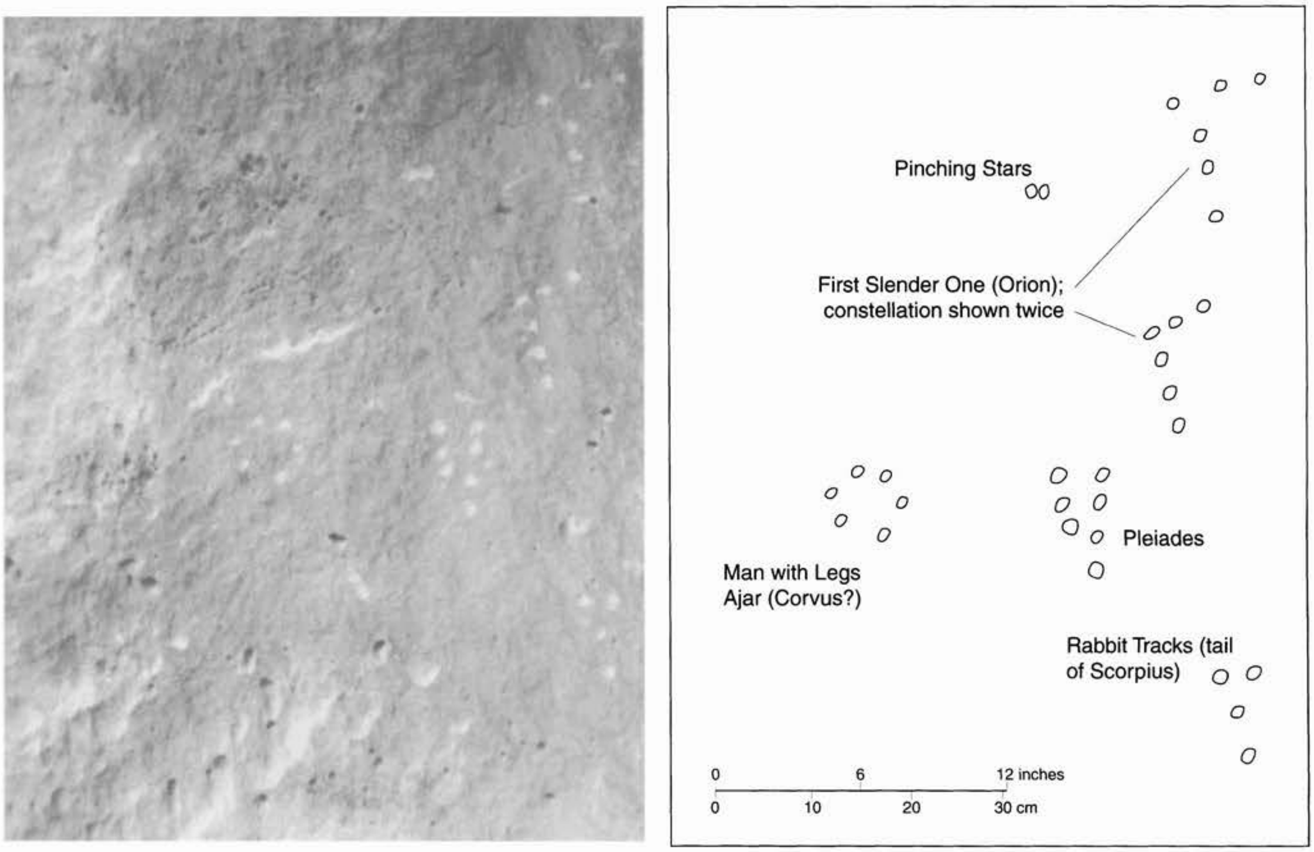


FIG. 4.9. STAR PANEL IN LARGO CANYON, NEW MEXICO. Star patterns in this panel from Largo Canyon drainage of northern New Mexico are represented by light dots in the figure; dark spots are natural holes. Chamberlain identifies Orion, the tail of Scorpius, Pinching Stars, Pleiades, and possibly Corvus.

From Von Del Chamberlain, "Navajo Constellations in Literature, Art, Artifact and a New Mexico Rock Art Site," *Archaeoastronomy* 6 (1983): 48–58, esp. 57. By permission of Von Del Chamberlain, Salt Lake City, Utah.

stantially. East Coast groups had sustained contact with French and English settlers and traders in the sixteenth and seventeenth centuries, whereas areas farther inland were not greatly affected until late in the eighteenth century. These factors are reflected in the surviving corpus of cartographic artifacts and texts. Few artifacts survive from earlier centuries, and early accounts, though relatively plentiful, often provide little information about the process of mapping or the maps themselves.[60]

EPHEMERAL MAPS

Among the oldest European accounts of cartographic interest are those describing Indians drawing, inscribing, or modeling ephemeral maps. French and English explorers and colonists in New England and New France and the Chesapeake Bay area noted that native people could produce maps on request, and a few witnessed maps being made by Indians for other Indians. In the earliest account, Jacques Cartier, in the course of ascending the St. Lawrence River below the confluence of the Ottawa River in 1541, portaged around the lowest of the Lachine Rapids. Reaching the Cascades Rapids beyond, he could get no farther and asked four St. Lawrence Iroquoian men for information about conditions upstream. They responded "with certaine little stickes, which they layd upon the ground in a certaine distance, and afterward layde other

60. One very early account, from sixteenth-century Englishman Ralph Lane's narrative of the Roanoke Island colony, refers to a "report of all the countrey" that was "set downe" by Skiko, son of the King of Chawanokes (North Carolina Algonquians), in the Chesapeake Bay region. Richard Hakluyt, *The Principal Navigations Voyages Traffiques and Discoveries of the English Nation,* 12 vols. (Glasgow: James MacLehose, 1903–5), 8:329. Lane's published account may have been purposefully vague to conceal information on the area from the Spanish. David B. Quinn, ed., *New American World: A Documentary History of North America to 1612,* 5 vols. (New York: Arno Press, 1979), 3:295. In another case Samuel de Champlain wrote that in 1611 Hurons "spoke to me . . . in great detail, showing me by drawings all the places they had visited, taking pleasure in telling me about them." Henry Percival Biggar, ed., *The Works of Samuel de Champlain,* 6 vols. (Toronto: Champlain Society, 1922–36), 2:192. If the drawings were indeed maps, they may have covered a very large area.

small branches betweene both, representing the Saults [Rapids]." Hakluyt's account is followed by the statement, "Here after followeth the figure of the three Saults," but none was reproduced.[61] There is little doubt, however, that the placing of the "little stickes" modeled the three Lachine Rapids and the St. Lawrence River for an undetermined distance beyond.

In 1602, on board a ship off the coast of southern Maine, a Micmac Indian "with a piece of Chalke described the Coast thereabouts" for Bartholomew Gosnold, the first European to sail along it since Estavão Gomes almost eighty years before.[62] Three years later and eighty kilometers farther south, Samuel de Champlain was in conversation with either Pawtuckets or Massachusetts on a beach at Cape Ann. After he had "drawn for them with a charcoal the bay and the Island Cape, where we then were, they pictured for me with the same charcoal another bay which they represented as very large. Here they placed six pebbles at equal intervals, giving me thereby to understand that each one of these marks represented that number of chiefs and tribes." The Indians also added the Merrimack River, whose mouth he had failed to see because of fog and a bay bar.[63] Although Champlain provided a cue for the Indians, he had been with them for only a few hours, and it is unlikely they had had previous contacts with Europeans.

From the early seventeenth century through the eighteenth century, many examples were noted of ephemeral maps made by Indians of the Northeast. Shortly after Jamestown was founded, a Virginia Algonquian "offred with his foote to describe" the James River from Chesapeake Bay perhaps as far upstream as the Blue Ridge.[64] In Upper New York Bay, an Indian who was probably a member of the Munsee-speaking group of the Delawares drew for Thomas Dermer in 1619 "a Plot with Chalke upon a [sea?] Chest." It apparently represented Manhattan Island, the lower Hudson and East Rivers, the turbulent waters at Hell Gate, and the Harlem River.[65] On the southern Delmarva Peninsula of Chesapeake Bay in 1650, a Pocomoke used a stick to make "divers circles by the fire-side . . . [giving] to every hole a name" such that Henry Norwood found it was not hard to conceive "that the several holes were to supply the place of a sea-chart, shewing the situation of the most noted *Indian* territories."[66] In 1670 an elderly Monacan described with a staff for John Lederer "two paths on the ground" from the present site of Richmond, Virginia, into the Appalachians beyond.[67] Another elderly Indian known as the Pheasant informed George Washington in 1770 about the upper part of the Buffalo (now Bull) Creek valley south of the Ohio River in what is now Washington County, Pennsylvania. He "chalkd out . . . upon his Deer skin" the situation of "a fine piece of Land and beautiful place for a House."[68]

Oneidas used modeling techniques in 1634 to make a map for the Dutch traders Harmen Meyndertsz van den Bogaert and Jeronimus de la Croix, employees of the Dutch West India Company. Van den Bogaert wrote that, while at the village of the Oneidas near modern Munnsville, New York, "we asked them for the locations of all of their castles and for their names, and how far they were from one another. They put down kernels of corn and stones, and Jeronimus made a map from them. We reckoned everything in miles; how far every place was from one another."[69]

Gesture was an important element of many ephemeral maps, and some maps were entirely gestural. On 9 November 1761 Aikon Aushabuc, a Micmac chief, explaining the current geopolitical situation to Gamaliel Smethurst, an Englishman in the captivity of his band,

> made almost a circle with his forefinger and thumb, and pointing at the end of his forefinger, said there was Quebec, the middle joint of his finger was Montreal, the joint next the hand was New-York, the joint of the thumb next the hand was Boston, the middle joint of the thumb was Halifax, the interval betwixt his finger and thumb was Pookmoosh [the place they were], so that the Indians would soon be surrounded, which he signified by closing his finger and thumb.[70] (See fig. 4.10).

They had long been allied with the French, and the cities Aikon Aushabuc pointed out were centers of British

61. Hakluyt, *Principal Navigations,* 8:270–71.

62. Samuel Purchas, *Purchas His Pilgrimes,* 4 vols. (London, 1625), vol. 4, pt. 8, p. 1647.

63. Biggar, *Works of Samuel de Champlain,* 1:335–36 (note 60).

64. "A relatyon . . . written . . . by a gent. of y^e Colony." [Captain Gabriel Archer?], manuscript, Public Record Office, London, State Papers Colonial (C.O. 1/1, fol. 46v), printed in Philip L. Barbour, ed., *The Jamestown Voyages under the First Charter, 1606–1609,* 2 vols., Hakluyt Society Publications, ser. 2, nos. 136–37 (Cambridge: Cambridge University Press, 1969), 1:80–98, esp. 82. The Indian was then given a pen and paper and "layd out the whole River."

65. Purchas, *Purchas His Pilgrimes,* vol. 4, pt. 9, p. 1779 (note 62).

66. Henry Norwood, "A Voyage to Virginia," in *A Collection of Voyages and Travels,* 3d ed., 6 vols., comp. Awnsham Churchill and John Churchill (London, 1744–46), 6:161–86, esp. 181.

67. John Lederer, *The Discoveries of John Lederer . . . Collected and Translated out of Latine . . . by Sir William Talbot* (London: Samuel Heyrick, 1672), 9.

68. John C. Fitzpatrick, ed., *The Diaries of George Washington, 1748–1799,* 4 vols. (Boston: Houghton Mifflin, 1925), 1:439. The Pheasant was possibly a Mingo.

69. Charles T. Gehring and William A. Starna, trans. and eds., *A Journey into Mohawk and Oneida Country, 1634–1635: The Journal of Harmen Meyndertsz van den Bogaert* (Syracuse: Syracuse University Press, 1988), 14.

70. Gamaliel Smethurst, *A Narrative of an Extraordinary Escape out of the Hands of the Indians, in the Gulph of St. Lawrence* (London, 1774), 14.

influence. Halifax had been established as a British military base in 1749, and Montreal and Quebec had fallen to the British in 1759 and 1760. Although these sites were quite distant from the New Brunswick coast where the exchange took place, Aikon Aushabuc's awareness was probably heightened by local conflicts between the French and the British.[71]

These early descriptions of ephemeral maps introduce several attributes that are also characteristic of later maps. Like many surviving maps, they were made for Europeans, often to extend Europeans' knowledge into their terra incognita. Maps were commonly produced by inscribing in earth or drawing with chalk or charcoal on a floor or deck, which made the map inevitably short-lived. In several cases objects such as sticks and stones represented natural or cultural features. On the map made for Henry Norwood in 1650, circles symbolized settlements. It is even possible that the relative size of the circles reflected the importance of places.[72]

Two other descriptions of ephemeral mapmaking came out of activities that, although observed by Europeans, seem to have been based in indigenous custom. In the first instance Champlain described how in 1609, when expecting possible conflict with the Iroquois, the headmen of alliances of Hurons, Algonquins, and Montagnais would brief their warriors by allocating a specific stick to each man, inserting the sticks vertically in battle order in a specially leveled-off place about six feet square in the woods, then instructing the men "to arrange themselves in the order in which they have seen these sticks."[73]

John Smith, held captive by Virginia Algonquians in 1607, saw them make a cosmographical map as part of a three-day ceremony. It showed their country, marked with a circle of cornmeal, the boundaries of the circumambient ocean marked with corn kernels, and sticks placed in a pile to signify the British Isles from which John Smith had come (fig. 4.11). Although the end product was modeled on the earth floor of a longhouse and may have survived only a few hours or at most days, much of the information content was incorporated in the "strange gestures and passions," invocation, and song that were part of the ceremony.[74] On an engraving depicting one stage in the event, it is described as "Their Coniuration" (fig. 4.12).

Another ephemeral map made for John Smith in late summer or autumn 1608 by Powhatan, a leader of the Virginia Algonquians, appears to have been intended to correct an impression that there was a sea to the west beyond the mountains, perhaps derived in part from the idea of the circumambient ocean mapped during the earlier ceremony. Powhatan told Smith that as for "any salt water beyond the mountaines, the relations you haue had from my people are false." Powhatan then "began to draw plots vpon the ground (according to his discourse)

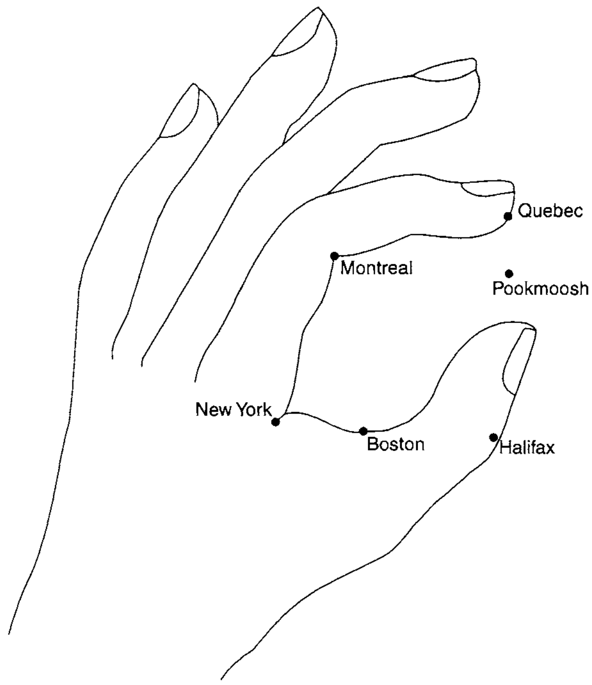


FIG. 4.10. RECONSTRUCTION OF AIKON AUSHABUC'S GESTURAL MAP.

of all those regions."[75] In spite of this information, perhaps in hope that the Pacific Ocean was near, Smith indicated a stippled lake or sea far beyond the headwaters of the Potomac River in his 1612 map of Virginia (fig. 4.13). The coast and stretch of water at the upper right could have been the shoreline of Lake Erie, the Pacific Ocean, or the cosmographical circumambient ocean Smith had seen them represent in their "coniurations."

It is possible that a little-known manuscript map, tentatively dated 1608, was derived at least in part from the

71. *Historical Atlas of Canada*, 3 vols. (Toronto: University of Toronto Press, 1987–93), vol. 1, pls. 30 ("Acadian Deportation and Return," by Jean Daigle and Robert LeBlanc) and 42 ("The Seven Years' War," by W. J. Eccles and Susan L. Laskin).

72. The critical phrase in Norwood's account (note 66 above) is "divers circles." Spelled in that way at that date, "divers" could simply have meant sundry or several; it could also have meant diverse (different in character or quality; not of the same kind). William Little, H. W. Fowler, and Jessie Coulson, *The Shorter Oxford English Dictionary on Historical Principles*, 3d. rev. ed., 2 vols., ed. C. T. Onions (Oxford: Clarendon Press, 1973), 1:585. If the latter, then it is reasonable to assume that the Pocomoke mapmaker was using the circles to indicate the relative sizes or importance of settlements or groups.

73. Biggar, *Works of Samuel de Champlain*, 4:87 (note 60).

74. John Smith, *The Generall Historie of Virginia, New-England, and the Summer Isles: With the Names of the Adventurers, Planters, and Governours from Their First Beginning An° 1584 to This Present 1624* (London: Michael Sparkes, 1624), 48.

75. John Smith et al., *A Map of Virginia, with a Description of the Country, the Commodities, People, Government and Religion* (1612); see Barbour, *Jamestown Voyages*, 2:414 (note 64).

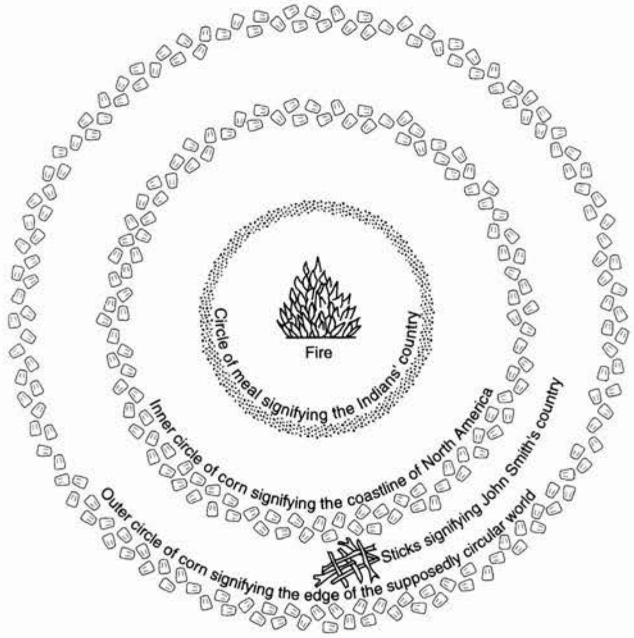


FIG. 4.11. RECONSTRUCTION OF A VIRGINIA ALGONQUIAN COSMOGRAPHY. This reconstruction is based on the model of the world by Powhatans described by John Smith (*Generall Historie of Virginia* [1624], 48). The Indians' model was constructed in the course of three days of incantations during the time they held Smith captive in 1607. See figure 4.12 for a contemporary engraving of the event, in which, however, the only common component is the central fire.

FIG. 4.12. VIRGINIA ALGONQUIANS (POWHATANS) MODELING A COSMOGRAPHICAL MAP IN 1607. This is one of six scenes illustrating John Smith's adventures that surround a map of Virginia. The ceremony depicted involved the construction of an ephemeral cosmographical map. See figure 4.11 for a modern reconstruction of the model.
Size of this scene: ca. 13.1 × 11.5 cm. From John Smith, *The Generall Historie of Virginia, New-England, and the Summer Isles: With the Names of the Adventurers, Planters, and Governours from their First Beginning An° 1584 to This Present 1624* (London: Michael Sparkes, 1624). Photograph courtesy of the Huntington Library, San Marino, Calif. (RB 19417).

"plots" made by Powhatan. The recently discovered map (fig. 4.14) was supposedly drawn by George Percy, who was probably with Smith when he met Powhatan at Werowocomoco. Significantly, Werowocomoco is one of only two named villages among the seventy marked on the map. Even more significantly, the rivers draining east toward Chesapeake Bay are represented as rising in a straight ridge, beyond which three short rivers drain in the opposite direction into what looks more like a right-to-left-flowing river than a sea. The latter could well have been Powhatan's representation of the southwest-flowing Allegheny–Upper Ohio River with three of its left bank tributaries that rise in the Allegheny Mountains and flow essentially northwest.

In addition to these accounts, the legacy of ephemeral and gestural maps (as well as other kinds of Indian cartographic knowledge) can be found in European maps of the early postcontact period. The "Velasco map" of the northeast coast of North America and adjacent interior affords a good example. Compiled in London in 1611 or just before, it has 5 to 10 percent of its linework enhanced with blue and labeled as having been "done by the relations of the Indians." In the early seventeenth century, a "relation" was the action of relating (telling) in words. Although the sources are not acknowledged, the compiler of the Velasco map almost certainly used geographical information given by several northeastern Indians as reported by Samuel de Champlain and one or more members of John Smith's Virginia explorations.[76] The Indian

76. Although the evidence has not been analyzed conclusively, the representations of Lakes Champlain and George, the uppermost stretch of the St. Lawrence River, and Lake Ontario appear to have been derived from accounts given to Champlain by Algonquins in June 1603, as reported in Samuel de Champlain, *Des Savvages; ov, Voyage de Samvel Champlain de Brovage, fait en la France nouuelle, l'an mil six cens trois* (Paris: Claude de Monstr'oeil, 1603). For an English translation of the relevant passages see Quinn, *New American World,* 4:403–7 passim (note 60); the map is reproduced in William Patterson Cumming, R. A. Skelton, and David B. Quinn, *The Discovery of North America* (New York: American Heritage Press, 1971), 326–27. The evidence is less conclusive for the representation of the hinterland of Virginia having been based on reports given by Indians to John Smith during one or more of his four explorations in 1607 and 1608. It is certainly not based on Smith's printed map, "Virginia," published in 1612 (fig. 4.13), although that map does employ Tuscan crosses on the main rivers and mountains to mark the limits of what had been discovered. There is a very real possibility that in 1610 the compiler of the Velasco map was in Virginia and had access to variants of the geographical information obtained by Smith from Powhatan's Algonquian Indians and the Susquehannocks to the north.

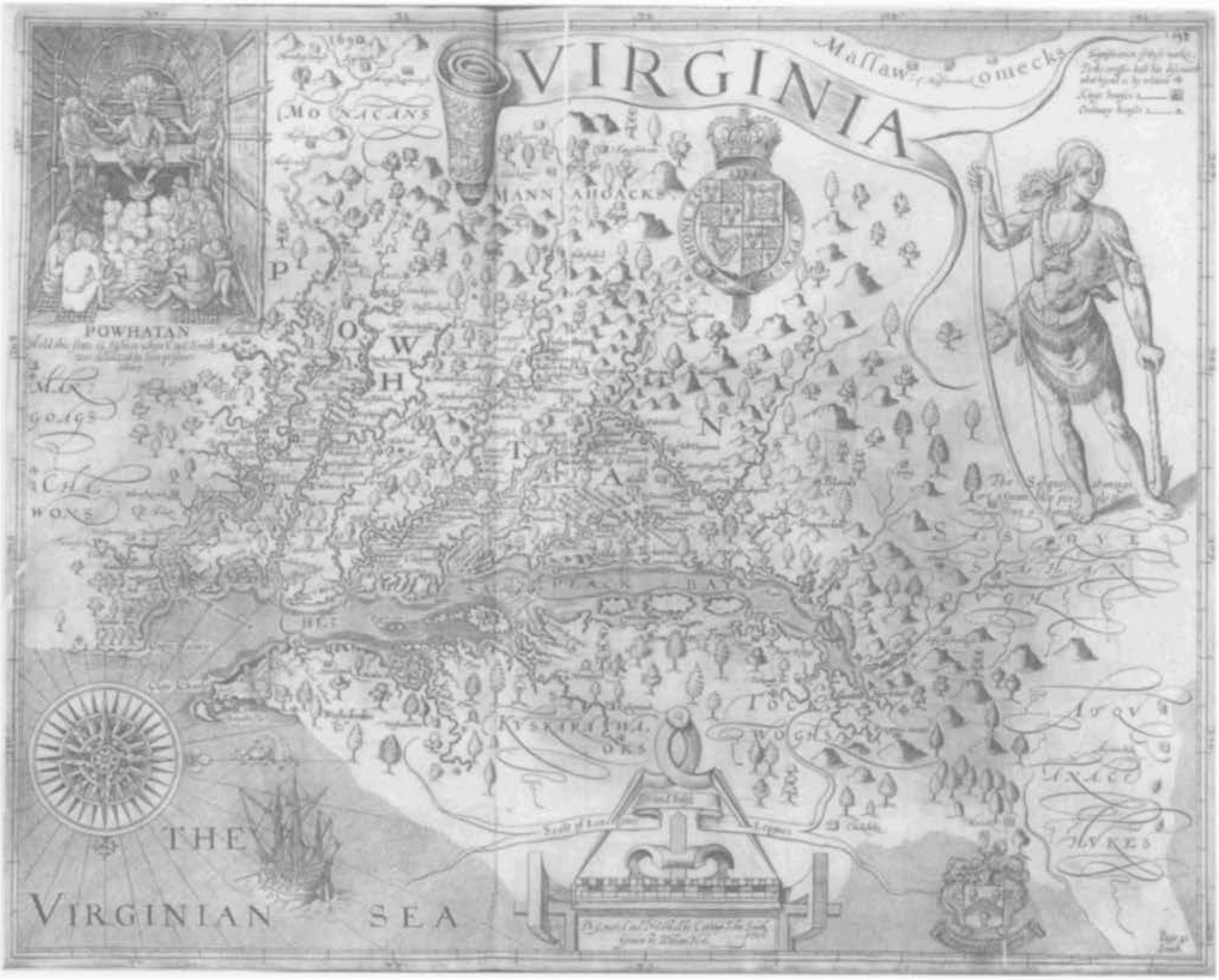


FIG. 4.13. VIRGINIA (1612), BY JOHN SMITH. Published in 1612 in John Smith et al., *A Map of Virginia, with a Description of the Country, the Commodities, People, Government and Religion* (1612). The legend on the map differentiates between areas and features that "hath bin discouered" and those learned about "by relation" of the Indians. The main text is more specific: "as far as you see the little Crosses on riuers, mountaines, or other places haue beene discovered; the rest was had by information of the Savages, and are set downe, according to their instructions" (Philip L. Barbour, ed., *The Jamestown Voyages under the First Charter, 1606–1609*, 2 vols., Hakluyt Society Publications, ser. 2, nos. 136–37 [Cambridge: Cambridge University Press, 1969], 2:344). The small body of water at the upper right could have represented part of Lake Erie, the Pacific Ocean, or the cosmographical circumambient ocean.
Size of the original: 33 × 42 cm. By permission of the British Library, London (G7037).

component of the Velasco map was of areas beyond the limits of European experience: Lakes Champlain, George, and Ontario and the upper Susquehanna and Potomac Rivers, with what may have been the south coast of Lake Erie beyond. As the frontiers of Euro-American exploration expanded, such incorporations were less necessary, although traces remained.[77]

MAPS MADE FOR EUROPEANS

In addition to these ephemeral maps, there may have been others that were made with more permanent materials but did not survive. For example, while exploring the St. Lawrence River in 1603, Samuel de Champlain ob-

77. For example, maps and geographical intelligence collected from Crees on or near the northwest shore of Lake Superior by Pierre Gaultier de Varennes et de La Vérendrye in 1728–29 were mosaicked to create a false geography of the then Northwest structured around a great river rising just to the northwest of Lake Superior and flowing due west to, at least by implication, the Pacific Ocean via a westwardly displaced Lake Winnipeg, a little Red River, and a mountain of bright stones, to a place where its waters began to ebb and flow. This error was to persist on printed maps in progressively debased forms for approximately seventy years: Lewis, "Misinterpretation of Amerindian Information," 546–56, and idem, "La Grande Rivière," 54–62 (both in note 2).

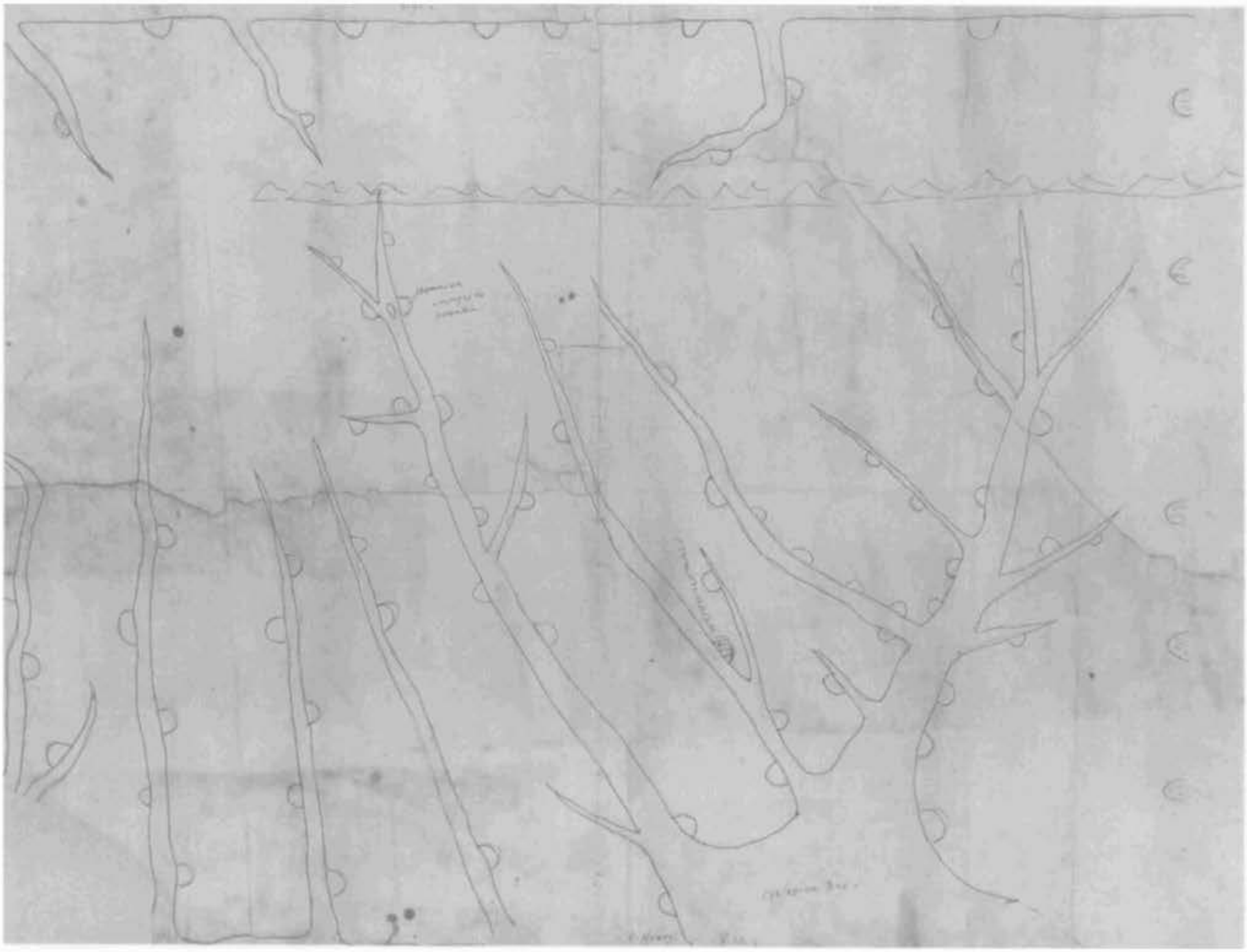


FIG. 4.14. 1608 MANUSCRIPT MAP, POSSIBLY A TRANSCRIPT OF POWHATAN'S MAP MADE ON THE GROUND OF AREAS TO THE WEST AND NORTH OF CHESAPEAKE BAY. The little-known "Kraus Virginia map" has many Indian characteristics. In part at least, it may have been derived from the "plots" made on the ground by the Virginia Algonquian Powhatan for Captain John Smith. It was supposedly drawn by George Percy, who was probably with Smith when he met Powhatan at Werowocomoco in 1608. Significantly, this is one of only two named Indian villages among the seventy marked. The semicircle symbol used for these villages may have been derived from the Algonquian's barrel-roofed lodges as seen in end profile. The angular geometry of the drainage network is very characteristic of Indian maps. The rivers draining east toward Chesapeake Bay are represented as rising in a straight ridge, beyond which three short rivers drain in the opposite direction into what looks more like a river flowing right to left than a sea. The whole system could well be a representation of the southwest-flowing Allegheny–Upper Ohio River, with three of the left bank tributaries that rise in the Allegheny Mountains and flow essentially northwest. This interpretation is in keeping with Powhatan's intent to counter his people's earlier account of a sea to the west of the mountains.

Size of the original: 48.5 × 63 cm. Photograph courtesy of the Harry Ransom Humanities Research Center, University of Texas at Austin.

tained two sketches of the upper stretches of the river and beyond that appear to have included considerable detail, including information on distances, given by Champlain in leagues but probably converted from travel times. He apparently requested the information a second time to confirm it.[78] Neither version survived. Maps made in later stages of Euro-American settlement in the context of negotiations over land or trade had better odds of survival. Sometimes they were preserved as official records, and even if they were not, the settled circumstances of Euro-Americans created a more favorable environment for preservation. These maps, generally either created on or transcribed onto paper, reflect both indigenous cartographic principles and the exigencies of the transactions they were created for. Their interpretation is complicated because in many cases Europeans supplemented the maps, or in the course of transcribing them may have omitted material they found incomprehensible or ir-

78. Biggar, *Works of Samuel de Champlain,* 1:153–61 (note 60).

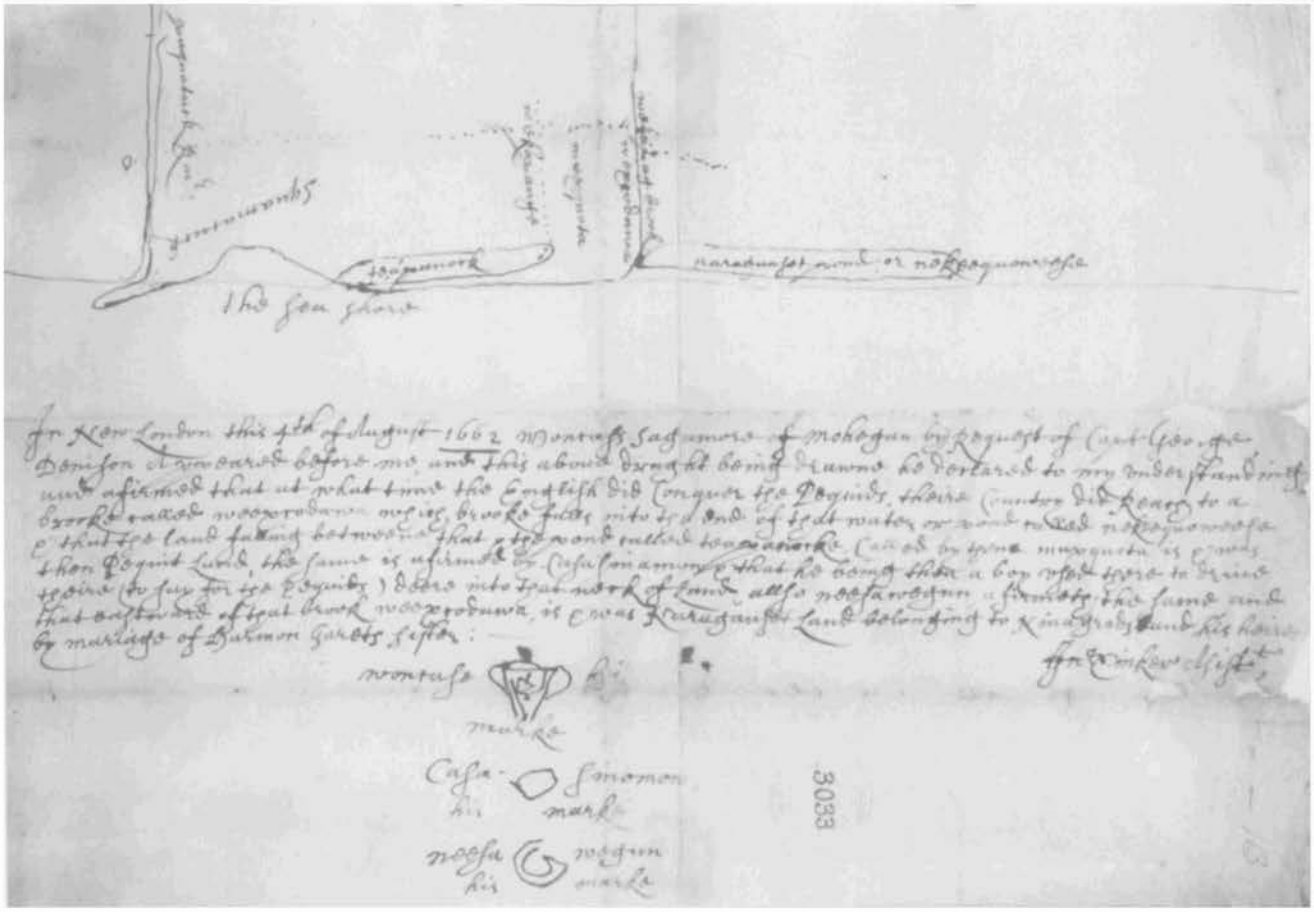


FIG. 4.15. CONTEMPORARY TRANSCRIPT OF A PROBABLE INDIAN MAP RECONSTRUCTING THE EASTERN EXTENT OF PEQUOT COUNTRY BEFORE 1637. A supplemented manuscript transcript, 4 August 1662, ink on paper, by John Tinker of a 1662 Indian map (probably Pequot, Mohegan, and Narragansett) reconstructing the eastern extent of Pequot country before 1637. Deer were driven into the "neck of Land" between two elongate coastal ponds in what is now southwestern Rhode Island.
Size of the sheet: 23 × 33.5 cm; size of the map portion: ca. 8.5 × 33.5 cm. Photograph courtesy of the Massachusetts Archives Collection, Massachusetts State Archives, Boston (vol. 30, p. 113, stamped "Mass. Archives Maps and Plans #3033").

relevant, making reconstruction of the original virtually impossible.[79]

Neither Indians nor Inuit had a tradition of exclusive ownership of precisely bounded land, yet their maps were used in land negotiations with Europeans. In 1662 John Tinker transcribed a map recording the extent of Pequot country before 1637 in what is now southwestern Rhode Island (fig. 4.15). According to Tinker's legend, the original was made by one member of each of the three nations living in the area at the time; a Pequot, a Mohegan, and a Narragansett. The map was made as part of an attempt to settle a dispute over land between the Connecticut and Massachusetts colonies, but also reflects Indian concerns. An inscription includes a statement by the Mohegan concerning land marked on the map between two coastal ponds "that he being then a boy used there to drive theire (to say for the Pequids) deere into that neck of Land." Indian maps often mark favorable locations for food resources, including edible plants, but especially animals.

Another example is a map made in 1666 or 1668 delimiting a rectangular area of land in what is now southern Massachusetts that the Pokanoket (Wampanoag) sachem King Philip (Metacom) was prepared to sell to the Plymouth Colony (fig. 4.16).[80] It was drawn and anno-

79. A series of maps on paper were made in a different context by Shanawdithit, the last of the Newfoundland Beothuks, shortly before her death in 1829. While living in St. John's she made several drawings, including five detailed maps representing a series of critical events in Anglo-Beothuk relations between 1810 and 1823. The original pencil drawings, heavily annotated by W. E. Cormack who obtained them, are in the Newfoundland Museum, St. John's (NF 3304–8). They are described and reproduced in James P. Howley, *The Beothucks or Red Indians: The Aboriginal Inhabitants of Newfoundland* (Cambridge: Cambridge University Press, 1915), 238–46 and sketches I–V, and Warhus, *Another America* (note 28). See also Matthew Sparke, "Between Demythologizing and Deconstructing the Map: Shawnadithit's New-found-land and the Alienation of Canada," *Cartographica* 32, no. 1 (1995): 1–21.

80. There has been confusion about whether the draft shows lands

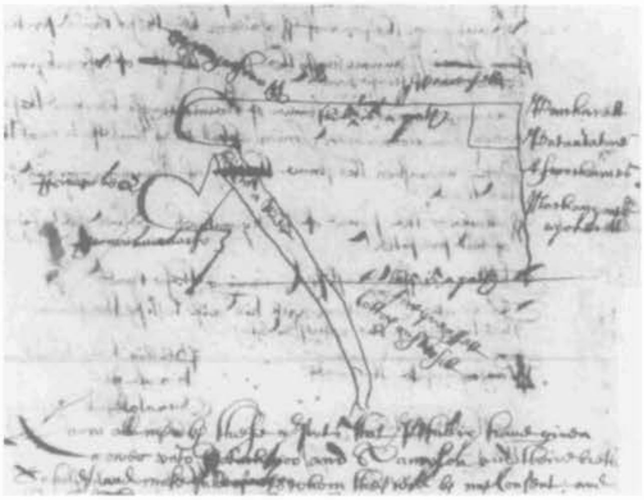


FIG. 4.16. MAP DELIMITING AN AREA OF THE SOUTHERN COAST OF WHAT IS NOW MASSACHUSETTS THAT METACOM (KING PHILIP) WAS WILLING TO SELL TO THE PLYMOUTH COLONISTS. A seventeenth-century clerk's copy of a 1666 or 1668 map that was part of a land deed. The original was drawn by John Sassamon, a Harvard-educated Massachusett Indian who acted as secretary to King Philip. The copy is difficult to read, and one critical word has been read by some as "now" and by others as "not." This has caused uncertainty whether the enclosed area is the land "wee are" *now* or *not* "willing should be sold." In cartographic terms, did the boundary enclose lands available for sale or delimit lands that were being withheld? See also note 80.
Size of the original or clerk's transcript: 17 × 26.5 cm. Bound in "Indian deeds, Treasurer accounts; Lists of Freemen," by permission of the Plymouth County Commissioners, Plymouth Court House, Plymouth, Mass. Photograph courtesy of the Dublin Seminar for New England Folklife, Concord, Mass.

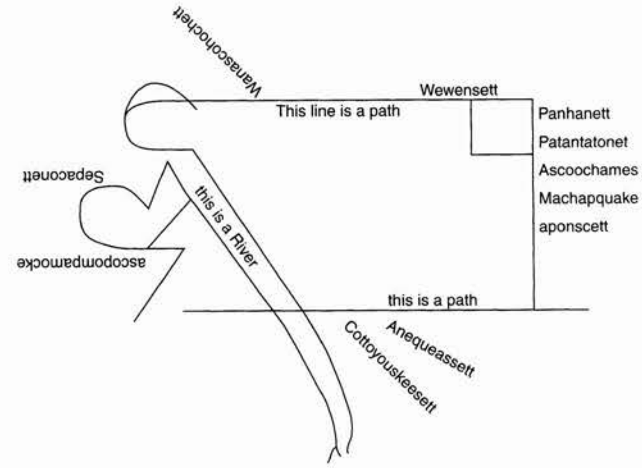


FIG. 4.17. REDRAWING OF THE MAP OF THE LAND KING PHILIP WAS WILLING TO SELL TO THE PLYMOUTH COLONISTS (FIG. 4.16). After *Records of the Colony of New Plymouth in New England,* vol. 12, *Deeds, &c., 1620–1651. Book of Indian Records for Their Lands* (Boston: W. White, 1861), 223–44, esp. 237.

tated for him by his secretary, John Sassamon, a Massachusett Indian who had been educated at Harvard College. On the evidence of the map alone it would have been impossible to know what King Philip and Sassamon intended, because the drawing was scaleless and lacked information inland from the coast (see fig. 4.17).

Map content was shaped by the circumstances of interaction with Europeans as well as by geographical knowledge. On 7 September 1683 at Albany, New York, the English trader Robert Livingston obtained from two Cayugas and one Susquehannock a map of the Susquehanna River (fig. 4.18). The map was almost certainly transcribed or enhanced by Livingston. On the map, the course of the Susquehanna is markedly simplified, and all the important west bank tributaries of that river are represented, also simplified, down to and including the confluence with West Branch. The river is represented down to its mouth on Chesapeake Bay. Conversely, though well within the mapped area, the map omits each of the east bank tributaries as well as the Juniata, an important west bank tributary of the lower Susquehanna. The reason for the omissions is implicit in the endorsement: "Draught of y[e] Susquehannes River & how soon ye Indians westward can come there." This is elaborated on in a long inscription on the front:

> This draugt is taken from 3 Indians, 2 [of them] Cajouges . . . and [the other one a] Susquehannes that Live amongst ye onnandages, . . . [They] asked why so Exact an account of ye Susquehannes River was de-

that King Philip is "not" willing to sell or "now" willing to sell (e.g., Peter Benes, *New England Prospect: A Loan Exhibition of Maps at the Currier Gallery of Art, Manchester, New Hampshire* [Boston: Boston University for the Dublin Seminar for New England Folklife, 1981], 75–76). The full statement from *Records of the Colony of New Plymouth in New England,* vol. 12, *Deeds, &c., 1620–1651. Book of Indian Records for Their Lands* (Boston: W. White, 1861), 223–44, esp. 237, reads:

> This may informe the honor Court that I Phillip ame willing to sell the Land within this draught; but the Indians that are vpon it may liue vpon it still but the land that is [waste] may be sold and Wattachpoo is of the same mind; I haue set downe all the principall names of the land wee are not willing should be sold.
> ffrom Pacanaukett
> the 24th of the 12th month 1668
> PHILLIP [his mark]

A recent interpretation of this map has located the lands for sale as being along and to the northwest of that part of the southeast coast of Massachusetts now known as Buzzards Bay, between Charles Neck and Wings Cove. It has also offered a solution to the apparent contradiction between land "not" and "now" for sale, the former being the lands with toponyms outside the rectangular area and the latter the lands without toponyms within it. Margaret W. Pearce, "Native Mapping in Southern New England Indian Deeds," in *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis (Chicago: University of Chicago Press, 1998), chap. 7.

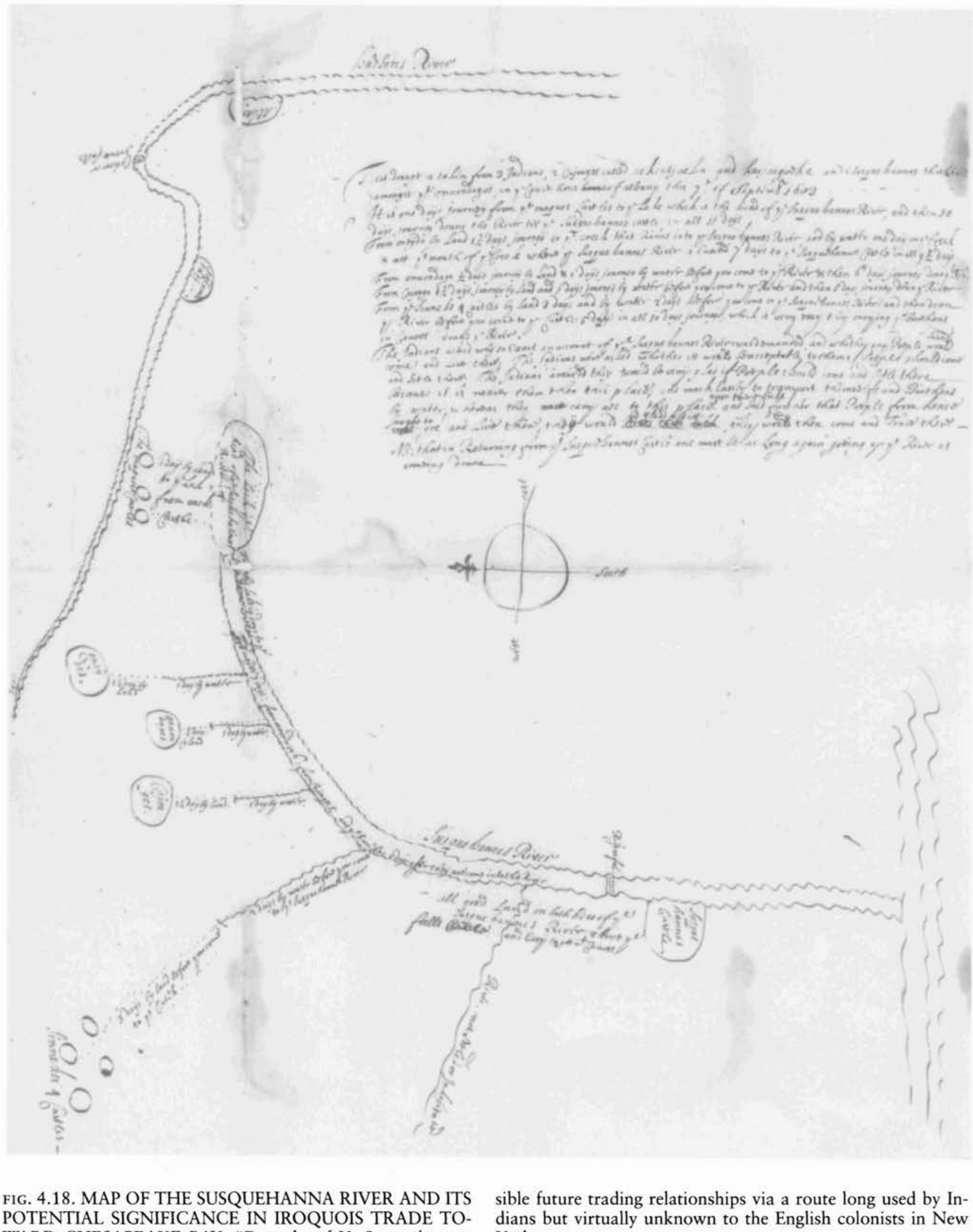


FIG. 4.18. MAP OF THE SUSQUEHANNA RIVER AND ITS POTENTIAL SIGNIFICANCE IN IROQUOIS TRADE TOWARD CHESAPEAKE BAY. "Draught of Ye Susquehannes River" by two Cayugas (Ackentjaekon and Kaejaegoehe) and one unnamed Susquehannock, 7 September 1683. Made on request, this map is particularly interesting in presenting possible future trading relationships via a route long used by Indians but virtually unknown to the English colonists in New York.

Size of the original: 39.5 × 30.5 cm. Photograph courtesy of the Pierpont Morgan Library, New York (GLC 3107–Livingston Collection).

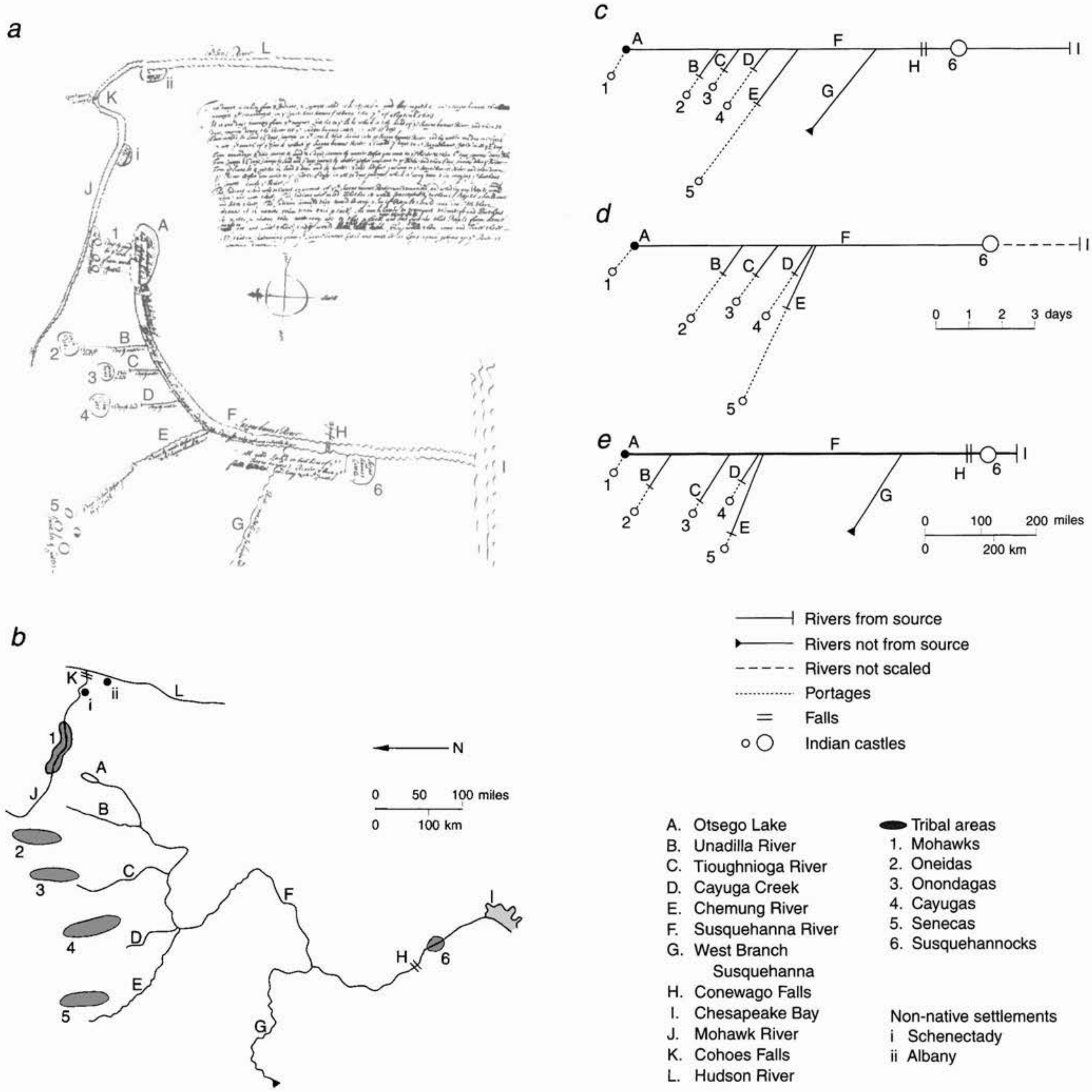


FIG. 4.19. MAPPED DISTANCES AND JOURNEY TIMES ON THE SUSQUEHANNA RIVER ROUTE. *a* is the Cayuga-Susquehannock map of 1683 (fig. 4.18); *b* maps the same information on a modern map. Distances are proportionally scaled in *c*, *d*, and *e*, and the length of the Susquehanna River is standardized between its source in Otsego Lake (A) and the Susquehannocks castle (6) (*c* is based on the 1638 map; *d* is based on days travel as given by Ackentjaekon; and *e* is based on river and portage distances on modern maps). Intervals on the main river, tributaries, and portages are scaled proportionally. In the case of *d*, downstream travel times were used ("Returning from y^e Susquehannes [= Susquehannocks] Castle one must be as Long again goeing up y^e River as comeing downe.") Because travel times across the portages presumably would not be significantly different on return journeys, scaling by upstream times would have resulted in an appreciably different *d*.

manded [presumably by Livingston], and whether any People would come and Live there; The Indians were asked whether itt would be acceptable to them if People should come and Setle there: The Indians ansured they would be verry glad if People should come and Setle there because it is nearer them then this place [Albany]; and much Easier to transport themselfs and Burthens by water, whereas they muste carry all to this

> place upon there baks; and said further that People from hence ought to goe and Live there, they would be gladd off itt, they would then come and Trade there.

Though "demanded" by one or more English traders, the map was quite clearly a plea by two presumably representative Iroquois Indians, supported by one Susquehannock who would also benefit, for the English to open a trading post on the lower Susquehanna River as an alternative to Albany on the Hudson River. The represented tributaries of the Susquehanna River were the ones they would then use to take their furs to the new post. With the exception of the West Branch of the Susquehanna River, the tributaries they would not use were all omitted from their map.

The map also omits the south shore of Lake Ontario, doubtless reflecting the long-standing antipathy of the Iroquois toward the French and an unwillingness to trade with them via the lake and the St. Lawrence River. In retrospect these cartographic silences are difficult to detect unless the purpose of the map is well documented and can be related to conditions and events within the wider region.

This map may employ scaling of distance by travel time. Journey times to the nearest half day are given for the sectors of the main river, for all but one of the represented tributaries, and for the portages beyond these to the Iroquois villages. Hence it is possible to compare spacings between key points on the Indians' map with the journey times given and with distances taken from a modern map (fig. 4.19). The lengths of the portages are exaggerated, and presumably because travel time was given for downstream journeys, the rapidly flowing tributary streams are represented as shorter.

Annotators almost always failed to note when they replaced pictographs with text, added information given by the mapmaker in words or by gesture, or supplemented a map with information obtained elsewhere. Livingston's long legend on his transcript of the 1683 map of the Susquehanna Valley is rich in information about days of travel by land and water along marked routes between specific points, but it is not made clear whether that information was represented pictographically on the original map.

On 2 March 1697 at Albany, Livingston either had made or acquired another map (fig. 4.20). The linework is inked over what appears to be original red crayon. The map represents places and features within the upper parts of four adjacent major river systems; the St. Lawrence, Connecticut, Hudson, and Susquehanna. Assembling all four rivers on one map makes some of the distortions enormous, particularly among lesser streams that had to be reoriented or have their lengths adjusted to represent important interbasin routes. For example, the hydrologically minor Oswego River system afforded vital canoe links between the Hudson-Mohawk, Susquehanna, and Great Lakes–St. Lawrence systems (see also fig. 4.103*c*). To demonstrate these canoe links, angular distortion and linear exaggeration were essential.[81]

Maps produced in the course of negotiations with Europeans were not always made with European materials. Negotiations between the Mississaugas and the British concerning land around Toronto in 1805 included a number of cartographic exchanges. In 1787 the Mississaugas sold the land known as the Toronto Purchase before an accurate survey had been done. In part the 1805 meeting was being held to establish "what had been the generally received opinion of the Mississagues as to [that] boundary line."[82] During the meeting, the spokesman Quenepenon revealed an oral tradition of boundary:

> All the Chiefs who sold the Land you speak of are dead and gone. I now speak for all the Chiefs of the Mississagues. We cannot absolutely tell what our old people did before us, except by what we see on the plan [produced by Colonel William Claus, deputy superintendent of Indian Affairs] & what we remember ourselves and have been told. . . . Our old Chiefs told us that the line was on the East side of the Etobicoke following the course of the River upwards from the mouth of to the most Easterly bend of the same two or three miles up in a strait line. That the River then runs from the westward but a continuation of that strait line from the mouth of the River and intersecting that Easterly bend was the boundary.[83]

On 1 August Quenepenon produced "a sheet of Bark with Lines representing the Tract they are willing to let their Father [King George III] have."[84] As contemporarily described, it was certainly a boundary map

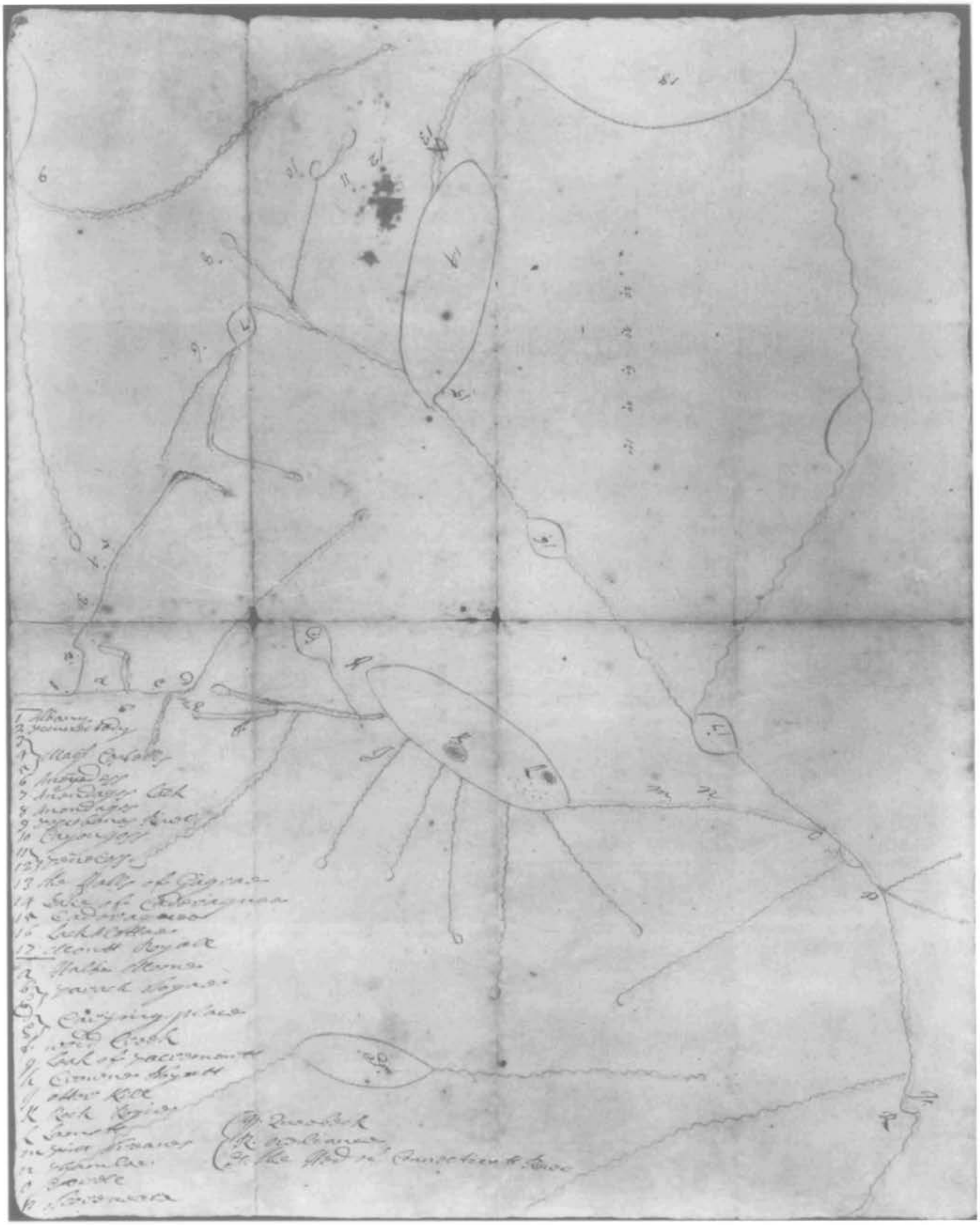
> from the Etobicoke to Capn Brants' Land on the margin of the Lake [Ontario] reserving a Mile on each side of the Credits to its source, half a mile on each side of

81. Another apparent distortion is the circuit shown from the St. Lawrence River above Montreal, via the Ottawa River, undifferentiated Lakes Huron and Erie, Niagara Falls, Lake Ontario, and the St. Lawrence River back to Montreal. Apparent hydrological impossibilities of this kind occur frequently on Indian maps when portages across primary watersheds are distinguished by neither linework nor symbols. In this case the unrepresented portage is that between the Ottawa River and the Lake Nipissing–French River system draining into Georgian Bay of Lake Huron. If, as is virtually certain, the marked lake is Lake Nipissing, then the long connecting link with undifferentiated Lakes Huron and Erie is another good example of distortions frequently arising from the need to represent linkages.

82. Colonel William Claus, deputy superintendent of Upper Canada, introducing the proceedings of a meeting with the Mississaugas at River Credit on 31 July 1805. National Archives of Canada, Ottawa, Lieutenant-Governor's Office–Upper Canada, Indian Affairs (Correspondence, 1796–1806, RG 10, vol. 1), 290.

83. Correspondence, Quenepenon, on 31 July 1805, p. 290–91.

84. Correspondence, Quenepenon, on 1 August 1805, p. 296.


1 Albany
13 the ffalls of Niagara
17 Mount Royal
Carrying place
Wood Creek

(*Facing page*)
FIG. 4.20. A PROBABLE INDIAN MAP OF PARTS OF FOUR MAJOR BUT SEPARATE DRAINAGE SYSTEMS, 1696 OR 1697. Such maps were common whenever strategic and especially transportational relationships were being represented within large areas, in this case, approximately 400,000 square kilometers. The map is manuscript, ink over red crayon on paper; endorsement on back: "alb^y 2 m[arch] 1696/7 Drafft of this Country."
Size of the original: 41.3 × 32.8 cm. Photograph courtesy of the Pierpont Morgan Library, New York (GLC 3107–Livingston Collection).

> the Sixteen mile Creek & half a mile on each side of the Twelve mile Creek; A tract sold by them to the Tuscaroras near Brants land and Sugar Bush which they gave to Mrs Brant together with Two or three Chains wide the whole length of the Beech, that they may not be subject to be driven off, and said they are willing to give Two miles to the Northward of the road and all to the Southward of it except the Two or three Chains on the Beech.[85]

The following day, Quenepenon "spoke with a flat stone in his hand on which was represented the lines within which they had on a reconsideration agreed to give their Father [King George III]."[86] The reconsideration had been hasty and the map had been scratched or drawn on the stone within twenty-four hours.

The Ojibwas used maps in the course of negotiating the boundaries of reservations on the eastern and northern shores of Lake Huron under the terms of the so-called Robinson-Huron Treaty, signed September 9, 1850. The schedule of reservations attached to that treaty defined seventeen reserves, but in a manner that did not establish definitive boundaries. For instance, the seventeenth was "for Chief Muckatamishaquet and his Band, a tract of land on the east side of the River Naishconteong [Naisoot], near Pointe aux Barils, three miles square; and also a small tract in Washauwenega Bay [Shawanaga Inlet]–now occupied by a part of the Band–three miles square."[87] Not only were the delineations vague, but so were the units of measurement. Indian Department representative John W. Keating agreed with the representatives of one band that "the league was the measure of length usually used by the Indian people," and the use of miles in the schedule was an error.[88] As a result, a field survey of each reserve was performed, preceded by a consultation at which the band chief and his people were given an opportunity "to explain more clearly to the officials of the Indian Department the boundaries and extent of the Indian Reserves [as] specified in the 'Schedule of Reservations.'"[89] The bands were usually well prepared for the negotiations, sometimes with their own maps. At reserve 17, for example, "they had their own 'Indian plan' on birchbark ready to indicate their desire for different areas than those identified in the 'Schedule of Reservations.'"[90] Neither the birchbark plan nor a contemporary copy is extant.

A series of five pictographs, two with cartographic elements, appears in Henry Rowe Schoolcraft's *Historical and Statistical Information respecting the History, Condition, and Prospects of the Indian Tribes*.[91] The pictographs, which were carried to Washington in 1849 to petition Congress and President James K. Polk for a permanent home in Wisconsin for the Lake Superior Chippewas, were printed in color from drawings by Seth Eastman. In total the five images depict forty-four persons by their animal totems. The first pictograph (A) (fig. 4.21) represents seven Chippewa chiefs linked together symbolically by eyes and hearts to signify that they see and feel alike about the settlement proposal. The second image with cartographic elements, pictograph (E) (fig. 4.22), clearly shows nine more members of the party associated with the Lac Vieux Desert region on the present Wisconsin-Michigan border. Both images illustrate the importance of cultural context in understanding the meaning and purpose of representations.

BIRCHBARK MAPS

Native Americans inscribed and sometimes painted maps on the inner bark of birch in the northeastern forest region until the mid-twentieth century. Despite the fragility of birchbark, a number of nineteenth-century examples are extant, and many accounts exist from earlier periods.

After serving as a missionary to the Micmacs of the Gaspé Peninsula (now northeastern Quebec) between 1675 and about 1687, Chrétien Le Clercq, a Recollect priest, reported that "they have much ingenuity in drawing upon bark a kind of map which marks exactly all the rivers and streams of a country of which they wish to make a representation. They mark all the places thereon exactly and so well that they make use of them successfully, and an Indian who possesses one makes long voy-

85. Correspondence, Quenepenon, on 1 August 1805, p. 296.

86. Correspondence, Quenepenon, on 2 August 1805, p. 298.

87. *Copy of the Robinson Treaty Made in the Year 1850 with the Ojibewa Indians of Lake Huron Conveying Certain Lands to the Crown* (1939; reprinted Ottawa: Queen's Printer, 1964), 5.

88. David T. McNab, *Research Report: The Location of the Northern Boundary, Mississagi River Indian Reserve #8, at Blind River* (Toronto: Office of Indian Resource Policy, Ontario Ministry of Natural Resources, 17 November 1980; revised 8 March 1984), 11.

89. McNab, *Research Report,* 11.

90. McNab, *Research Report,* 11.

91. Henry Rowe Schoolcraft, *Historical and Statistical Information respecting the History, Condition, and Prospects of the Indian Tribes of the United States,* 6 vols., illustrated by Seth Eastman (Philadelphia: Lippincott, Grambo, 1851–57), 1:416–19. The other three pictographs, depicting the remaining twenty-eight members of the delegation, do not have cartographic elements.

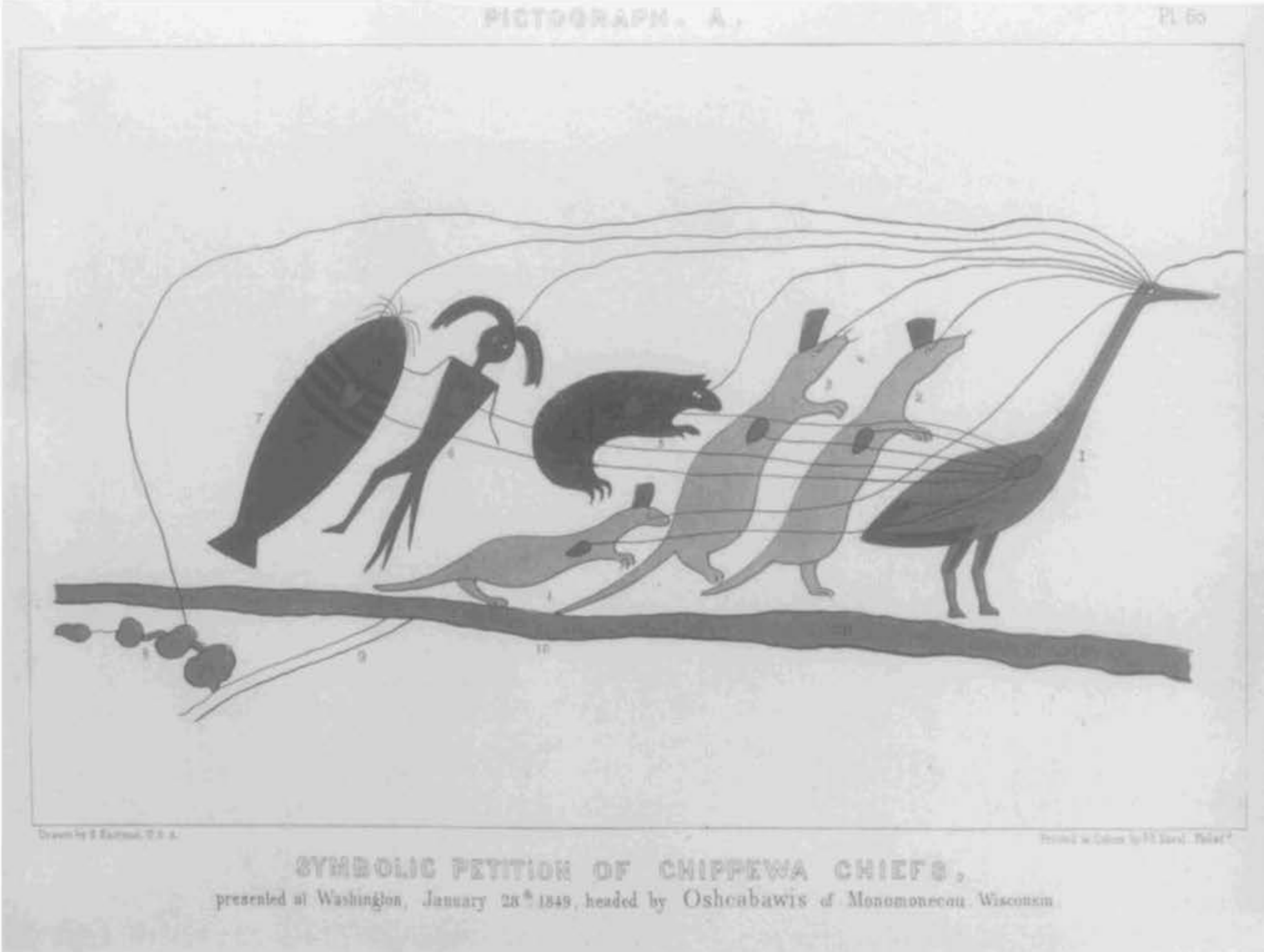


FIG. 4.21. PICTOGRAPH A SHOWING OSHCABAWIS AND OTHER CHIPPEWA CHIEFS. The images of animals–a crane, three martens, a bear, a man-fish (a Chippewa myth), and a catfish–represent the totems of seven Chippewa chiefs taking a land petition to Washington in 1849. The totem of the chief Oshcabawis (of the Crane clan), who headed the party, is connected to a chain of lakes in northern Wisconsin at which wild rice cultivation is proposed (circular images at lower left). The straight-line center represents Lake Superior. Size of the original: 18.6 × 25.2 cm. From Henry Rowe Schoolcraft, *Historical and Statistical Information respecting the History, Condition, and Prospects of the Indian Tribes of the United States,* 6 vols., illustrated by Seth Eastman (Philadelphia: Lippincott, Grambo, 1851–57), 1:416–17 (description and key) and pl. 60. Photograph courtesy of the State Historical Society of Wisconsin, Madison. Schoolcraft's key is also reproduced in David Turnbull, *Maps Are Territories, Science Is an Atlas: A Portfolio of Exhibits* (Geelong, Victoria: Deakin University, 1989; reprinted Chicago: University of Chicago Press, 1993), 18.

ages without going astray."[92] Based on experience in both the St. Lawrence and upper Mississippi Valleys between 1683 and 1692, Lahontan observed that the Indians of the two regions

> are as ignorant of *Geography* as of other *Sciences,* and yet they draw the most exact Maps imaginable of the Countries they're acquainted with, for there's nothing wanting in them but the Longitude and Latitude of Places: They set down the True *North* according to the *Pole Star;* The Ports, Harbours, Rivers, Creeks and Coasts, of the Lakes; the Roads, Mountains, Woods, Marshes, Meadows, *&c.* counting the distances by Journeys and Half-journeys of the Warriers, and allowing to every Journey Five Leagues. These *Chorographical Maps* are drawn upon the Rind of your *Birch Tree;* and when the Old Men hold a Council about War or Hunting, they're always sure to consult them.[93]

After observing northern Iroquoian Indians to the west of Montreal between 1712 and 1717, the Jesuit mission-

92. Chrétien Le Clercq, *New Relation of Gaspesia: With the Customs and Religion of the Gaspesian Indians,* ed. and trans. William Francis Ganong (Toronto: Champlain Society, 1910), 136.

93. Louis Armand de Lom d'Arce, baron de Lahontan, *New Voyages to North-America,* 2 vols. (London: H. Bonwicke and others, 1703), 2:13–14.

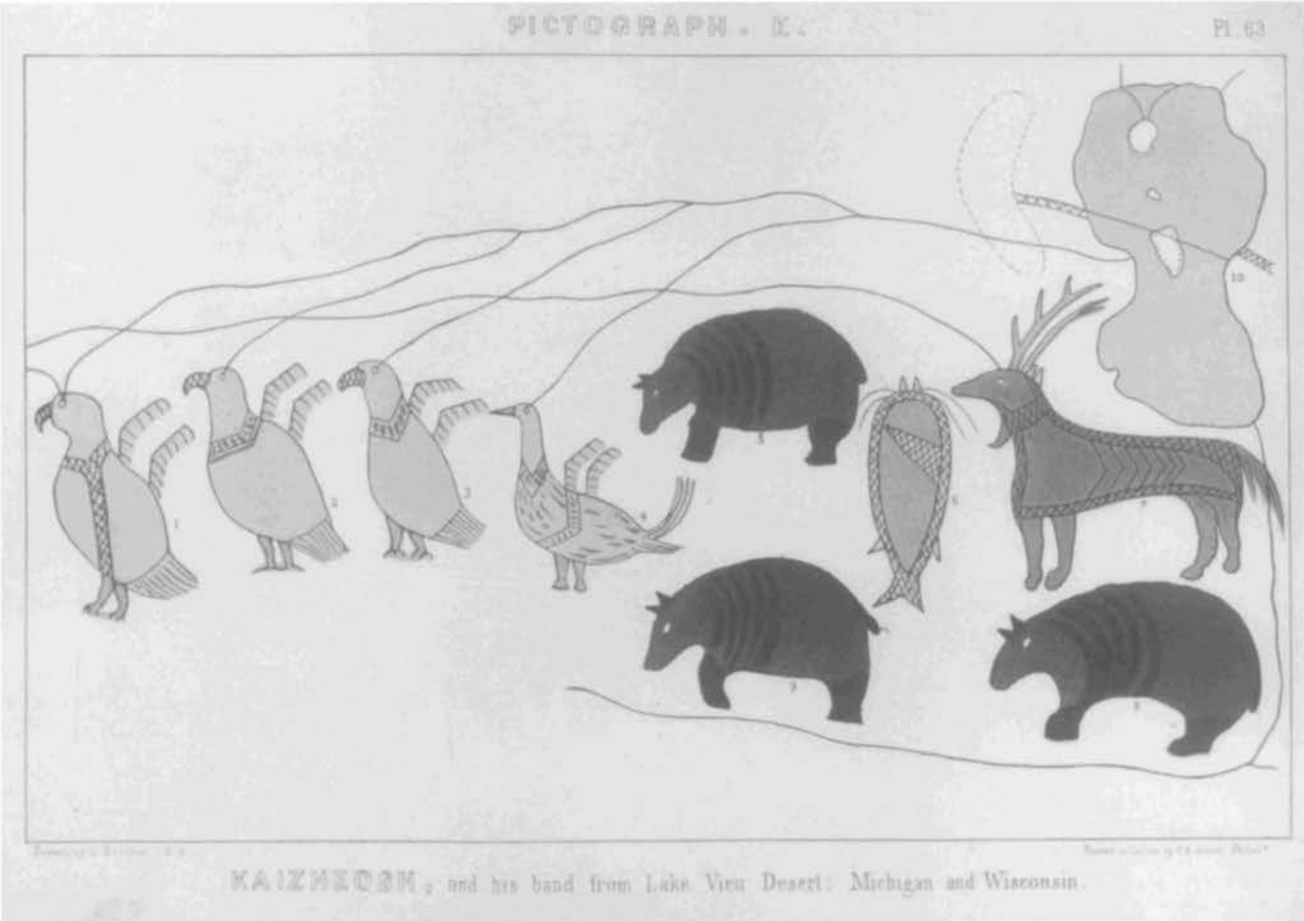


FIG. 4.22. PICTOGRAPH E SHOWING KAIZHEOSH AND HIS BAND FROM LAC VIEUX DESERT, MICHIGAN AND WISCONSIN. Lac Vieux Desert, the source of the Wisconsin River, is shown at top right with the Wisconsin River flowing from it. Draper Island can be easily identified at the east of the lake (east is at the top), and Duck Island is in the center. The lake is linked to three members of the eagle totem and one member of the duck totem, symbolizing their origin with it. Size of the original: 18 × 26 cm. From Henry Rowe Schoolcraft, *Historical and Statistical Information respecting the History, Condition, and Prospects of the Indian Tribes of the United States,* 6 vols., illustrated by Seth Eastman (Philadelphia: Lippincott, Grambo, 1851–57), 1:419 (description and key) and pl. 63. Photograph courtesy of the State Historical Society of Wisconsin, Madison.

ary Joseph-François Lafitau reached unequivocal conclusions concerning their sense of direction and mapmaking skills. They had "an excellent sense (of direction). It is a quality which seems born in them. . . . They go straight where they wish to go, even in uncharted wildernesses and where no paths are marked. On their return, they have observed everything and trace, grossly, on sheets of bark or on the sand, exact maps on which only the marking of degrees is lacking. They even keep some of these geographical maps in their public treasury to consult them at need."[94] European accounts such as Lafitau's stress the use of birchbark maps as a permanent information resource, a function familiar to Europeans. Indeed, although the circumstances are not well known, some northeastern Indians preserved birchbark and other artifacts in central repositories. Such treasuries included maps that served as mnemonics of traditions and beliefs, often, though not necessarily, for use in rituals. Responsibility for these artifacts could be vested either in individuals or in groups. Those who made and stored them were powerful individuals within their communities.

Lafitau indicated that the Iroquois stored maps made on birchbark, possibly at Onondaga since it is known that wampum belts, another kind of culturally important artifact, were stored there by the Iroquois Confederacy in the early eighteenth century.[95] A more detailed description of

94. Joseph-François Lafitau, *Customs of the American Indians Compared with the Customs of Primitive Times,* 2 vols., trans. and ed. William N. Fenton and Elizabeth L. Moore (Toronto: Champlain Society, 1974–77), 2:130.

95. *Council Fire: A Resource Guide* (Brantford, Ont.: Woodland Culture Centre, 1989), 5.

such a repository concerns the Ojibwas. Although not specifically mentioning maps, the Ojibwa chief George Copway described how, in the mid-nineteenth century, his people and most adjacent peoples had

> places in which they deposit the records which are said to have originated their worship. The Ojibways have three such depositories near the waters of Lake Superior. Ten of the wisest and most venerable of the nation dwell near these, and are appointed guardians over them.
>
> Fifteen years intervene between each opening. . . . As they are being opened, all the information known respecting them is given to the new members; then the articles are placed before them. . . . if any have begun to decay they are taken out; an exact fac-simile is made and placed in its stead. . . .
>
> These records are written on slate-rock, copper, lead, and on the bark of birch-trees. . . .
>
> The chief of Lac Coart, Oreille, ("Moose Tail,") in the spring of 1836 [reported that]. . . .
>
> . . . the guardians had for a long time selected as the places of deposit the most unsuspected spot, where they dug fifteen feet, and sunk large cedar trees around the excavation. In the centre was placed a large hollow cedar log, besmeared at one end with gum. The open end is uppermost, and in it are placed the records, after being enveloped in the down of geese or swan, which are changed at each examination.[96]

Copway reproduced with explanations approximately seventy of the more than two hundred pictographic characters then in use on Ojibwa artifacts. These included signs for geographical and hydrological features such as seawater, lake, and river (the last two manifestly in plan); islands, and mountains (each in profile); and land (totemically, in the form of a turtle).[97] Copway did not precisely indicate the origin and use of these records, but they seem to have been related to spiritual beliefs: "The record is said to be a transcript of what the Great Spirit gave to the Indian after the flood."[98]

The material Copway discussed probably included examples of scrolls preserved by the Midewiwin ("grand medicine society") or Mide, an organized priesthood of men and women among the Ojibwas who had occult knowledge of killing and curing. Some of the esoteric knowledge of the society was recorded in pictographs on birchbark scrolls. Analyzing examples held in museums and private collections in many parts of the world, Dewdney identified six categories of scrolls, one of which is the migration scroll, showing the westward diffusion of the Mide religion. According to oral tradition, the beliefs were first brought to Indians on the Atlantic coast. Historical sources record that the Ojibwas had reached Sault Sainte Marie by the mid-seventeenth century, and that after 1780 there were settlements in what is now northern Minnesota. The scrolls show the route of the diffusion linearly, but distances are not scaled.[99]

In 1966 Dewdney collected a scroll from the shaman Red Sky at Shoal Lake, western Ontario, and was able to discuss its interpretation at the time. Since it has many elements in common with the other migration charts, parts of this interpretation can probably be applied to other examples (fig. 4.23).[100] Because it represented the route by which the Mide religion was believed to have been received, it is best interpreted retrochronologically from west to east, that is, left to right. Even at the left, however, interpretation is difficult, because in addition to the many mythical symbols "the doubly outlined route makes no distinction between land trails or portages and water courses."[101] To the east identification becomes even more difficult. However, Dewdney was able to identify features to the east by using lists of names of stopping places preserved orally, which suggests that an oral tradition of toponyms had persisted, preserving meaning longer than the pictographs alone.[102]

Because membership in the Midewiwin was limited and involved a long period of instruction, it is doubtful whether Ojibwas outside the society could understand

96. George Copway, *The Traditional History and Characteristic Sketches of the Ojibway Nation* (London: Charles Gilpin, 1850), 131–33.

97. Copway, *Traditional History,* 134–36.

98. Copway, *Traditional History,* 132.

99. Selwyn Dewdney, *The Sacred Scrolls of the Southern Ojibway* (Toronto: University of Toronto Press, 1975), 57–80 and 183–84. See also G. Malcolm Lewis, "Amerindian Antecedents of American Academic Geography," in *The Origins of Academic Geography in the United States,* ed. Brian W. Blouet (Hamden, Conn.: Archon Books, 1981), 19–35, esp. 26.

In addition to the Mide migration scrolls among the Ojibwas, other nations and groups had similar traditions. For example, a record exists that some believe to be the ancient history of the Delawares (Lenni Lenape), told in the form of an epic migration story. Known from records on bark or wood collected in 1820 and now lost, the Walam Olum, or Red Record, consists of 183 pictographs. Many of them have been interpreted as topographic, including ground level, earth, homeland, body of water, island, an establishment, town, and capital. The work has been interpreted as an ancient narrative of the crossing of the Delawares from Asia into the New World, their journey south and east across North America to a homeland centered in the Delaware River Valley, and ending with a description of European ships arriving on the Delaware River about 1620 (David McCutchen, trans. and annotator, *The Red Record: The Wallam Olum, the Oldest Native North American History* [Garden City Park, N.Y.: Avery, 1993]). However, in 1994 "conclusive textual proof" was published "demonstrating the fraudulence" of the Walam Olum: David M. Oestreicher, "Unmasking the *Walam Olum*: A 19th-Century Hoax," *Bulletin of the Archaeological Society of New Jersey* 49 (1994): 1–44 (quotations from editor's note, p. 1).

100. Dewdney, *Sacred Scrolls,* esp. 23–36, 57–80. Eight migration scrolls are discussed; although Dewdney saw a ninth, he was not permitted to reveal its contents, aside from some place-names.

101. Dewdney, *Sacred Scrolls,* 61.

102. Dewdney, *Sacred Scrolls,* 68–69.

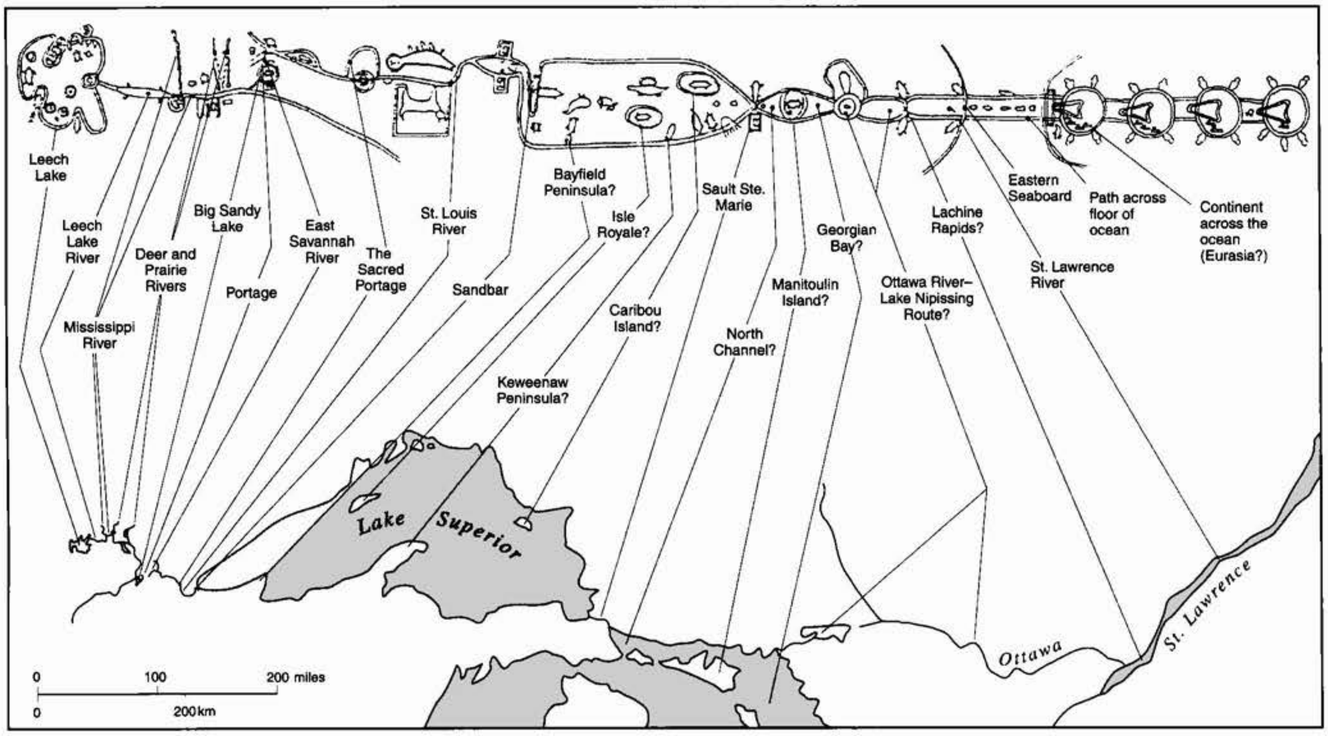


FIG. 4.23. GEOGRAPHICAL INTERPRETATION OF RED SKY'S BIRCHBARK MIGRATION SCROLL. The original scroll is Southern Ojibwa, collected in 1966, but probably a genuine copy in a long tradition. (Permission could not be obtained to reproduce the original.) Such scrolls recorded for posterity the tradition of the route through the St. Lawrence–Great Lakes whereby they received the Mide religion. A drawing of the scroll (top) shows that it is crudely topographical to the left, becoming topological toward the center, and almost cosmographical toward the right. Leech Lake is at the journey's end, including Double and Pine Points, the Leech River, and its drainage into Mud Lake, and then the upper Mississippi. Two rivers not part of the route, the Deer and Prairie, are shown as snakes. Farther downstream, where the river swings south, the route goes up a small stream to Sandy Lake and leaves the Mississippi basin. A portage must be made into the Great Lakes drainage, probably to the upper Savannah River. The chart is more difficult to follow at this point, but a sandbar at the mouth of the St. Louis River can be clearly identified as the Fond du Lac. In this, as in all the migration charts, Lake Superior is "unmistakably identified," and there is no evidence of any real knowledge of the geography east of Sault Sainte Marie.
Length of the original: 262 cm in six sections. Based on Selwyn Dewdney, *The Sacred Scrolls of the Southern Ojibway* (Toronto: University of Toronto Press, 1975).

the migration scrolls or even knew about them. Furthermore, the society had probably originated in postcontact times as a creative response to changes in relations with the outside world consequent on European encroachment from the east.[103] If so, the scrolls were indigenous and indirect responses to a major external event.

There are many early historical accounts of Indians' making and using maps on birchbark, but very few of them contain significant information about how the maps were made. However, birchbark has been used as a pictographic medium by native peoples in various parts of the Northern Hemisphere for thousands of years.[104] It is therefore unlikely that techniques have changed significantly in the historic period, so Dewdney's detailed account of techniques used by the Southern Ojibwas in modern times to make their sacred scrolls, including migration scrolls, is significant.[105] The material used for pictographic purposes was the outer bark (phloem) together with the thin intermediate layer (cambium). It was best stripped in the spring, when the cambium side was coated with a dull yellow to deep brick red deposit. At most seasons of the year the stripped bark rolls up with the cambium side out. In the spring, however, the bark is so flexible that it will adjust its tensions and become essentially flat. The outer side of the bark bleaches in the sun to give a hard, silvery white surface marked with many closely spaced, subparallel, short linear scars (lenticels) caused by

103. See, for example, Lyle M. Stone and Donald Chaput, "History of the Upper Great Lakes Area," in *Handbook of North American Indians*, ed. William C. Sturtevant (Washington, D.C.: Smithsonian Institution, 1978–), 15:602–9, esp. 605–6.

104. "Map Surface, Birchbark," in *Cartographical Innovations: An International Handbook of Mapping Terms to 1900*, ed. Helen M. Wallis and Arthur H. Robinson (Tring, Eng.: Map Collector Publications in association with the International Cartographic Association, 1987), 265–69.

105. Dewdney, *Sacred Scrolls*, 11–22 (note 99).

the natural shedding of small branches. In contrast, the inner surface of the bark is darker and softer, and the lenticels are sealed off, leaving only ripples. Consequently a hardwood, bone, or metal stylus produces fine scratch lines on the outer surface, while the same tool used on the cambium side leaves a deeper, wider, and softer-edged groove. Both sides were used for pictography, but the cambium side appears to have been preferred.[106]

Occasionally, red ocher or charcoal mixed with bear's grease (or in later postcontact times, trade colors) was used to highlight particular components of a pictograph. Soft-pencil lines were also used, especially in the nineteenth century. Henry, writing retrospectively about his observations in 1775 in northern Maine, described how "bark, when taken from the tree, may be obtained lengthwise of the tree, from one to four feet, and of a length equal to the circumference," that is, approximately 120 centimeters by perhaps as much as 80 centimeters, although most birchbark maps were considerably smaller.[107]

MESSAGE MAPS ON BARK

Some birchbark maps and other maps were used and stored as important ritual and cultural objects, but they also appear to have been made as messages for others. Along trails and navigated waterways, birchbark maps were often inserted into the split end of a stick that had been blazed to attract attention and then driven into the ground, inclined toward the direction of travel being reported or recommended. Directional movements were typically shown by the way a person, animal, or transport vehicle was oriented. Birchbark message maps were used in certain areas until quite recently. Indeed, they may still be used.[108]

An account from the American Revolution describes the discovery and use of such a map during Benedict Arnold's 1775 expedition against the British garrison at Quebec. Many years later, John J. Henry recalled that while following the Dead River in Maine

> we came to a stream flowing from the west, or rather the northwest. As we were going along in uncertainty, partly inclined to take the westerly stream, one of the party fortunately saw a strong stake which had been driven down at the edge of the water, with a piece of neatly folded birch bark, inserted into a split at the top. The bark, as it was placed, pointed up the westerly stream, which, at its mouth, seemed to contain more water than our true course. Our surprize and attention was much heightened, when opening the bark, we perceived a very perfect delineation of the streams above us, with several marks which must have denoted the hunting camps, or real abodes of the map-maker. There were some lines, in a direction from the head of one branch to that of another, which we took to be the course of the paths that the Indians intended to take that season. This map we attributed to Natanis, or to his brother, Sabatis, who, as we afterwards knew, lived about seven miles up this westerly stream. . . . Inspecting the map thus acquired, we pursued our journey fearlessly.[109]

Sabatis and Natanis probably belonged to the Kennebec dialect group of Eastern Abenakis, who were known to leave such birchbark messages. It is not known whether the message Henry discovered was left deliberately for his group, but the Eastern Abenakis did side with the rebelling colonists in 1775.[110]

It is possible that the map described above resembled the oldest extant birchbark map, which was mounted, framed, and hence physically protected soon after it was found on the Ottawa River–Lake Huron watershed in 1841, probably shortly after its creation (fig. 4.24). This map reveals some of the technical constraints of working with bark. Birchbark maps tend to rectilinearity, because in making long, curved lines the stylus would get caught in the lenticels.[111] There are a few long, smooth curves,

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106. Regional differences may also have existed. For example, Dewdney noted that Indians around and beyond the upper Great Lakes preferred to use the cambium side of bark but that, for an unknown reason, the Indians around Lake Winnipeg preferred the outer surface; Dewdney, *Sacred Scrolls,* 16.

107. John Joseph Henry, "Campaign against Quebec," reprinted in *March to Quebec: Journals of the Members of Arnold's Expedition,* comp. and annotated Kenneth Roberts (New York: Doubleday, Doran, 1938), 295–430, esp. 311. A Mide migration chart of unknown provenance, hung on the wall of a storage room on the fifth floor of the American Museum of Natural History, New York, consists of three approximately equal sections stitched together, with an overall length of 260 centimeters; see Dewdney, *Sacred Scrolls,* 66–67 and 183.

108. Nicholas N. Smith, of Ogdensburg, New York, gave me a color transparency of a Mistassini Cree birchbark map he found attached to a tree in 1970 at a point where, shortly before, an old trail intersection had been crossed by a new gravel road.

> To better appreciate such messages one should be aware that the hunting patterns of the people were well established and known. . . . Before the Indians left for their winter camps the hunters met at the Trading Post letting the chief trader or factor know where and when they would be at each of their camps during the winter. . . . Times when neighbors would visit were established. It was important for the hunters to know when visitors were coming so that they could plan their busy hunting schedule and not take days off needlessly. . . . If hunting conditions were not good forcing a group to make an unanticipated move, it was very important for any change in plan to be communicated. The birch bark message was the means of letting the "world" know "one's" whereabouts or change in plan. (Nicholas N. Smith, personal communication, 2 November 1994.)

For general reference, see Mallery, "Picture Writing," 329–40 (note 4).

109. Henry, "Campaign against Quebec," 314–15 (note 107).

110. Dean R. Snow, "Eastern Abenaki," in *Handbook of North American Indians,* ed. William C. Sturtevant (Washington, D.C.: Smithsonian Institution, 1978–), 15:137–47, esp. 144.

111. Dewdney, *Sacred Scrolls,* 17 (note 99).

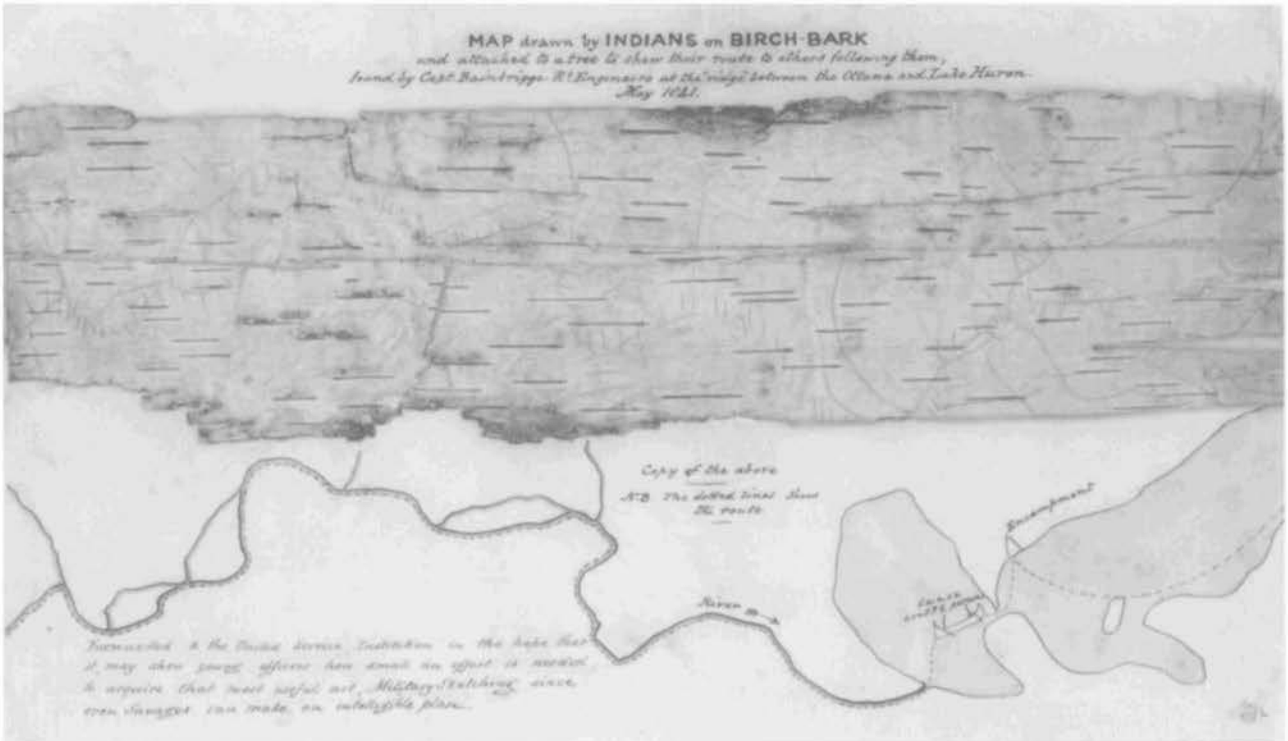


FIG. 4.24. POSSIBLY THE OLDEST EXTANT MAP ON BIRCHBARK. Probably Ojibwa. An inscription on the paper the map was mounted on reads: "Map drawn by Indians on birch-bark and attached to a tree to shew their route to others following them, found by Capt. Bainbrigge R[l]. Engineers at the 'ridge' between the Ottawa and Lake Huron. May 1841." Size of the original: 10 × 38 cm. By permission of the British Library, London (Map Library, RUSI [Misc.], fol. 2).

but they avoid lenticels; the river is composed of several straight sections with angular intersections, and the many short hatched lines are approximately at right angles to the lenticels, though avoiding them wherever possible.

Maps drawn on birchbark with charcoal or pencil tend to be less constrained by lenticels and ripples. A mid-nineteenth-century map of the Rangeley Lakes region in northeastern Maine appears to have been drawn on the cambium side of bark with a mixture of charcoal and bear grease (fig. 4.25). Without exception, the linework is bold and, except for short straight lines in a symbol representing portages, is made up almost exclusively of curves. Furthermore, the ripples are never avoided and are intersected at all angles.

Although in the examples just discussed the map was the dominant element, more frequently maps were a small part of the pictographic message. An example is the Ojibwa message on birchbark described by Henry Rowe Schoolcraft in 1820 near Kettle River (now in eastern Minnesota):

> On quitting our encampment this morning, the Indians left a memorial of our journey inscribed upon bark, for the information of such of their tribe as should happen to fall upon our track. This we find to be a common custom among them. It is done by tracing, either with paint or with their knives upon birch bark, (*betula papyracea*) a number of figures and hieroglyphics which are understood by their nation. This sheet of bark is afterwards inserted in the end of a pole, blazed, and drove into the ground, with an inclination towards the course of travelling. In the present instance the whole party were represented in a manner that was perfectly intelligible, with the aid of our interpreter, each one being characterized by something emblematic of his situation or employment. . . . The figure of a tortoise and prairy hen, denoted that these had been killed, . . . three hacks upon the pole, leaning N.W. [denoted] that we were going three days N.W. . . . . Should an Indian hereafter visit this spot, he would therefore read upon this memorial of bark [among many other things] that they were going to Sandy Lake, (knowing three days journey N.W. must carry us there).[112]

At its most sophisticated, pictography could be extremely complicated but remarkably precise.[113] Based on

112. Henry Rowe Schoolcraft, *Narrative Journal of Travels through the Northwestern Regions of the United States* (Albany: E. and E. Hosford, 1821), 211–12. Schoolcraft contrasted this with a map of part of the coast of Lake Superior drawn by "one of the lake Indians," because the former was "a historical record of passing events" (213).

113. Pictography could also be used to express quantitative information. See, for example, Father Paul Le Jeune's description in the *Jesuit Relations* for 1637 of an Iroquois message painted on a plank that had

FIG. 4.25. MAP ON BIRCHBARK OF THE RANGELEY LAKES REGION, MAINE. Drawn on one sheet of birchbark for the Bangor doctor Elijah L. Hamlin by his Indian (probably Eastern Abenaki) guide in the mid-nineteenth century. Unlike the Ojibwa birchbark example of the Ottawa River (fig. 4.24), this was not engraved but drawn, probably with the traditional mixture of charcoal and bear's grease.
Size of the original: ca. 81 × 51 cm. Photograph courtesy of Hamlin Memorial Library, Paris, Maine.

FIG. 4.26. DRAWING OF THE PICTOGRAPHIC CONTENT OF A *KIKAIGON* WITH A LINEAR SPATIAL STRUCTURE. Ojibwa, 1836–37. "The bear and eelpout [full-size male with bear totem and breasted female with fish totem] three nights ago [three short strokes to left] left a son and daughter [small and very small figures, each with its totem] in their lodge [crude conical tipi at extreme left with external poles holding down hides] and took a son with them [very small figure between parents with its own bear totem]. They went to the two lakes [represented in stereotyped plan with tributaries at the extreme right] where they are drying the meat [on a frame to left of the lakes] of a deer killed by the husband [between the adult male figure and the drying frame]." Joseph N. Nicollet, *The Journals of Joseph N. Nicollet: A Scientist on the Mississippi Headwaters, with Notes on Indian Life, 1836–37*, trans. André Fertey, ed. Martha Coleman Bray (St. Paul: Minnesota Historical Society, 1970), 269. Although the sequence is spatial there is no attempt here to indicate relative distance or unique topographical features. The pair of lakes appears to be stylized–there were thousands in the region.
Size as reproduced: 3.5 × 10.0 cm. Photograph courtesy of the Library of Congress, Washington, D.C.

his experience with the Ojibwas in the headwaters region of the Mississippi River in 1836–37, Joseph N. Nicollet gave a detailed account of the type of pictography (which he called "figurative language") used when "they travel or hunt or wage war in order to make known their whereabouts and the events they witnessed, to show where they came from, where they are heading, and what they plan to do, and to tell of the things they saw, etc. They mark all these things at the confluence of rivers, on lake shores, on portage trails, always in the most conspicuous places, along the paths traveled most by passersby who are carriers of these dispatches."[114] Nicollet included examples of birchbark messages left at such points, for which Ojibwas had a noun: *kikaigon,* "a mark, an inscribed bark giving information," derived from the verb *kikaigem,* "to mark something, to inscribe a bark, or also to indicate or say where one is going, to communicate news, etc."[115] Although a high proportion of *kikaigon* have a spatial component to their message, they tend to emphasize historical events. One example (fig. 4.26) was interpreted by Nicollet.[116]

been torn from a Christian cross, depicting the heads of thirty captured Hurons. The figures were intended to communicate a great deal of quantitative and qualitative information, using repetition of figures to indicate number, different colors and size variations to denote categories, and ornamentation (the "plumes" were probably totems) to show particular cases (Reuben Gold Thwaites, ed., *The Jesuit Relations and Allied Documents: Travels and Explorations of the French Jesuit Missionaries among the Indians of Canada and the Northern and Northwestern United States, 1610–1791,* 73 vols. [Cleveland: Burrows Brothers, 1896–1901], 12:215). The same techniques were probably used frequently on maps, though transcribers did not always appreciate their significance and details may not always have been copied faithfully.

114. Joseph N. Nicollet, *The Journals of Joseph N. Nicollet: A Scientist on the Mississippi Headwaters, with Notes on Indian Life, 1836–37,* trans. André Fertey, ed. Martha Coleman Bray (St. Paul: Minnesota Historical Society, 1970), 266.

115. Nicollet, *Journals,* 275.

116. See also the three birchbark *wikhegan* discussed on p. 173.

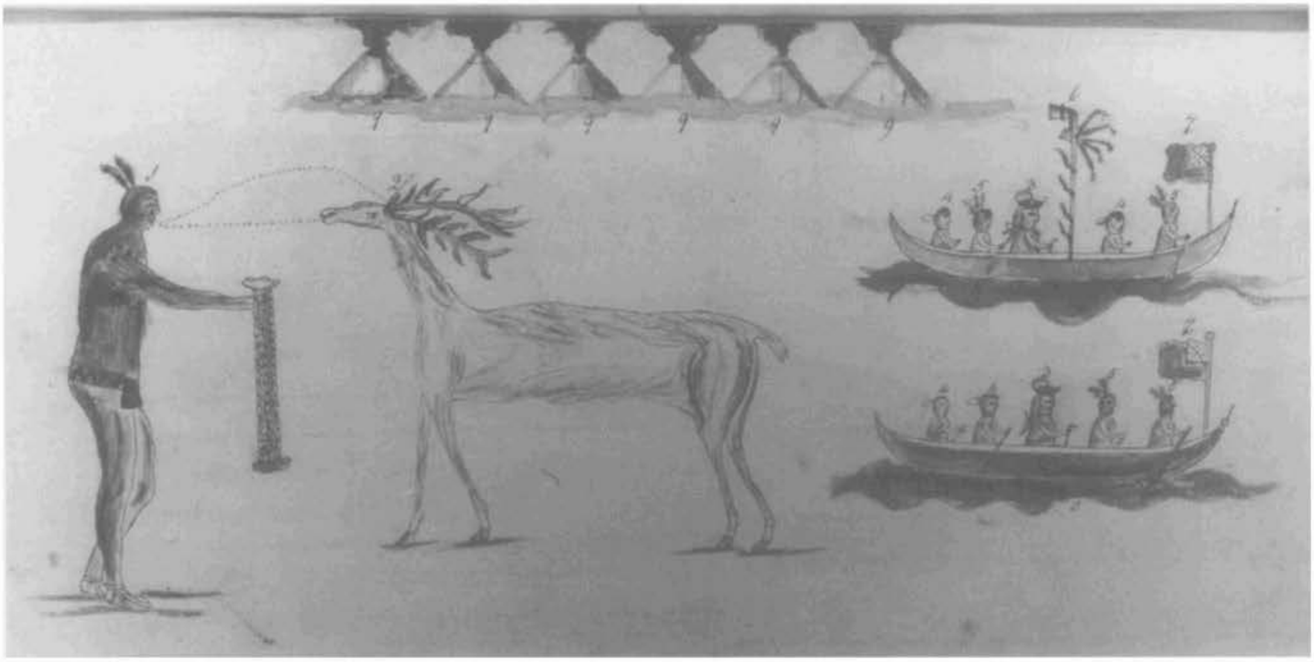


FIG. 4.27. COPY OF A CHIPPEWA PAINTING ON A BLAZED TREE, 1767. Copied by Jonathan Carver from the original drawn or painted with charcoal mixed with bear's grease on the white outer sapwood of a conspicuously-located tree. The copy differs from the account of the original in showing two canoes and positioning them to the right.
By permission of the British Library, London (Add. MS. 8950, fol. 169).

MAPS ON BLAZED TREES

Another form of message map used in the heavily forested Northeast was painted or drawn on the exposed wood of trees whose inner and outer bark had been stripped away. A conspicuous tree on the route was blazed so the mark would be seen as the intended recipients of the message arrived.

Hugh Jones, reporting on his experience in tidewater Virginia between 1717 and 1721, wrote that the Indians

> have certain hieroglyphical methods of characterizing things; an instance of which I have seen upon the side of a tree where the bark was taken off.
>
> There was drawn something like a deer and a river, with certain strokes and dashes; the deer looking down the river, which we interpreted to be left for information to some of their stragling company, that certain of them were gone down that river a hunting, and others were gone different ways.[117]

Paintings and drawings on blazed trees rarely if ever equaled the maplike characteristics of certain birchbark maps. At best they indicated direction of movement, relative position, and perhaps spatial linkage. Jonathan Carver described and explained the making of one in 1767 on the Chippewa River, just above its confluence with the Mississippi (fig. 4.27). His guide was a Chippewa, to whose territory they were moving upstream. They were still, however, in the territory of the Dakota Sioux, enemies of the Chippewa. The guide had been appointed with the full agreement of the Sioux. To inform any members of the Sioux who were unaware of that agreement,

> he [the Chippewa guide] peeled the bark from a large tree near the entrance of a river, and with wood-coal mixed with bear's-grease, their usual substitute for ink, made in an uncouth but expressive manner the figure of the town of the Ottagaumies [the Fox settlement, where Carver had spent several weeks]. He then formed to the left a man dressed in skins, by which he intended to represent a Naudowessie [Dakota Sioux], with a line drawn from his mouth to that of a deer, the symbol of the Chipéways. After this he depictured still farther to the left a canoe as proceeding up the river, in which he placed a man sitting with a hat on; this figure was designed to represent an Englishman, or myself, and my Frenchman was drawn with a handkerchief tied round his head, and rowing the canoe; to these he added several other significant emblems, among which the Pipe of Peace appeared painted on the prow of the canoe.
>
> The meaning he intended to convey to the Naudowessies, and which I doubt not appeared perfectly intelligible to them, was, that one of the Chipéway chiefs [i.e., the guide–message maker himself] had re-

117. Hugh Jones, *The Present State of Virginia . . . From Whence Is Inferred a Short View of Maryland and North Carolina* (London: J. Clarke, 1724), 16–17.

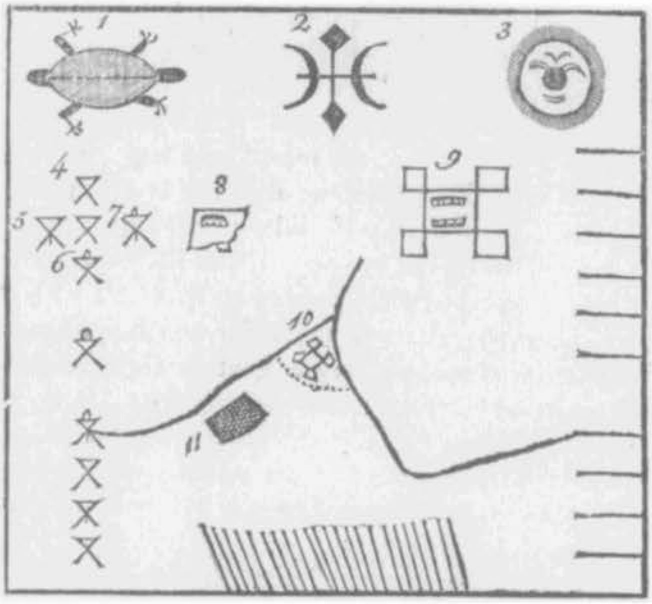


FIG. 4.28. AN EARLY EXAMPLE OF A LINE ENGRAVING CONTAINING AN INDIAN MAP. The original was painted on a blazed tree by the Muskingum River (southeastern Ohio), and the information it contained dates from 1781 or earlier. Apparently representing the exploits of a Delaware warrior, only parts 8–11 are cartographic: (1) imitation of a river turtle distinguishing this group (the Delawares are divided into three groups, whose emblems are the turtle, the wolf, and the eagle); (2) personal mark or character of the maker; (3) meant for the sun; the ten horizontal lines under it, running down the right side, show the number of times the maker had been at war (on expeditions); (4) men's scalps taken; (5) women's scalps taken; (6) men prisoners taken; (7) women prisoners taken (the scalps and prisoners are situated across from the war expedition in which they were taken; e.g., on his first expedition (first horizontal line) he took none, on his second he took one, on his third he took three); (8) unknown small fort; (9) Fort Detroit; (10) Fort Pitt at the confluence of the Allegheny and Monongahela Rivers forming the Ohio River; and (11) Pittsburgh.
From William Bray, "Observations on the Indian Method of Picture-Writing," *Archaeologia* 6 (1782): 159–62, esp. 159.

> ceived a speech from some Naudowessie chiefs at the town of the Ottagaumies, desiring him to conduct the Englishman, who had lately been among them, up the Chipéway river; and that they thereby required, that the Chipéway, notwithstanding he was an avowed enemy, should not be molested by them on his passage, as he had the care of a person [Carver] whom they esteemed as one of their nation.[118]

Sometime before 1781, "a gentleman" described a drawing made by a Delaware Indian on a blazed tree, including somewhat more detail on the production process than was given by Carver. He reported

> that he found the marks on a tree on the banks of the Muskingham [Muskingum] river; that he does not certainly recollect of what species the tree was, but thinks it was a sugar maple; that the bark was peeled off on one side of the tree, about a foot square, and these characters painted on that part with charcoal and bear's oil; that black is the color which signifies anger or war; that there is nothing very elegant in their paintings, the end of the finger, or the point of a burnt stick, being the only pencil they use; that this was the performance of Wingenund, an Indian warrior of the Delaware nation, when going out to war. . . .
>
> He says that the marks they make on their return are generally done with vermillion, which is a peaceable color, and shews that their anger is no more.[119]

The drawing was a composite of pictographic statements concerning its maker's military record (fig. 4.28). Four of the pictographic components were indicated by the Delaware chief White-Eyes to be schematic plans: an unknown small fort,[120] Fort Detroit, Fort Pitt, and Pittsburgh. The identity of the last two is in no doubt because they are at the confluence of two rivers (the Monongahela and Allegheny; unnumbered but named Moningalialy and Alligany by White-Eyes) to form a third (the Ohio). Furthermore the line representing the Allegheny River has a distinctive bend, indicating the elbow in that river downstream from what is now Rimer, Pennsylvania.

WAMPUM MAPS

In northeastern North America, highly stylized maps were incorporated in mnemonic devices known as wampum belts. The word wampum was derived from the eastern Algonquian *wampumpeage,* white beads made from shell. Originally fashioned from freshwater shells, by the early eighteenth century white beads were almost exclusively made from any of several species of marine shells, whereas the only source of purple (or "black") wampum was the quahog clam. In the fur trade years, wampum became a trade item. The Europeans took it inland from the coast, and demand became so great that factories were established on Long Island and in New Jersey. Much of the increase in demand was generated by the Iroquois, who

118. Jonathan Carver, *Travels through the Interior Parts of North America in the Years 1766, 1767 and 1768,* 3d ed. (London: C. Dilly, 1781), 418–19.

119. William Bray, "Observations on the Indian Method of Picture-Writing," *Archaeologia* 6 (1782): 159–62, esp. 160–61.

120. White-Eyes thought it might have been one of the small forts on Lake Erie that was surprised by the Indians about 1762. Gregory A. Waselkov, University of South Alabama, said that it reminded him of Fort Loudon (1756–60) on the Little Tennessee River in the Cherokee country (personal correspondence, July 1993). The arrangement of the known places and features is topologically correct. If the positioning of the unknown fort was intended to conform to that arrangement, then it could not have been on Lake Erie but must have been somewhere south of the Ohio River. At that period Fort Loudon was the only fortified military post in that direction.

wove the wampum on sinew "into belts with particular designs to serve as mnemonic devices to recall a specific treaty or agreement. Wampum was at once the witness to a pledge and the pledge itself, a living record that bound the participants to their words as it helped them to recall their promises."[121]

The earliest unambiguous reference to a wampum map is in Father François Le Mercier's relation from Quebec for the years 1652 and 1653. He described how, in the course of a council, an elderly Iroquois "ambassador" spoke of his people's affection for the Algonquins at Sillery, Quebec. This was symbolized by presents, some of them "porcelain collars of great size." Taking one of these,

> he stretched it out in the middle of the room, and said: "Behold the route that you must take to come and visit your friends." This collar was composed of white and violet-colored porcelain [shell], so arranged as to form figures, which this worthy man explained after his own fashion. "There," said he, "are the lakes, there the rivers, there the mountains and valleys that must be passed; and there are the portages and waterfalls. Note everything, to the end that, in the visits that we shall pay one another, no one may get lost."[122]

This would become known as a road or alliance belt. Most were considerably less geographical than the Iroquois belt appears to have been.

A road belt was used by a Cherokee captain in Philadelphia in 1758 at a meeting with representatives of the Iroquois. Both supported the British. In the course of a speech expressing friendship "he took out a Belt of Nine Rows, with Three Figures of Men wrought in it, one at each End and one in the middle, and a Row of black from one End to the other." In the course of his speech the Cherokee captain told the Iroquois,

> We have made a Road for you, and we will endeavour to keep that Road clear for our Brothers to walk in, in hopes that you will come and make use of that Road; but if any of the Children of the French [Indian allies of the French in the Ohio Valley, including the Delawares, Shawnees, and Wyandots] make use of our Road, or throw any obstructions in the Way we will certainly kill them.[123]

The Cherokee captain identified the man on the end of the belt as the king of the Iroquois and the middle figure as the Kiowee king. This probably refers to Keewhoee, a Cherokee town in North Carolina, probably the captain's home, near British colonial settlements. The Kiowee king, reported the captain, said, "I have cut down all the Trees and moved away all the Stones out of your Way that you may come to my Town; likewise the Road is cleared from my Town to the Indian Town Chotta [another Cherokee town, remoter from the British, and in the heart of the Appalachian Mountains] for your Messengers to come to us, and tell us the News; and they may go safe from Town to Town."[124] The road described is stylized and metaphorical and ignores geographical and geopolitical complexities. The three locations represented by the diamonds were geographically neither equidistant nor on the same axis, and the region between the Iroquois and Cherokee homelands was dominated by allies of the French, enemies to both.

Perhaps the best-known examples of wampum symbolizing both geopolitical and spatial relationships were the "Five Nations" belts. The territories of the five nations of the League of the Iroquois–Mohawks, Oneidas, Onondagas, Cayugas, and Senecas–were linked by the natural routeway afforded by the Mohawk Valley and bench at the base of the Niagara escarpment. "Once the League was established, certain people were designated to commit to memory the laws of the Great Peace, the constitution and history of the League. Wampum records were created to assist their memories and were stored at Onondaga, the geographic and political centre of the Confederacy."[125] The Five Nations war belt was probably made to serve as a mnemonic of the pre-Confederacy era, when the five nations were frequently at war with each other: five paired diamonds on a dark background (fig. 4.29). A red pigment was applied to each of the diamonds to represent war, and the absence of a linking device reinforced their separateness. In contrast, the Five Nations peace belt in figure 4.30 originally showed five equally spaced human figures in white on a purple background. The five figures were represented as holding hands, but with their elbows crooked to indicate that any of the nations could leave the Confederacy, though not without weakening it and leaving its protection.[126]

Although the overall symmetry of wampum belts was not an inevitable consequence of the medium, the characteristic style was. The beads were small cylinders, with length normally two to four times the diameter. Hence when different colored beads were threaded to make dark-on-light or light-on-dark patterns, shapes were defined by essentially straight lines intersecting at angles. Furthermore, the length of a belt was characteristically five to fifteen times its width.

In the early and middle eighteenth century, French and British civil and military officials encouraged the two-way

121. *Council Fire*, 2 (note 95).
122. Thwaites, *Jesuit Relations*, 40:203–5 (note 113).
123. Recorded in William Johnson, *The Papers of Sir William Johnson*, 14 vols. (Albany: University of the State of New York, 1921–65), 2:861.
124. Johnson, *Papers*, 2:861.
125. *Council Fire*, 5 (note 95).
126. *Council Fire*, 5.

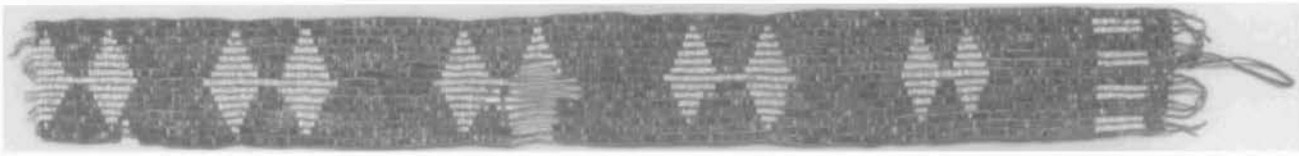


FIG. 4.29. FIVE NATIONS WAR BELT. Iroquois, unknown date. Wampum was not an appropriate medium for maps, except as stylized mnemonics. In this case the five double diamonds are believed to represent the east-west alignment of the Five Nations territories at a time when they were at war with each other: from right to left, Mohawks, Oneidas, Onondagas, Cayugas, and Senecas. Red on each of the five diamonds indicates war.
Size of the original: 11.5 × 103 cm. Photograph courtesy of the Woodland Cultural Centre, Brantford, Ontario.

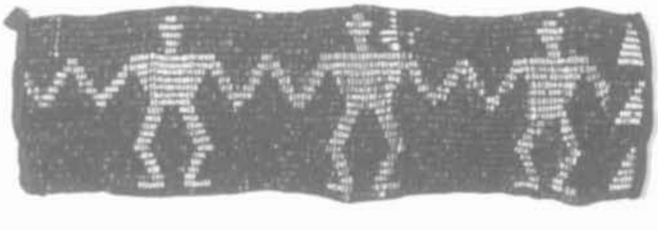


FIG. 4.30. FIVE NATIONS PEACE BELT. Iroquois, unknown date. Before it was damaged, there were five figures holding hands. They represented the same geographical sequence of Five Nations as in the war belt (fig. 4.29), but after the alliance arising from the Iroquois Confederacy.
Photograph courtesy of the Royal Ontario Museum, Toronto (ROM #937.39.1).

use of belts in the course of their dealings with the Indians of the Northeast. They were convenient symbols of trust and mnemonics of agreements. Indeed, the British preserved the belts that had been presented to them.[127] However, the use of wampum declined by the late 1700s. It became harder to obtain, and Indian leaders found writing a more precise form of communication. British authorities became less familiar with the use of wampum, and the Americans prohibited the belts and other symbols of Indian sovereignty and independence.[128]

MAPS ON SKIN

Animal skins of various kinds were available to all Native North Americans. In the Northeast, however, maps on skin are rarer, either as artifacts or in accounts, even though skin would presumably be more durable. One possible extant example is what appears to be a skyline profile of part of the coast of Maine as seen from the sea, perhaps that controlled by the chief whose legs bestride it, supposedly made in 1607 (fig. 4.31).[129] If authentic, it would constitute the only known Indian-made cartographic artifact from the seventeenth century. Even if verified, however, it obviously reflects considerable European influence, possibly having been made by Skidwarres, one of three Abenakis whom Ferdinando Gorges said he made "able to set me downe what great Rivers ran up into the Land, what Men of note were seated on them, what power they were of, how allyed, what enemies they had, and the like of which in his proper place."[130] The skyline profile had much in common with those made by English mariners for identifying coastlines and their hazards.[131] The very poorly written and apparently phonetically spelled text, not to mention the written date of 1607, suggests that, if the piece is an Indian artifact, it was made under rapid acculturation.

Another skin map of uncertain provenance is of the Wabash Valley, embracing much of what is now Indiana and southern and central Illinois (fig. 4.32).[132] Taken to England as a curio in 1825, it has always been known as "an Indian map on skin" but without authentication. It

127. "The Command^{rs} Room in the Forts where conferences are held, & where all the belts which the Indians deliver are hung up," Johnson, *Papers*, 3:454n (note 123).

128. *Council Fire*, 19 (note 95).

129. Formerly thought by its owner to be an Indian map of the James River, Virginia; Frank H. Stewart, "Jamestown, Virginia, Indian Document of May 1607, Reminder of Capt. John Smith, Found in Haddonfield," *Haddon (N.J.) Gazette*, 15 February 1945, 2.

130. Ferdinando Gorges, *A Briefe Narration of the Originall Undertakings of the Advancement of Plantations into the Parts of America* (London: E. Brudenell for N. Brook, 1658), 4.

131. For example, one of three manuscript versions of William Strachey's The Historie of Travaile into Virginia Britannia (1612), British Library, London (Sloane MS. 1622), contains several examples of such profiles. They were probably transcripts or traced from similar ones in James Davies's The Relation of a Voyage into New England, describing the voyage of 1607–8 in which Skidwarres, the probable painter of the skin, was returned from England to Maine. Unfortunately, only a later transcript of the latter exists: the William Griffith copy, Lambeth Palace Library, London (MS. 850).

132. G. Malcolm Lewis, "An Early Map on Skin of the Area Later to Become Indiana and Illinois," *British Library Journal* 12 (1996): 66–87. The initials H. B. on the back (burned?) probably indicate that it was owned and perhaps made by Hypolite Bolon, a longtime resident of Fort Vincennes who was, or was to become, an Indian interpreter. Later moving to St. Louis, from where the map was eventually taken to England, he probably had an early formal education and wrote well. Years later he was said to speak "several languages of the Mississippi tribes," the only interpreter in St. Louis capable of doing so, and in that capacity he received from the United States government "200 dollars a year and his firewood"; Colonel Charles Dehault Delassus to Captain Amos Stoddard, St. Louis, 6 March 1804; see also Frederic L. Billon, comp., *Annals of St. Louis in Its Early Days under the French and Spanish Dominations* (St. Louis, 1886), 370–71.

was almost certainly made in 1775 in connection with negotiations by the Wabash Land Company at Post Vincennes to purchase land from the Piankashaws. The pattern of rivers and trails is unlike that on any known European map of the region at the time (see fig. 4.33). Indeed, it has many of the characteristics of the Catawba, Chickasaw, and, to a somewhat lesser extent, Chipewyan maps discussed below. In contrast, the fineness of the inscribed linework is like that on known Euro-American maps made on skin,[133] and it is very unlikely that the neat hand of the names and inscriptions could have been that of a Wabash Valley Indian about 1775.

In 1762 a Delaware religious prophet (known as Neolin, the Enlightened One) in the upper Ohio Valley used as a visual aid a cosmographical map drawn on a dressed deerskin.[134] He ended each of his orations with the following: "'And now, my friends, in order that what I have told you may remain firmly impressed on your minds, and to refresh your memories from time to time, I advise you to preserve, in every family, at least, such a book or writing as this, which I will finish off for you, provided you bring me the price, which is only one buck-skin or two doe-skins a piece.'"[135] The Delaware speaker, who was widely influential in the early 1760s, assumed that all who heard him and members of "every family" could understand his cosmographical map.

Although no copy of the map survives, Heckewelder's detailed description allows it to be reconstructed (fig. 4.34):

> An inside square was formed by lines drawn within it, of about eight inches each way, two of those lines, however, were not closed by about half an inch at the corners. Across these inside lines, others of about an inch in length were drawn with sundry other lines and marks, all which was intended to represent a strong inaccessible barrier, to prevent those without [i.e., in the terrestrial world] from entering the space within, otherwise than at the place appointed for that purpose. . . . In explaining or describing the particular points on this map, with his fingers always pointing to the place he was describing, [the preacher] called the space within the inside lines "the heavenly regions," or the place destined by the great Spirit for the habitation of the Indians in future life; the space left open at the south east corner, he called the "avenue," which had been intended for the Indians to enter into this heaven, but which was now in the possession of the white people; wherefore the great Spirit had since caused another "avenue" to be made on the opposite side, at which, however, it was both difficult and dangerous for them to enter, there being many impediments in their way, besides a large ditch leading to a gulf below, over which they had to leap; but the evil spirit kept at this very spot a continual watch for Indians, and whoever he laid hold of, never could get away from him again, but was carried to his regions. . . .

FIG. 4.31. POSSIBLE PROFILE OF PART OF THE COAST OF MAINE. Drawing in red on skin, "Moi [May?] 1607." Probably painted in that year in England by one or more Abenakis.
Size of the original: 33 × 38 cm. Photograph courtesy of the Stewart Collection, College Library, Rowen College of New Jersey, Glassboro.

> The space on the outside of this interior square, was intended to represent the country given to the Indians to hunt, fish and dwell in while in this world; the east side of it was called the ocean or "great salt water Lake [the Atlantic Ocean]." Then the preacher, drawing the attention of his hearers particularly to the south east avenue, would say to them. "Look here! See what we have lost by neglect and disobedience; by being remiss in the expression of our gratitude to the great Spirit, for what he has bestowed upon us; by neglecting to make to him sufficient sacrifices; by looking upon a people of a different colour from our own, who had come across a great lake [the English, who had arrived via the Atlantic Ocean], as if they were a part of ourselves; by suffering them to sit down by our side, and looking at them with indifference, while they were not

133. For example, a cadastral map on goatskin, formerly rolled around a wooden dowel, shows lands sold and for sale in Groton and Hebron Townships, Grafton County, New Hampshire, in the late eighteenth century. Based in part on a land survey, the control points are pricked, the boundaries of lands sold and for sale are straight and finely scribed, and other details are in ink. Geography and Map Division, Library of Congress (C 3 Vault Shelf, G 3744. G 78 G 45 18–). Given the importance of saddlery and cobbling in frontier societies, there may have been a tradition of cadastral mapping on leather in the eighteenth century.

134. See Arlene B. Hirschfelder and Paulette Fairbanks Molin, *The Encyclopedia of Native American Religions: An Introduction* (New York: Facts on File, 1992), 66.

135. John Gottlieb Ernestus Heckewelder, *An Account of the History, Manners, and Customs, of the Indian Nations, Who Once Inhabited Pennsylvania and the Neighbouring States,* Transactions of the Historical and Literary Committee of the American Philosophical Society, vol. 1 (Philadelphia: Abraham Small, 1819), 1–348, esp. 290.

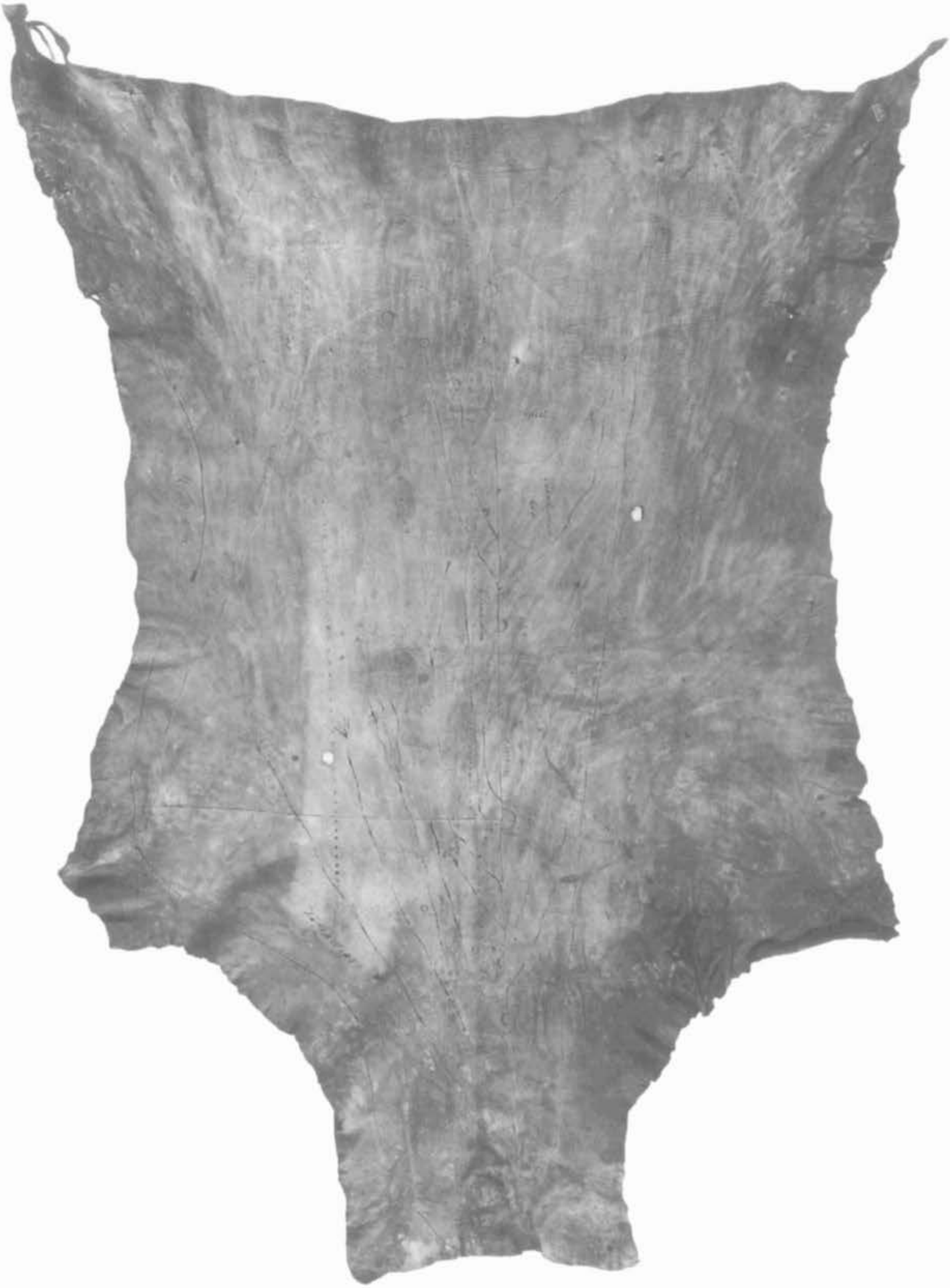


FIG. 4.32. MAP ON SKIN, WITH INDIAN CHARACTERISTICS, OF THE WABASH AND ADJACENT VALLEYS, CA. 1775. Perhaps in part Piankashaw. The drainage pattern has all the characteristics of being Indian. The map is untitled and unendorsed. Size of the original: 157×91 cm. Photograph courtesy of the British Museum, London (Stonyhurst 25a16). By permission of Stonyhurst College, Lancashire.

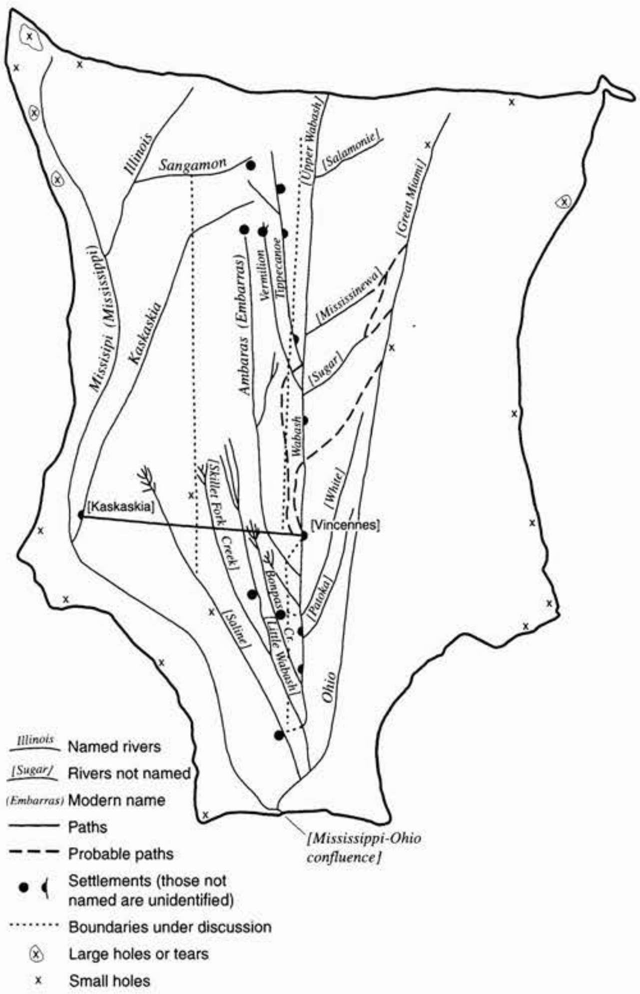


FIG. 4.33. INTERPRETIVE REDRAWING OF THE CA. 1775 MAP ON SKIN (FIG. 4.32).

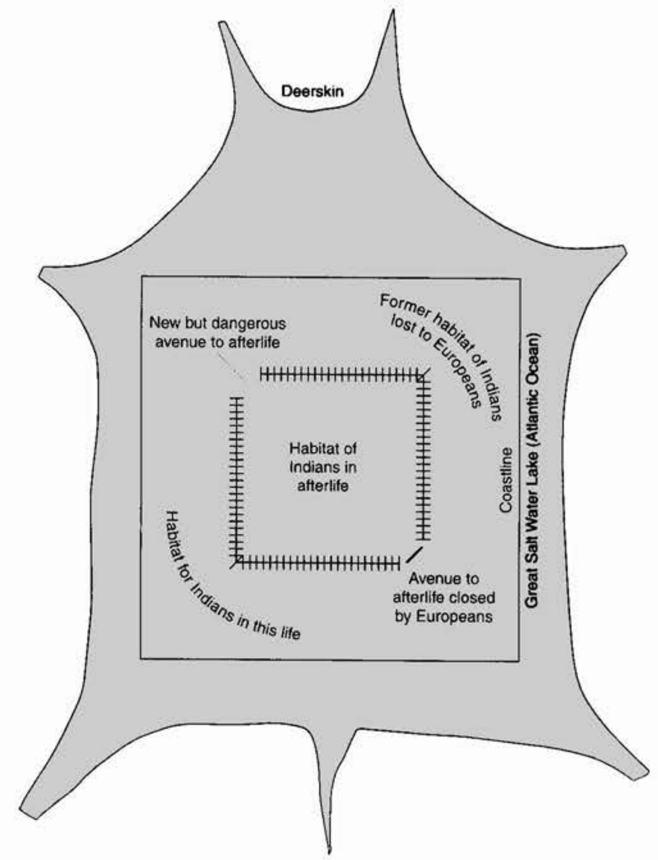


FIG. 4.34. RECONSTRUCTION OF A 1762 DELAWARE COSMOGRAPHICAL MAP ON SKIN OF FORMER, CURRENT, AND AFTERLIFE HABITATS. An example of the representation on one plane of two fundamentally different worlds–the afterworld nesting within the plane of the current and former worlds.

> only taking our country from us, but this, (pointing to the spot) this, our own avenue, leading into those beautiful regions which were destined for us."[136]

The map clearly combined on one surface the terrestrial world of the middle Atlantic coastal lowlands, upper Ohio Valley, and intervening Appalachian Mountains, with the intended habitat of Indians in an afterlife. The description is less clear about the location of the regions of the evil spirit, but they may have been at one or more lower levels and not, therefore, representable on one plane.

Documents in the Public Record Office in London provide insight into the transmission of geographic and political information and the production of maps by Indians for Europeans in the colonial period. In February 1701 the Lords of Trade and Plantations wrote to the governor of New York requesting "a good map to be drawn of all the Indians Countrys in the neighbourhood of His Majesty's Plantations; marking the names of the several Nations (as they call themselves and are called by the English and French) and the places where they inhabit."[137] In June, the governor having died in the interim, Lieutenant Governor John Nanfan replied, stating his intention to obtain such a map.[138] The English were urging their allies the Iroquois to make peace with Canadian Indians to the north of the Great Lakes, and in July Nanfan called to council thirty-two sachems of Five Nations of the Iroquois at Albany in order to determine the progress of peacemaking.[139] There, a Mohawk sachem spoke:

> As to the satisfying of what treaties wee have made

136. Heckewelder, *History, Manners, and Customs,* 288–89.

137. Letter from the Lords of Trade and Plantations to the Earl of Bellomont, 11 February 1701, Public Record Office, London, State Papers Colonial (C.O. 5/1118), 120–36.

138. Letter from Lt. Govr. Nanfan to the Lords of Trade and Plantations, 9 June 1701, Public Record Office, London, State Papers Colonial (C.O. 5/1046/20).

139. See Francis Jennings, "Susquehannock," in *Handbook of North American Indians,* ed. William C. Sturtevant (Washington, D.C.: Smith-

> with the Dowaganhaes and other Farr Indians, wee have endevoured to acquaint you by the sending of a large skinn upon which the Castles are painted with whome wee have concluded a peace, meaning that Elk skin sent by Capt^{n} Bleeker and David Schuyler where there is two Castles painted with red upon itt, adding, they have made peace with seaven nations and that the two nearest nations are only painted as being the principall.[140]

It is not clear whether the skin contained information such as rivers, lakes, or trails. The two "castles"–fortified log structures–may have been depicted merely as place signs, perhaps equivalent to the linearly sequenced place symbols on Five Nations wampum belts (figs. 4.29 and 4.30). The elkskin map appears to have been selective, incorporating only two of the seven nations concerned, and its information was supplemented by the sachem's oral account.

In the following month, Nanfan wrote to the Lords of Trade and Plantations informing them of the council and sending a draft, "the most accurate I have been able to procure, of the situation of our Five Nations," which included as well an indication of land the Iroquois ceded to the colony in exchange for British protection. This map is likely to have been that made by Samuel Clowes and may have incorporated information from the elkskin sent to Nanfan.[141]

A similar map on skin, known only through accounts, was made in 1769 during skirmishing between the French and English in what has subsequently been referred to as King William's War. The allegiance of the Iroquois was to the English, and on 1 October at Albany, Cayenquaragoes, one of their chiefs,

> laid down a bundle of bever skins, and on the outside thereof a draft of the river of Canada, with the Chiefe places thereof marked, to show the smallness of the Enemy, and how seated upon Canada river which they desire be sent over and shown to the Great King.[142]

Another account of the same event indicated that they

> have sent to His Majesty a small bundle of bever skins four black strokes upon the outside representing the river of Canada and 3 round strokes signifying the 3 principal places.[143]

A third account referred to a "bundle of bever with their description of Canada,"[144] conveying the idea of the St. Lawrence River and the three main French settlements thereon: Quebec, Trois-Rivières, and Montreal. As in the Delaware Indian drawing on a blazed tree of almost one hundred years later (fig. 4.28 above), the use of black signified enemy, in this case the French. Whether the map was on one skin only or a bundle of beaver pelts is not clear. It was certainly not rich in detail. Though undoubtedly on skin, its geometry and role appear to have had much in common with a wampum belt.

Southeast

Although no precontact maps survive from the Southeast, Waselkov has concluded, from accounts by colonial Euro-Americans, that "drawing maps was within the competence of every adult southeastern Indian of the colonial period."[145] It is certain that within a short period after contact Indians from the Southeast drew, painted, and inscribed what were both intended and immediately recognized by Europeans as maps, and that that practice continued. In 1754 Governor James Glen of South Carolina implied that, among the Cherokees at least, ephemeral maps and maps on paper were made interchangeably. From 1743 onward, in seeking to verify oral accounts given by the Indians of the region between the southern Atlantic seaboard and the lower Mississippi River, he had "often made them trace the Rivers on the Floor with Chalk, and also on Paper," concluding that "it is surprizing how near they approach to our best Maps."[146]

The celestial world was the primary concern of many, perhaps most, immediate precontact cultures in North America.[147] Within the Southeast, the Ohio and middle Mississippi Valleys are noted for enormous earthworks, generally known as mounds. Built during the Hopewell-

sonian Institution, 1978–), 15:362–67, and Helen Hornbeck Tanner, ed., *Atlas of Great Lakes Indian History* (Norman: University of Oklahoma Press for the Newberry Library, 1987), 34.

140. Text of speech by Iroquois sachem as translated by Robert Livingston, 14 July 1701, Public Record Office, London, State Papers Colonial (C.O. 5/1046/33).

141. Letter from Lt. Govr. Nanfan to the Lords of Trade and Plantations, 20 August 1701, Public Record Office, London, State Papers Colonial (C.O. 5/1046/33). Clowes's map is C.O. 700 New York no. 15.

142. Journal of Governor Fletcher's expedition to Albany, 1 October, 1696, Public Record Office, London, State Papers Colonial (C.O. 5/1039/70, enc. 1).

143. Letter from Governor Fletcher to the Duke of Shrewsbury, 9 November 1696, Public Record Office, London (C.O. 5/1039/71).

144. Letter from Governor Fletcher to the Lords of Trade and Plantations, 9 November 1696, Public Record Office, London (C.O. 5/1039/70).

145. Gregory A. Waselkov, "Indian Maps of the Colonial Southeast," in *Powhatan's Mantle: Indians in the Colonial Southeast,* ed. Peter H. Wood, Gregory A. Waselkov, and M. Thomas Hatley (Lincoln: University of Nebraska Press, 1989), 292–343 (quotation on 292), provides detailed descriptions and explanations of the maps in question.

146. James Glen to Sir Thomas Robinson, Secretary of State for the Southern Department, South Carolina, 15 August 1754; unpublished transcript in South Carolina Archives Department, Columbia, Records in the British Public Record Office relating to South Carolina, 1663–1782 (vol. 26, p. 97).

147. Grieder, *Origins of Pre-Columbian Art,* 100–101 (note 49); the Southeast had a third wave culture in late precontact times, characterized by a new preoccupation with the celestial; see also pp. 176 and 181.

ian period (ca. 200 B.C. to A.D. 400), they were associated with burials. Many were effigies: birds, bears, and snakes represented either in plan or in profile. Others incorporate regular geometric shapes: circles, squares, octagons, ellipses, and rectangles.[148]

It has also been proposed that some of these represented constellations.[149] For example, the Effigy Mounds National Monument by the Mississippi River at McGregor in eastern Iowa is made up of an arc of ten "marching" bears and three birds; the latter apparently placed randomly in relation to the arc. Thaddeus Cowan claimed that

> the [bear] effigies marching line is oriented in an expected way with the march of Ursa Major [Great Bear constellation] around Polaris. The orientation of each bear is what would be expected from Indian legend. The path of the bear effigies follows the summer path of Ursa Major. The direction of the Bird Effigies relative to the end of the Bear's march is in keeping with the direction of [the constellation] Cygnus relative to Ursa Major at the end of his arc. The distance between the bird mounds and the bear mounds representing the bottom of the arc suggests the appearance of Cygnus at the time when Ursa Major reaches its bottom most point in the sky.

Cowan ended with an admission that the "evidence is hardly definitive," followed by a plea that the proposition "merits further investigation."[150]

EARLY MAPPING ENCOUNTERS

The map of Florida and the Gulf Coast made after Hernando de Soto's expedition through southeastern North America between 1539 and 1543 almost certainly incorporated Indian information, some quite likely given in cartographic form (fig. 4.35). Neither of the two accounts of the expedition explicitly mentions Indians' making or using maps in response to Spanish requests for information, but such practices were likely.[151] The de Soto expedition map, almost certainly made in Seville by Alonso de Santa Cruz, "archicosmographer" to Charles V of Spain, conforms to the geography of the area more closely than would have been possible through reconnaissance on de Soto's route alone. In particular, long rivers that the expedition crossed only once in its complex traverse are represented in their entirety and essentially correctly, far more so than native words or gestures could have communicated.[152]

Another early text describes the making of a map of the lower Mississippi and Neches Rivers and a region to the west perhaps extending to the lower Pecos River. The map is notable for having been made on bark, rare in this region. It was drawn at the Cenis village near the head of the Neches River in what is now eastern Texas "with a Piece of Coal . . . on the white Bark of a Tree" for René-Robert Cavelier de La Salle. The map satisfied La Salle that he was "within six days journey from the *Spaniards.*"[153] It was almost certainly the same map described elsewhere as "a very exact map of the neighboring rivers and nations," to which was added: "They [the Cenis] knew the Spaniards, and depicted to us their clothing, etc."[154] In the accounts of the map made for La Salle there is no indication of the type of bark used. Eastern Texas is well beyond the southern limit of the paper birch, which has the bark best suited to inscribing and drawing and was typically used in the Northeast and Subarctic.

It is possible that a similar map was incorporated in a manuscript map made by Lawrence van den Bosh six or seven years later, representing the lower Mississippi and an extensive area to the west (fig. 4.36). A letter of transmittal by the mapmaker refers to the countries and rivers to the left (west) of the Mississippi "which discription I lately reced. of the French Indian."[155] In what form the description was received is not made clear but, as for the much earlier map based on the de Soto expedition, it seems very unlikely that an essentially correct geography could have been communicated without graphic representation.[156]

148. Having surveyed many of the sites, James A. Marshall reached several speculative conclusions. Among these, two might be pertinent here: that the builders planned "on a drawing board or sand table . . . earthworks of specific measure and area" and that they had a "well developed ability at landmeasure," with which "came ability to view the terrain as if on a map." Likewise, he recognizes a unit of linear measure equivalent to 57 meters, but there is no indication that this was used in the Southeast or elsewhere since contact, certainly not in the context of making maps. James A. Marshall, "An Atlas of American Indian Geometry," *Ohio Archaeologist* 37 (1987): 36–48, esp. 40.

149. Thaddeus M. Cowan, "Effigy Mounds and Stellar Representation: A Comparison of Old World and New World Alignment Schemes," in *Archaeoastronomy in Pre-Columbian America,* ed. Anthony F. Aveni (Austin: University of Texas Press, 1975), 217–35.

150. Cowan, "Effigy Mounds and Stellar Representation," 234.

151. Edward Gaylord Bourne, ed., *Narratives of the Career of Hernando de Soto,* 2 vols., trans. Buckingham Smith (New York: A. S. Barnes, 1904), and James Alexander Robertson, ed. and trans., *True Relation of the Hardships Suffered by Governor Fernando de Soto,* 2 vols. (De Land: Florida State Historical Society, 1933).

152. De Vorsey notes that the braiding river systems reflect failure to distinguish between canoe routes and transwatershed portages–a characteristic indicative of Indian information sources. De Vorsey, "Silent Witnesses," esp. 715–17 (note 22). To this can be added two named "sals." Salt was a vital resource for Indians and was widely traded.

153. Louis Hennepin, *A New Discovery of a Vast Country in America,* 2 pts. (London: M. Bentley and others, 1698), pt. 2, 25.

154. Jean Delanglez, trans. and ed., *The Journal of Jean Cavelier: The Account of a Survivor of La Salle's Texas Expedition, 1684–1688* (Chicago: Institute of Jesuit History, 1938), 102–3.

155. Back of the map, Newberry Library, Chicago (Ayer no. 59).

156. For a full acount of this important map, see Waselkov, "Indian Maps," 294–95 and 309–13 (note 145), which explains how a manuscript map made in northeastern Maryland by a man who had never been to the Mississippi Valley almost certainly incorporated informa-

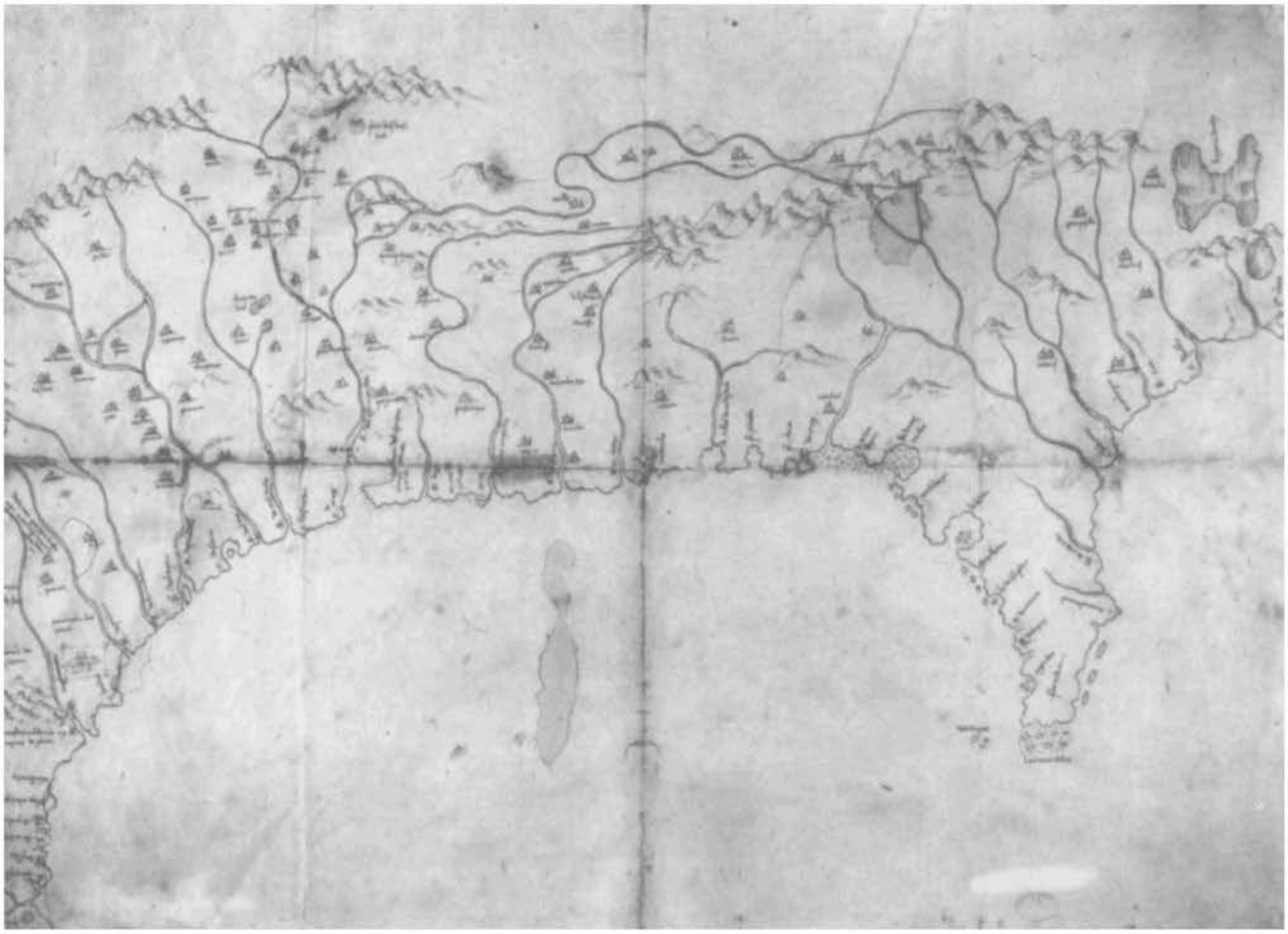


FIG. 4.35. MAP OF FLORIDA AND THE GULF COAST, CA. 1544. Mapa del Golfo y costa de Nuevo España, desde el Río de Panuco hasta el cabo de Santa Elena. "De los papeles que traxeron de Sevilla de Alonso de Santa Crus" (endorsement on the back). Ink on paper, made from reports of members of the de Soto expedition, possibly including maps drawn by Indians or from Indian information.
Size of the original: 44 × 59 cm. Photograph courtesy of the Ministerio de Cultura, Archivo General de Indias, Seville (Mapas y Planos, México, 1).

Early in 1708, a Towasa Indian named Lamhatty from the Florida Gulf Coast drew a map showing coasts, rivers, mountains, and named places along the path of a nine-month journey of approximately sixteen hundred kilometers. Figure 4.37 is a contemporary transcript of the map. The previous spring, Lamhatty had been captured by Creeks at his home village, Towasa, to the west of the lower Apalachicola River, and taken to Creek towns on the Tallapoosa River, where he was forced to work in the fields. That autumn his captors took him east via Oconee and then through the "vastly big" southern Appalachians to the headwaters of the Savannah River, where he was sold to Shawnees. The Shawnees marched him north "along the ledge of Lower mountains," but he escaped and headed east for nine days before surrendering to English backcountry settlers, for whom he drew a map naming or mentioning all these places.[157]

In forwarding a transcript of the map to the governor of Virginia, John Walker included his own account of Lamhatty's arrival at the British settlement and the account of Robert Beverley, another Englishman. The Towasa spoke a Timucuan language not related to any other groups of languages in North America. A Tuscarora Indian of the northern Iroquoian language stock and another interpreter tried to translate Lamhatty's story for the English, but both accounts state that Lamhatty, although eager to communicate, could not be understood. It is not clear, therefore, how the notations on the map and the account of Lamhatty's captivity related by Bever-

tion brought from the Illinois country by a Shawnee or Miami Indian, and how that information had been brought there from the eastern Texas region by returning members of the La Salle expedition. A number of features on the van den Bosh map can be matched to descriptions of the map made for La Salle.

157. Gregory A. Waselkov, "Lamhatty's Map," *Southern Exposure* 16, no. 2 (1988): 23–29, esp. 24–25. The map is also reproduced and discussed in David I. Bushnell, "The Account of Lamhatty," *American Anthropologist,* n.s. 10 (1908): 568–74, and Waselkov, "Indian Maps," 296 and 313–20.

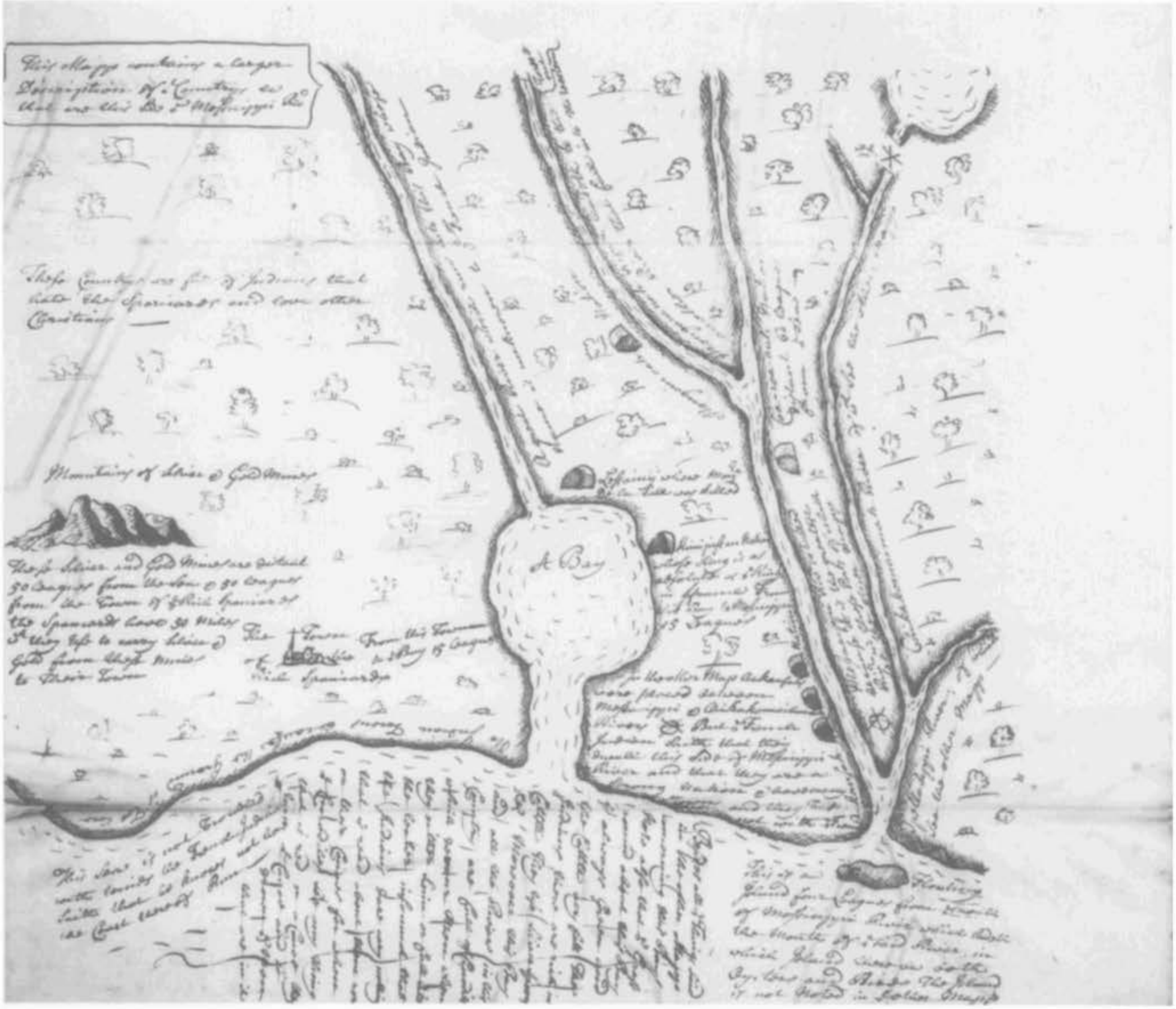


FIG. 4.36. MANUSCRIPT COPY, CA. 1694, OF A MAP BY LAWRENCE VAN DEN BOSH, POSSIBLY BASED ON A MAP BROUGHT EAST BY SHAWNEES. The map is of the country west of the lower Mississippi and of the neighboring coast and country to the southwest. It includes the names of several Indian villages and one Spanish settlement, probably a Spanish mission established in the upper Neches Valley in 1691. Indian-style elements include relatively straight rivers, the enlarged, nearly circular Galveston Bay, and rectangular barrel-roofed houses.
Size of the original: 32 × 38 cm. Photograph courtesy of the Edward E. Ayer Collection, Newberry Library, Chicago (no. 59).

ley and Walker were communicated. How much of the written account was pictographically represented on Lamhatty's original map is not known, but given the language barrier, it is reasonable to suppose that all of it could have been.

The main rivers on the transcript of Lamhatty's map have a sinuosity in marked contrast to what is seen in other maps (see, e.g., figs. 4.38 and 4.43). A similar depiction of rivers can be seen in another map associated with Florida, the map of southeastern North America, ca. 1544 (fig. 4.35 above).[158] Since de Soto did no more than cross the upper courses of most of these rivers between 1540 and 1541, he may have represented their lower courses based on information from the Indians of northeastern Florida with whom he had wintered, perhaps

158. The similarly sinuous rivers on figure 4.35 were probably drawn based on information obtained from Indians met en route. Interestingly, the Indians with whom he spent the ten months before entering the interior were the Timucuan speakers of northwestern Florida. Unfortunately, the extent of de Soto's influence on the extant map is not known, although it is almost certainly based on information brought back by one or more members of his expedition.

FIG. 4.37. CONTEMPORARY MANUSCRIPT TRANSCRIPT OF LAMHATTY'S MAP. The map showed Lamhatty's journey in captivity from his home near the Florida Gulf Coast through the southern Appalachians to the Virginia coastal plain in 1708. The original was Towasa; this supplemented manuscript transcript, ink on paper, is perhaps by Robert Beverley, whose one-page account is on the back. Among maps made by North American Indians, the sinuous lines representing rivers are unusual but not unique.
Size of the original: 26.5 × 29.5 cm. Photograph courtesy of the Virginia Historical Society, Richmond (Lee Family Papers 1638–1867, sec. 163, MS. 1L51, f. 677).

adopting some of their stylistic conventions. The festooning double lines representing rivers on both maps have something in common with some of the maps made by Mesoamericans in the early colonial period.[159] Other links exist between Indians of Florida and Mesoamerica. The Towasa language has recently been classified as a member of the Chibchan-Paezan language stock, most languages of which are found in Central and South America; almost exclusively in the Cordillera, discontinuously from southern Mexico to western Argentina.[160] These regions have also been grouped together on the basis of pre-Columbian art forms, including the characteristic "S-design," in which the S can face forward or backward and be long or short.[161]

Equally unusual on Lamhatty's map are the transverse

159. Several examples of similar hill profiles and double-line rivers (not always festooned) are reproduced in Mary Elizabeth Smith, *Picture Writing from Ancient Southern Mexico: Mixtec Place Signs and Maps* (Norman: University of Oklahoma Press, 1973), figs. 122–36. See also below, the Lienzo of Zacatepec, fig. 5.13.

160. Joseph H. Greenberg, *Language in the Americas* (Stanford: Stanford University Press, 1987), 382 and 388–89.

161. Grieder, *Origins of Pre-Columbian Art*, fig. 1 (pp. 16–17) and 116–28 (note 49).

profiles (as distinct from isolated hill symbols) symbolizing the alternating ridges and valleys of the southern Appalachians through which he passed. Perhaps because of his origins in the flatland environment of a coastal plain, he was particularly aware of the considerable effort needed to cross a series of parallel steep ridges. Indeed, he had made an earlier map of part of the area with "heaps of dirt."[162]

OFFICIAL MAPS MADE FOR COLONIAL AUTHORITIES

The record and transcript of Lamhatty's map survive because they were sent to a colonial official. Similarly, maps made for official presentation to royalty and their colonial representatives are among the best-known examples of what early Indian maps may have looked like. Two important maps were made for Francis Nicholson, who, while serving as governor of Maryland, Virginia, and South Carolina (1721–28), was particularly interested in Indian maps and geographic information.[163] The maps are a Chickasaw map from about 1723 of the whole of southeastern North America, perhaps the most extensive area ever mapped by North American Indians (fig. 4.38) and a Catawba map from about 1721 of the hinterland of South Carolina, of which two transcripts exist (see plate 4).[164] Each of the two original maps was made on deerskin by a cacique and presented to Nicholson when he was governor of South Carolina. Nicholson then sent transcripts to his superiors in England, including one of the Catawba map sent to the Prince of Wales. The transcripts are in black ink and a red pigment on paper trimmed to approximately the shape and size of a deerskin. The Catawba map is probably closer to the original than the Chickasaw map. All the linework is freely drawn on the former, whereas a compass was obviously used in copying the circles on the latter. For reasons of aesthetics, intelligibility, or propriety, the transcripts may have been modified considerably. For example, the Chickasaw map contains two pictographic drawings: one small pointing hand (lower left) and an armed Indian warrior leading a horse. Yet there are many empty spaces on the transcript where the original may have contained additional pictographs.

The Chickasaw map embraces more than a million square kilometers of what is now the south-central United States. As well as being vast, the area represented was culturally diverse.[165] The map could not possibly have been based on the direct experience of one individual or even the experiences of a single generation. Such accumulated and shared knowledge would have been made possible and greatly assisted with the emergence through much of the vast area of the jargon or trade language known as Mobilian.[166]

The Chickasaw chief's nation is represented almost at

162. This account of map modeling is much briefer and more ambiguous than others described in this chapter. It is contained in a letter of 16 January 1708, from Lt. Col. John Walker, to whose home the Indian Lamhatty had been brought, to Governor Edmund Jennings. The relevant part of the letter is as follows: "They [Indians who had bought Lamhatty from his captors] in a short time took him out a hunting . . . along y[e] ledge of Lower mountains, (as he at first described to us by heaps of dirt tho' his geography has not made him hit it right in his draught)." The letter, the original of which is in the Archives Department of the Virginia State Library, was reproduced in John R. Swanton, "The Tawasa Language," *American Anthropologist*, n.s. 31 (1929): 435–53, esp. 436–37. According to Waselkov, the Indians who took Lamhatty hunting were Shawnees from the upper Savannah River region (Waselkov, "Indian Maps," 320 [note 145]). If so, "y[e] ledge of Lower mountains" could well have been the Blue Ridge near where the present states of South Carolina, Georgia, and Tennessee converge.

163. In addition, the map by van den Bosh discussed above was sent to Nicholson in 1694. It is not clear whether Nicholson had requested it or van den Bosh was merely attempting to curry favor, but the map may have alerted him to the potential importance of Indian geographical information about the little-known but geopolitically important interior. By 1699, as governor of Virginia, he was aware of French threats to English trade in the trans-Appalachian region and urged Joseph Blake, governor of South Carolina, territory closer to the critical lower Mississippi Valley, to "have the Account of these Countrys from Some Indians, which you can rely upon." He cited Louis Hennepin's maps from Indian sources and sent his fellow governor a copy of Hennepin's *New Discovery* (1698) (note 153). Francis Nicholson, letter to Governor Joseph Blake of South Carolina, Jamestown, Virginia 25 September 1699, Public Record Office, London (C.O. 5/1311/10 liv [10]).

164. The two very similar versions of the Catawba map are figure 4.39 and "A Map Describing the Situation of the Several Nations of Indians between South Carolina and the Massisipi River; Was copyed from a Draught Drawn & Painted upon a Deer Skin by an Indian Cacique; and Presented to Francis Nicholson Esqr. Governour of Carolina"; the latter, about 1721, is 81 by 112 centimeters; Map Room, Public Record Office, London (North American Colonies General no. 6 [1], C.O. 700).

165. According to standard regional divisions, it included parts of three of the continent's ten native culture areas (Southeast, Northeast, and Plains), five of its seventeen dominant native language areas (Muskogean, Iroquoian, Algonquian, Siouan, and Caddoan), and three of its five dominant types of native subsistence areas (fish, cultivated plants, and game); Carl Waldman, *Atlas of the North American Indian* (New York: Facts on File, 1985), figs. 3.8, 3.34, and 3.5. For a comprehensive interpretation of the map, see Waselkov, "Indian Maps," 324–29 (note 145). The map is also interpreted in G. Malcolm Lewis, "Travelling in Uncharted Territory," in *Tales from the Map Room: Fact and Fiction about Maps and Their Makers*, by Peter Barber and Christopher Board (London: BBC Books, 1993), 40–41.

166. There is some doubt as to the date of origin of Mobilian. The earliest reliable attestations are dated 1699; this was the year the first Frenchman, Pierre Le Moyne d'Iberville, reached the Mississippi Delta by sea from the east, twelve years after the first Spaniards, Martín de Rivas and Pedro di Irarte, had done so from the west and thirteen years after Henri de Tonty had reached it from upriver. At least one authority on Mobilian believes it was "possibly of pre-European origin with roots in a (non-pidginized?) contact language based on Western Muskogean"; Emanuel J. Drechsel, "A Preliminary Sociolinguistic Comparison of Four Indigenous Pidgin Languages of North America," *Anthropological Linguistics* 23 (1981): 93–112, esp. 102. Significantly, Chickasaw, the mapmaker's language, was one of two Western Muskogean languages. According to Drechsel's map (p. 100), the spread of Mobilian coincided very approximately with the territory covered by

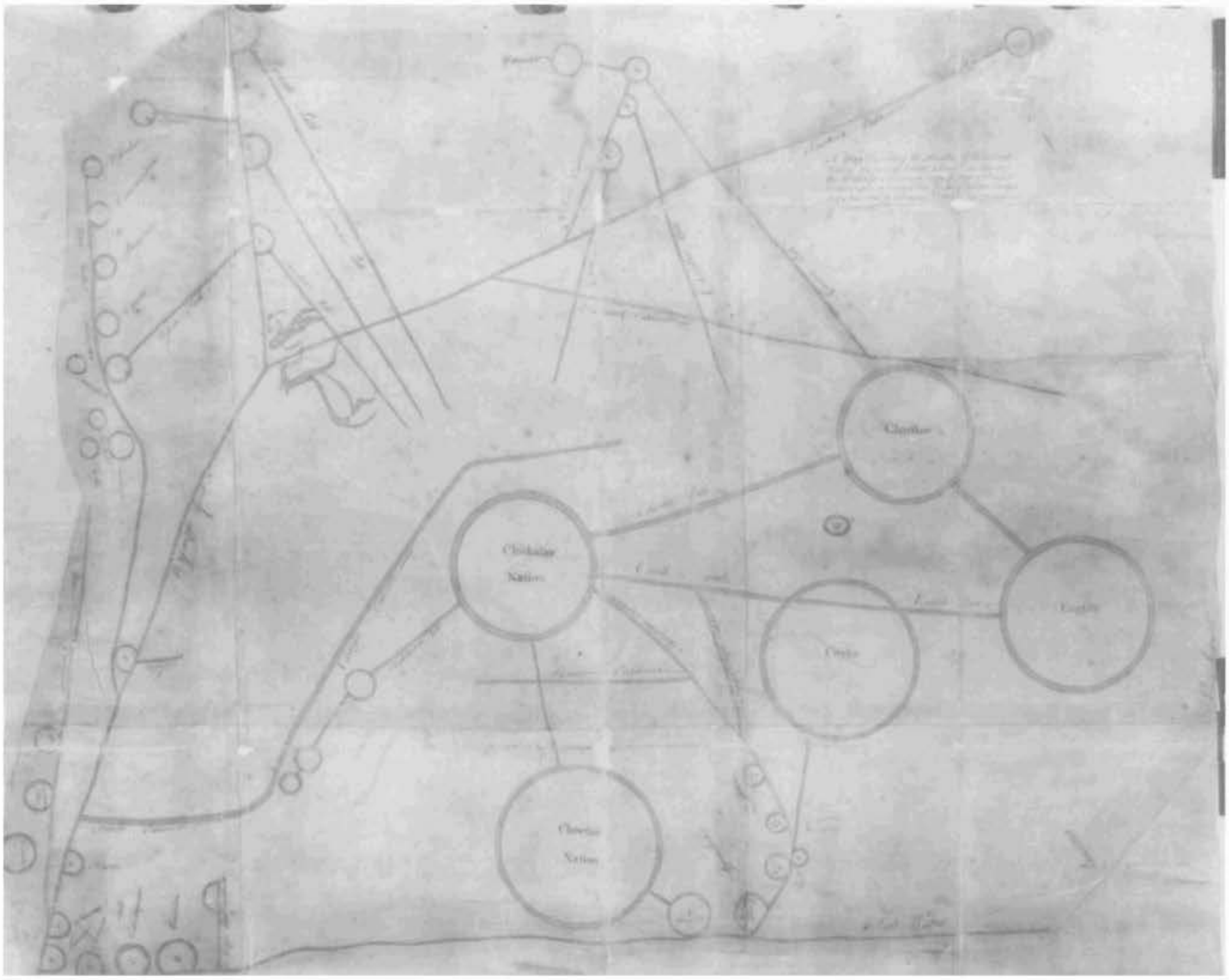


FIG. 4.38. SUPPLEMENTED MANUSCRIPT COPY OF A CA. 1723 CHICKASAW MAP ON SKIN OF INDIAN AREAS IN SOUTHEASTERN NORTH AMERICA. Caption, upper right: "A Map Describing the Situation of the several Nations of Indians between South Carolina and the Massisipi; was Copyed from a Draught Drawn upon a Deer Skin by an Indian Cacique and Presented to Francis Nicholson Esq^{r}. Governour of Carolina." Made to affirm the alliances and trading relationships between the Chickasaws, other Indians, and the English, the map also emphasized the isolation of the Chickasaw Nation from Indians allied to the French to the south, west, and north.
Size of the original: 114 × 145 cm. Photograph courtesy of the Public Record Office, London (C.O. 700/N.A. 6[2]).

the center. Comparing the drainage network on the map with that on a modern map, we see that this central area is not necessarily represented in greater detail (the information content thereabouts is no more than in some other parts of the map) but is shown large and relatively undistorted in relation to the rest (fig. 4.39). Radially away from it in each direction, though least so to the south, directional distortion increases, area diminishes, and shape becomes increasingly deformed. The forty-five-degree clockwise rotation of the Red and Arkansas Rivers in relation to the Mississippi River and the excessively straight representation of the eastern Gulf Coast close to and parallel with one of the flanks of the skin were doubtless due to peripheral constraints imposed by the shape and size of the deerskin.[167]

the Chickasaw map of about 1723, though its maximum extent may not have been achieved until a later date. For a wide-ranging review of nongraphical communication by native North Americans to Europeans, see G. Malcolm Lewis, "Native North Americans' Cosmological Ideas and Geographical Awareness: Their Representation and Influence on Early European Exploration and Geographical Knowledge," in *North American Exploration,* ed. John Logan Allen, vol. 1, *A New World Disclosed* (Lincoln: University of Nebraska Press, 1997), 71–126. And in volume 3, *A Continent Comprehended*, of the same series, see William H. Goetzmann, "A 'Capacity for Wonder': The Meanings of Exploration," 521–45, esp. 528–32, for a more limited review of native North Americans' geographical lore and its significance in facilitating exploration and discovery by Europeans and Euro-Americans.

167. There is no indication whatever of major features that occur on the coast: the eastern part of the birdsfoot delta of the Mississippi River; the distinctively deep Mobile Bay; the string of offshore islands with the sounds and deep bays behind them; and perhaps the western part of the bold Apalachicola delta.

Not all physically prominent features were shown on the map. To the southeast, the Florida peninsula, the southern Atlantic seaboard, and the rivers flowing to it from the southern Appalachians were all omitted. All could have been accommodated but were irrelevant to the Chickasaws' representation of the geopolitical relations between themselves, other Indian nations, the English, and the French. The English controlled the seaboard absolutely, and neither the Spaniards nor the Indians of the Florida peninsula constituted a threat. Conversely, the Yazoo River, relatively small regionally, was represented with an emphasis and magnitude even greater than that given the Mississippi River below the Ohio confluence. Significantly, on a map made by Chickasaws, the upper part of the Yazoo is named "Chickasau Oakhinnau [river]." Topological principles readily accommodated parochialism, the promotion of regions, and geopolitical manipulation. For the British the primary interest of the map was political–it would not have helped them in planning journeys or wayfinding. Their focus on its political content may have led English copyists to omit pictographs that did not seem relevant to the strategic relations between themselves, the French, and Indians allied with each power.

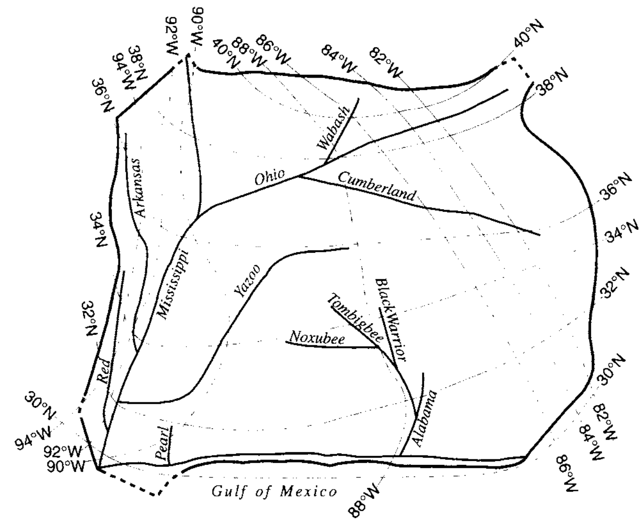


FIG. 4.39. DISTANCE DECAY AND DISTORTION ON A CHICKASAW MAP, CA. 1723 (FIG. 4.38). This diagram has meridians and parallels superimposed based on the river sources and confluences and some named places depicted on the map. It shows the distance decay and increasing angular distortion away from the Chickasaw core.

The motivation and criteria for copying the Catawba deerskin map in 1721 (plate 4) were similar to those for the Chickasaw map of two years later. Indeed, the same draftsman (perhaps William Hammerton) may have made the transcript. Although paths and Indian nations or villages are the dominant components of both maps, they are drafted on the Catawba map without the use of drawing compass or ruler. Straight lines do, however, depict schematically the world of the English colonists on the coast in and around Charlestown (Charleston): roads, probably county boundaries, and perhaps even parish boundaries. In making the transcript, the draftsman was highlighting the cacique's attempt to distinguish between the natural world of the interior and the new and blatantly altered landscape of the rapidly growing English and Huguenot settlement. With the exception of the large circles depicting the Cherokees and Chickasaws, all the villages appear to have been Catawba, then situated in the Wateree-Catawba Valley on the South Carolina Piedmont. This was still a little-known region, and printed maps of it represented several large but nonexistent lakes. The only named path is "The English Path to Nasaw," which may have been the line of the road that later linked Charleston with Columbia. As with the Chickasaw map of 1723, the Catawba map was an up-to-date Indian statement concerning geopolitical relations.[168]

Two transcripts of Indian maps on deerskin were made by the draftsman and architect Alexandre de Batz. The originals of both maps were collected by the Captain of Pakana, an Alabama war leader and French emissary to the Chickasaws in 1737. As emissary, he had two objectives: to establish the strength and distribution of the Chickasaw nation, and to obtain the release of captives taken in two French defeats the previous year. One map, "Plan et Scituation des Villages Tchikachas," probably made by the Captain of Pakana, addressed the first of these. It shows the locations of ten Chickasaw villages, one Natchez village, the paths between them, nearby bayous and clearings, and the routes of earlier French attacks on the Chickasaws (fig. 4.40). It was apparently produced to communicate information about the Chickasaws to the French, who had been and were to be again at war with the Chickasaws. It is highly stylized, with straight paths linking circular nodes. There seem to be three circle sizes. They suggest a ranking of villages, though it is not clear by what criterion. The three largest circles include two at the center and Ogoula Tchetoka (near modern Tupelo, Mississippi),[169] where the Chickasaw leader Mingo Ouma lived. All the other Chickasaw villages are represented by medium-sized circles. The one slightly smaller circle represents a village of the Natchez. Small rectangular, fieldlike symbols between the villages are labeled "deserts." Although this is a common convention on French maps of the period and must have been introduced by de Batz, it is not known whether it was used here to represent cultivated areas or openings in the forest that may once have been cultivated.[170]

168. See Waselkov, "Indian Maps," 320–24 (note 145).

169. James R. Atkinson, "The Ackia and Ogoula Tchetoka Chickasaw Village Locations in 1736 during the French-Chickasaw War," *Mississippi Archaeology* 20 (1985): 53–72.

170. See Waselkov, "Indian Maps," 332–34 (note 145); Marc de Villiers du Terrage, "Note sur deux cartes dessinées par les Chikachas en

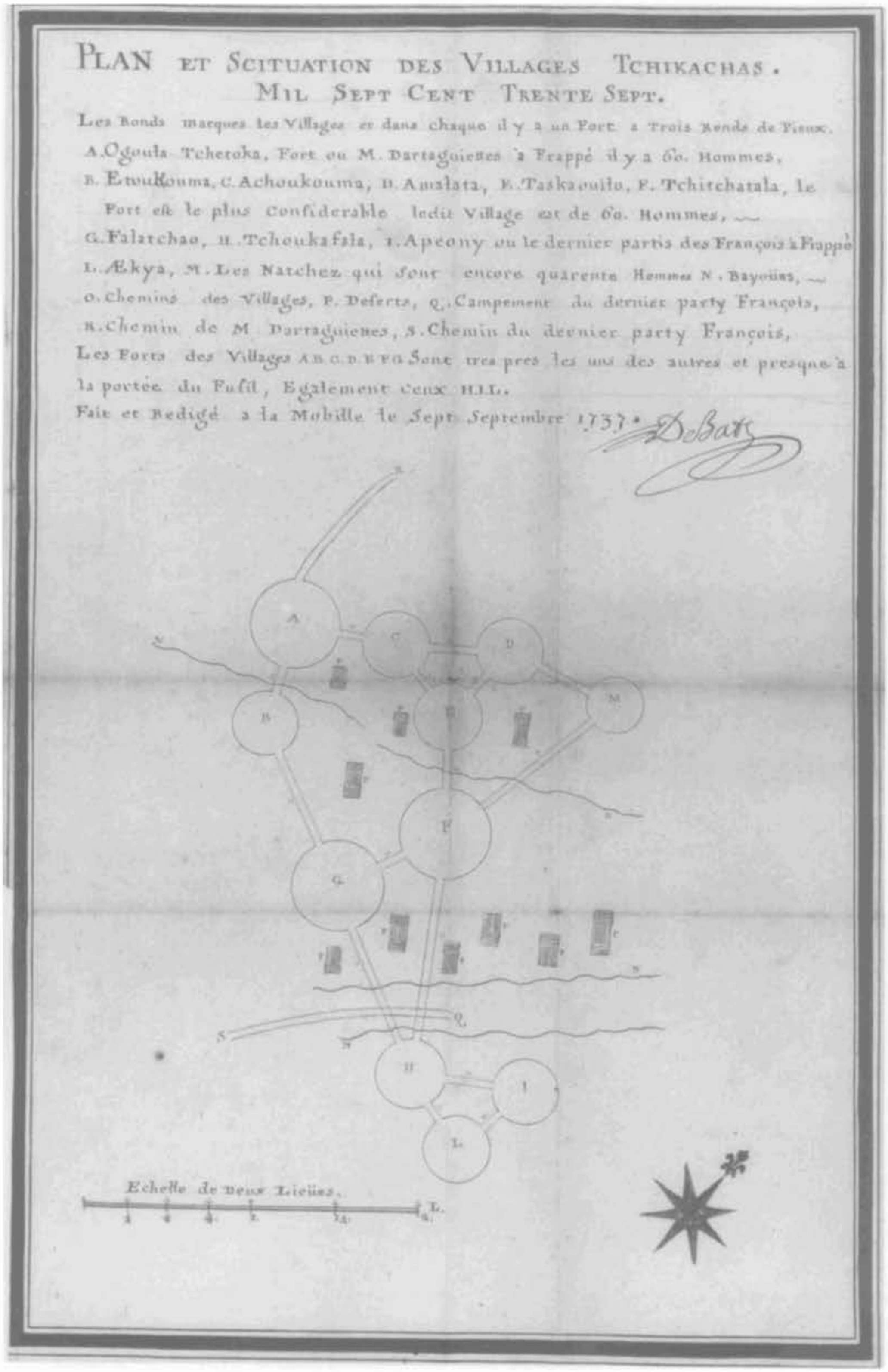


FIG. 4.40. SUPPLEMENTED MANUSCRIPT COPY OF AN ALABAMA MAP. This contemporary transcript by Alexandre de Batz of a map by the Captain of Pakana (Alabama headman) illustrates the paths connecting the Chickasaw villages in what is now northeastern Mississippi. "Plan et Scituation des Villages Tchikachas," signed manuscript ink on paper, 7 September 1737. There is also an unsigned manuscript copy in L'atlas Moreau de Saint Méry (F3 290 14), Directions des Archives de France, Aix-en-Provence.
Size of the original: 51 × 34.5 cm. Photograph courtesy of the Archives des Colonies, Archives Nationales, Paris (C/13/a/22, fol. 68).

The second transcript, "Nations Amies et Ennemies des Tchikachas," was drawn from a map made by Mingo Ouma (fig. 4.41). When the Captain of Pakana had met with Mingo Ouma, a Chickasaw war chief, Mingo Ouma expressed a desire for peace with the French and suggested that his people and the Alabamas join with them to attack the Natchez. As part of his strategic argument, he gave two copies of the map to the Captain of Pakana, one for the Alabamas and one for the French, from which de Batz made his transcript.[171] According to the text accompanying the map:

> The circles denote villages and entire nations [black for those friendly to the French and red for their enemies]. A, the English; B, the Cowetas; C, the Kashitas; D, the Yuchis; E, the Tugaloo Cherokees; F, the Cherokees who speak a different language than E; G, the Okfuskees Abekas; H, the Alabamas; I, Mobile, or the French; K, the Choctaws; L, the whole Chickasaw nation, which is white within, but the space [shaded zone between the inner and outer concentric circles] surrounding it is of nothing than blood. It is white because they claim that only good words come from their village, but those of the surrounding country lose their minds by not listening to them at all, and this stains their lands with blood. M, the Huron and Iroquois villages and those they call the Nantouaque; N, the villages and nations of the Tamarods, Piankashaws, etc.; O, the Arkansas or Quapaws; P, the Chachiumias, whom they are going to attack at once; Q, these are the warpaths that do not go as far as the villages, because they hope that they will become white when they [the Chickasaws] make peace with those toward whom they lead; R, River of the Alabamas and the path from that nation to Mobile. It does not go as far as Mobile because they say they would not dare to go there, but in spite of that it is white for us; S, white paths that lead to their friends; T, war paths; V, hunting paths of the Alabama white.

Quite clearly this was a geopolitical statement from the perspective of one southern nation (the Chickasaws) that embraced their friends and enemies in a vast region extending from the Gulf Coast in the south (I, Mobile) to the upper Great Lakes in the north (M, Hurons) and from the Carolina coast in the east (A, English) to the lower Arkansas River in the west (O, Quapaws). As such, the map embraced a similar area, had a similar form, and served a similar function as the Chickasaw map presented to Governor Francis Nicholson in 1723 (fig. 4.38). Though the precise linkages (relationships) and nonlinkages (animosities) between circles (nations) had changed somewhat during the intervening fourteen years, and whereas the earlier map had been intended for English authorities and the later one for the French, the similarities are such as to suggest that both manifested a deeper and perhaps much older cartographic tradition.

Fragments of an engraved shell cup from Spiro, Oklahoma, dating from the Mississippian period (A.D. 900–1450) (fig. 4.42) show a pattern strikingly similar to the colonial-era maps described above (figs. 4.38, 4.39, 4.40, and 4.41).[172] Robert H. Lafferty, noting the resemblance, suggested that the shell may represent important Mississippian sites and the relations among them. Going further, he attempted to map the circles onto archaeologically known sites, assigning the largest circle to the most populated Mississippian site and assuming both conservation of scale in the connecting paths and orientation similar to that of the Chickasaw map of 1737.[173] Given these assumptions, it is not surprising that the pattern of circles on the shell does not correspond with the distribution of archaeologically established settlements. Notwithstanding the methodological difficulties, Lafferty's case for the cross-in-circle motif's being a map is probably stronger than any other claims for supposed large-area maps. This is because it relates to a carefully reconstructed regional economic system that operated during a specific culture period and involves stylistic as well as geometrical evidence.

OTHER SOUTHEASTERN MAPPING ENCOUNTERS

Relatively little is known about southeastern Indian maps that were not accorded official status soon after they were made. Some, perhaps many, may have gone unrecorded. Maps are mentioned in Pierre Le Moyne d'Iberville's journal, which describes his accidental discovery of the Mississippi Delta when his ship was blown on shore in 1699. Uncertain where he was–information from La Salle's earlier explorations wrongly showed the lower part of the river to be far to the west[174]–he continued to sail inland to establish his whereabouts. Bayogoulas and

1737," *Journal de la Société des Américanistes de Paris,* n.s. 13 (1921): 7–9; and Patricia Galloway, "Debriefing Explorers: Amerindian Information in the Delisles' Mapping of the Southeast," in *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis (Chicago: University of Chicago Press, 1998), chap. 10.

171. See Waselkov, "Indian Maps," 329–34, and Villiers du Terrage, "Note sur deux cartes."

172. Philip Phillips and James A. Brown, *Pre-Columbian Shell Engravings from the Craig Mound at Spiro, Oklahoma,* 6 vols. (Cambridge, Mass.: Peabody Museum Press, 1975–82), vol. 3, pl. 122.3, with text and diagrams. The pattern as reconstructed from two fragments is described as "concentric cross-in-circle motifs in a connected grid."

173. Robert H. Lafferty, "Prehistoric Exchange in the Lower Mississippi Valley," in *Prehistoric Exchange Systems in North America,* ed. Timothy G. Baugh and Jonathon E. Ericson (New York: Plenum Press, 1994), 177–213, esp. 201–5.

174. Louis De Vorsey, "La Salle's Cartography of the Lower Mississippi: Product of Error or Deception?" in *The American South,* ed. Richard L. Nostrand and Sam B. Hilliard, Geoscience and Man 25 (Baton Rouge: Department of Geography and Anthropology, Louisiana State University, 1988), 5–23.

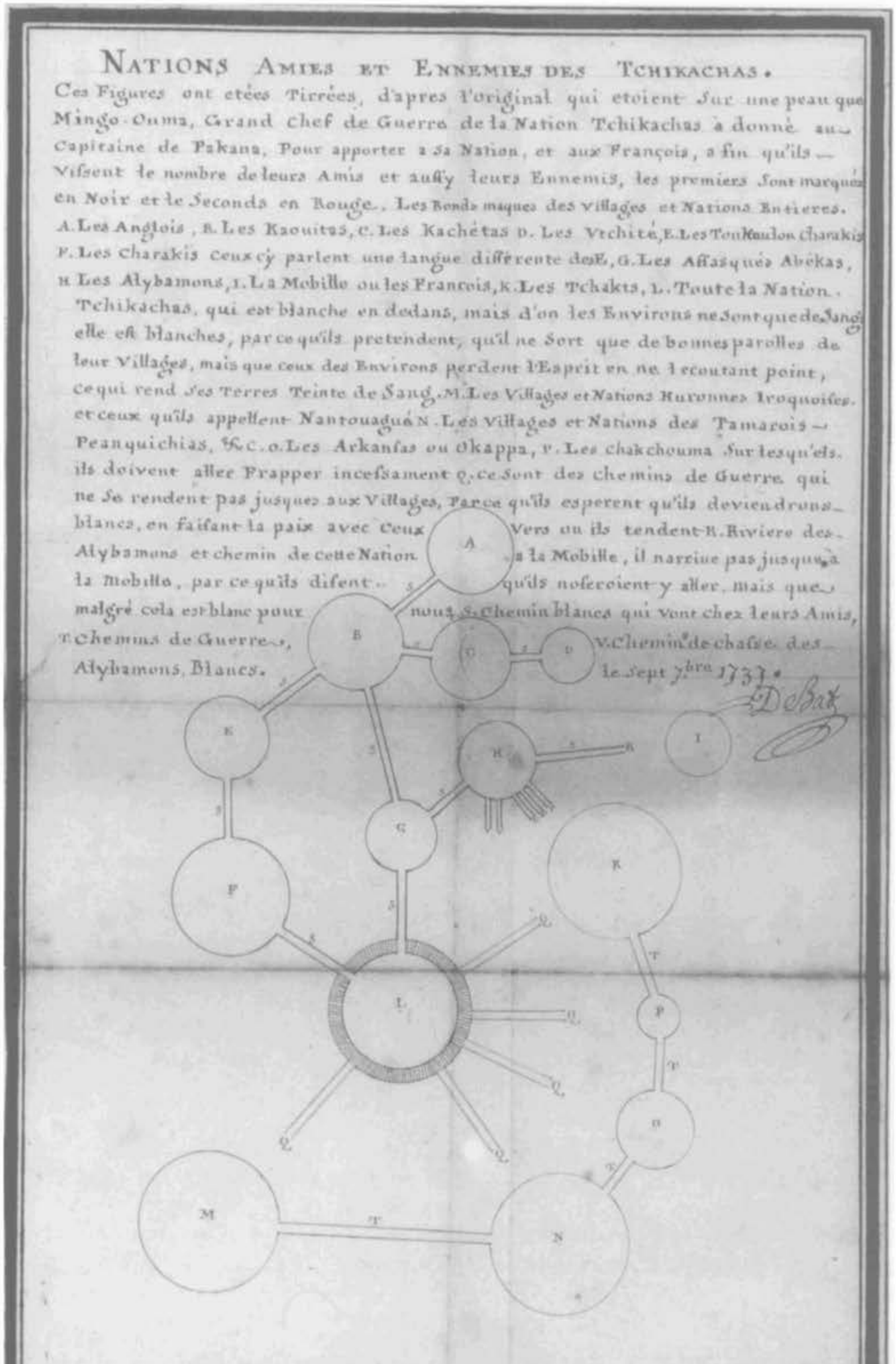


FIG. 4.41. SUPPLEMENTED MANUSCRIPT COPY OF A CHICKASAW MAP. "Nations Amies et Ennemies des Tchikachas," contemporary transcript by Alexandre de Batz. There is also an unsigned manuscript copy in L'atlas Moreau de Saint Méry (F3 290 12), Directions des Archives de France, Aix-en-Provence. Size of the original: 51 × 34.5 cm. Photograph courtesy of the Archives des Colonies, Archives Nationales, Paris (C/13/a/22, fol. 67).

Mougoulachas "drew maps of the entire region, indicating that Tonty traveled to the Ouma village after departing their own."[175] Iberville knew that ten years earlier Henri de Tonty had descended the Mississippi as far as the head of the Delta. The information the Indians gave Iberville may have assured him that he was on the Mississippi, but it also worried him. He wanted to return to the sea, since his provisions were running short and his mission to establish a French colony near the mouth of the Mississippi was not yet accomplished. Yet he also wanted to travel farther inland to establish the course of the river and pinpoint his exact whereabouts.

Iberville's journal contains other references to Indians' making and using maps. He showed them printed maps in an attempt to confirm the existence of a supposed fork upstream, and he later commented that "Indians, especially those who drew maps for me could not have lied about the fork."[176] On another occasion a warrior appears to have dissented, assuring Iberville that the Mississippi "does not divaricate," and drawing "a map on which he indicated that during the third day of our journey, we shall encounter a river on the left [west] bank, called the Tassénocogoula [probably Red River], which has two branches. Eight villages, which he named . . . are situated along the western tributary."[177] The map was made in partial response to Iberville's questions concerning Henri de Tonty's exploration down the Mississippi. Iberville, pursuing his country's geopolitical strategy to open up the Mississippi Valley from the south to prevent incursions by English traders from the east, was using Indians to make maps in order to verify position and establish links across a terra incognita with places to the north already known to the French. One suspects that many similar occurrences in the Southeast were either unrecorded or reported but since lost, though why they are less numerous than in other regions is unclear.

BOUNDARIES AND MAPPING

The delineation of boundaries by colonial authorities, which included boundaries between native groups, together with existing geographic knowledge among southern Indians, caused late eighteenth-century southern Indians to become increasingly aware of boundaries. These included boundaries separating one group's hunting grounds from another's as well as those separating Indian from colonial and, later, state and federal territory. De Vorsey notes:

> Although it was seldom credited on the maps drawn to illustrate the various boundary surveys undertaken [at first by the English colonial authorities] with the co-operation of the southern tribes, it is probable that much of the supplementary detail included in them came from information provided by the Indian members of the surveying parties. It would further seem probable that these same Indians, upon returning to the tribal council fires after the completion of these surveys, were quite capable of communicating the locations and significance of the new boundaries they had helped demarcate [in the field].[178]

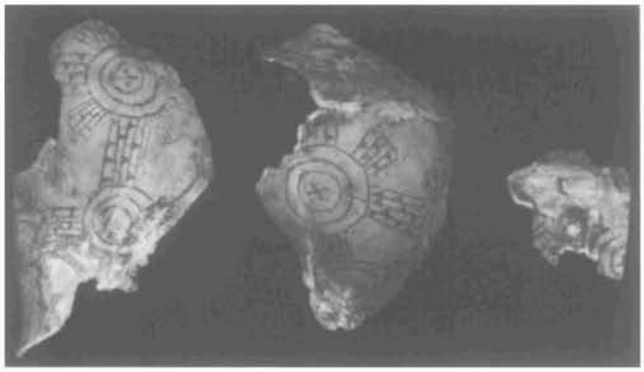


FIG. 4.42. CONCENTRIC CROSS-IN-CIRCLE MOTIF INTERCONNECTED GRID ENGRAVING ON A PREHISTORIC SHELL CUP. Mississippian period, ca. A.D. 900–1450, three fragments. Recently tentatively identified as a map of Mississippian sites and resource locations.
Size of the largest fragment: ca. 14 × 9 cm. Photograph courtesy of the Department of Anthropology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM 448828, 448877, and 448880).

Among a group of documents relating to territorial disputes with Indians transmitted to the Senate by President George Washington on 7 August 1789 was a map providing evidence that some southeastern Indians drew boundary lines (fig. 4.43). The original had been drawn four years before by "Koatohee or Corn Tassel of Toqua [usually Chota]," the chief Cherokee negotiator at the Treaty of Hopewell, which established a boundary west of which settlement by people of European stock would be illegal. In his address to the commissioners of the United States, 23 November 1785, Corn Tassel remembered "giving our lands . . . in 1777." He described in words the "lines" that had been transgressed on the ground by settlers. The commissioners then demanded of Corn Tassel "the boundary of your country; you must recollect yourself and give it to us, particularly the line be-

175. Carl A. Brasseaux, ed., trans., and annotator, *A Comparative View of French Louisiana, 1699 and 1762: The Journals of Pierre Le Moyne d'Iberville and Jean-Jacques-Blaise d'Abbadie* (Lafayette: Center for Louisiana Studies, University of Southwestern Louisiana, 1979), 47. According to Brasseaux's footnotes, Bayogoulas (Choctaw for bayou people) were Muskogeans, and Mougoulachas (also called Quinipissas) were culturally related to the Choctaws.

176. Brasseaux, *Comparative View,* 35 and 60.

177. Brasseaux, *Comparative View,* 56–57.

178. Louis De Vorsey, *The Indian Boundary in the Southern Colonies, 1763–1775* (Chapel Hill: University of North Carolina Press, 1966), 45–47, quotation on 47.

tween you and the citizens [settlers], with any information you have on that subject. If necessary, you may consult your friends, and inform us to-morrow, or as soon as possible with conveniency." Two days later, the "headmen, after some conversation together, requested the commissioners to give them some paper and a pencil, and leave them to themselves, and they would draw the map of their country." On the following day the Indians "produced their map, and the Tassel addressed the commissioners."[179] Both the map and the statements made by Corn Tassel and the several other headmen reveal a very precise understanding of linear boundary. Furthermore, the actual boundary passed through some of the most mountainous terrain of the southern Appalachians, crossing obliquely the upper reaches of many streams, some of which drained eastward to the Atlantic and others westward into the Ohio-Mississippi Valley. Hence no part of the boundary could follow either a river course or a linear watershed.

Corn Tassel had been involved in land negotiations for at least "eighteen springs."[180] His concept of boundary, the ability to relate it to actual terrain and drainage networks, and the skill to draw boundary lines on maps had almost certainly developed in the course of these negotiations. There is no indigenous evidence in either the Southeast or other parts of North America to suggest that Indians drew boundary lines on maps before they began to enter into land negotiations with governments and settlers.[181] Indeed, before such negotiations, there had been no need to do so. It would have been contrary to a deeply felt and continentwide belief later expressed by the Nez Percé Chief Joseph (Hin-mah-too-yah-lat-kekht) that "the country was made without lines of demarcation, and it is no man's business to divide it."[182]

Far West

Indians from four culture groups (Southwest, Northwest Coast, Plateau and Basin, and California) inhabited North America west of the Plains and Subarctic. Their cultures and means of subsistence varied substantially, as did the timing and circumstances of their contact with Europeans. They are treated together here because of the small number of surviving artifacts and accounts of mapmaking from the region as a whole, although each culture group is represented. Some of the intraregional variation may be due to cultural characteristics of Indian groups. For example, there are very few examples of indigenous mapmaking from California. Since most of its Indians occupied relatively small territories and were organized in small nuclear families (as distinct from the extended families that characterized most of the continent), it could be that they had less need to communicate with maps. There are, however, sufficient records to indicate that even here some of them did so.[183] Perhaps because they were only sparsely populated and contained few resources, there is little evidence of maps and mapmaking in the extensive high mountain regions of the Rocky Mountains and Sierra Nevada. Some groups may have been more likely to map in ephemeral forms, such as the earth modeling techniques of the Indians of the Plateau and Basin. It is also certain that the circumstances of initial and continuing contact influenced the survival and knowledge of Indian maps. For instance, knowledge of cartographic elements in Navajo sandpainting, an ephemeral form practiced in some secrecy, exists because twentieth-century collectors and ethnographers were interested.

(*Facing page*)
FIG. 4.43. CORN TASSEL'S MAP. In this case and others, the rarity of peaked summits, as distinct from conspicuous long, even ridge crests, may have caused confusion in Indian-settler disputes about land agreements. The boundary they were attempting to negotiate was more than six hundred kilometers long but was delimited on their map as intersecting sixteen very generalized rivers and connecting three mountains. None of the river intersections were at confluences, sources, settlements, distinctive natural features, or other kinds of establishable sites. Of the three mountains, one was 9.6 kilometers south of an unestablishable intersection with a river. If the region's mountains had been sharp peaks rather than long smooth ridges, they could have served as precise referents, but only two were named. "This map is copied from one drawn by the Tassel and some other of the Head men of the Cherokees to describe their territorial claims . . . Keeowee the 28th of Novr 1785." Ink on paper.
Size of the original: ca. 43 × 36 cm. Photograph courtesy of the National Archives, Washington, D.C. (Senate 1A–E4).

EARLY MAPPING ENCOUNTERS: SPANISH

Two very early records of mapmaking by North American Indians came as a consequence of Spanish *entrada* in

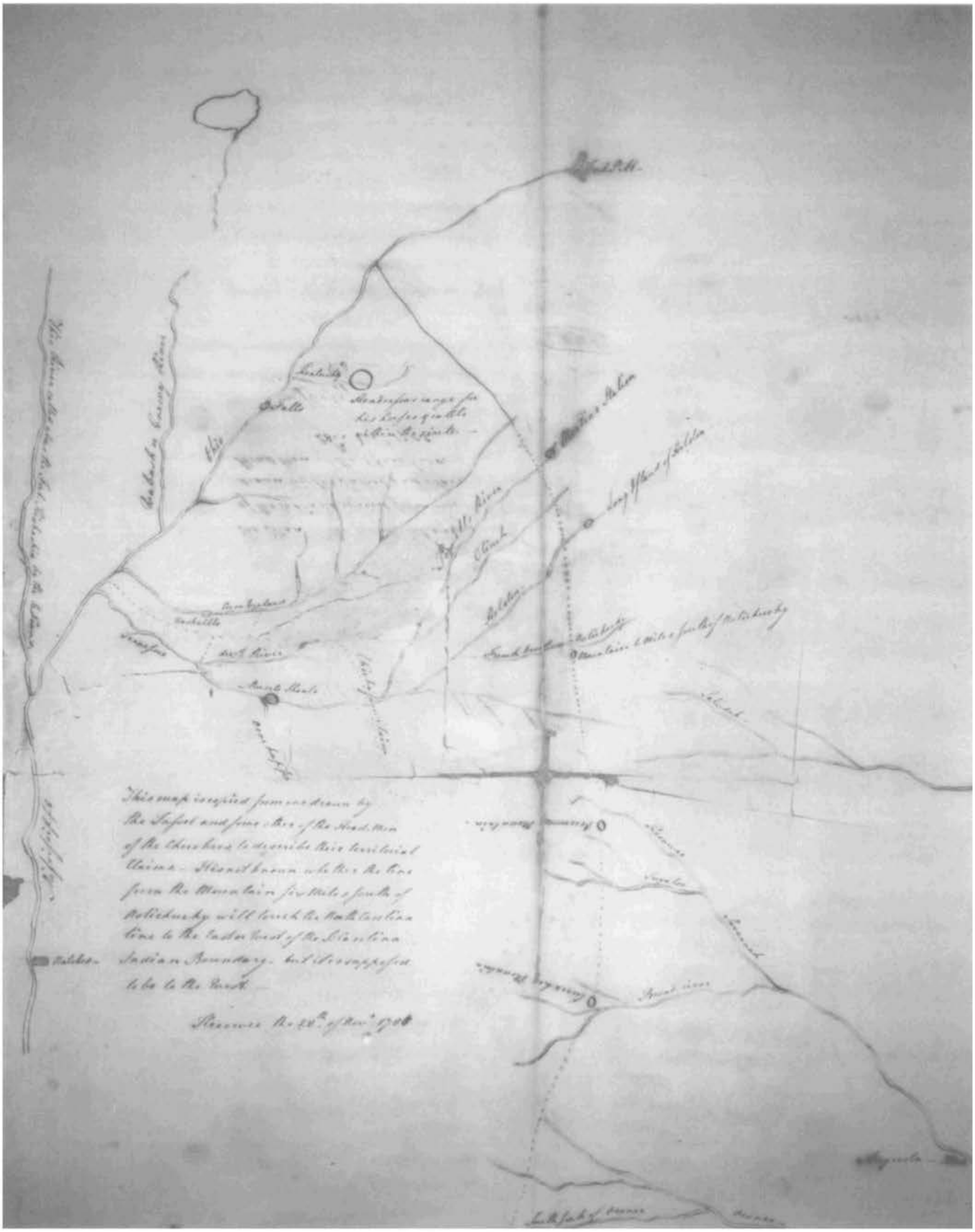
179. *American State Papers: Documents, Legislative and Executive, of the Congress of the United States,* Class 2, Indian Affairs, 1789–1827, 2 vols. (Washington, D.C.: Gales and Seaton, 1832), 1:42–43 (the engraved version of the map is on 40).

180. *American State Papers,* 1:41.

181. Boundaries exist, however, on cosmographical maps; see plate 5 and figs. 4.48 and 4.73. In part cosmographical, figure 4.57 also separates two spaces by means of a bold boundary.

182. T. C. McLuhan, comp., *Touch the Earth: A Self-Portrait of Indian Existence* (New York: Outerbridge and Dienstfrey, 1971), 54.

183. See, for instance, the maps made for Frémont in 1843 and 1844, pp. 113–14. Lieutenant Amiel Weeks Whipple reproduced as simple line engravings maps done on the ground by Southern Paiutes and Yumans in 1854: *Reports of Explorations and Surveys to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean,* 33d Cong., 2d sess., Sen. Ex. Doc. 78 (1856), vol. 3, pt. 3, p. 16. The two printed maps differed markedly from Whipple's manuscript copies of the ground maps: Whipple's Notebook 20, Oklahoma Historical Society, Oklahoma City (see below, note 360). Figure 4.103*b* below is derived from the Yuman map.


This map is copied from one drawn by
the Tassel and some others of the Head Men
of the Cherokees to describe their territorial
Claims - It is not known whether the line
from the Mountain six Miles South of
Nolichucky will touch the North Carolina
line to the Eastward of the S. Carolina
Indian Boundary, but it is supposed
to be to the East.
Hopewell the 28th of Novr 1785

the Southwest. In September 1540 Hernándo de Alarcón, leader of the first group of Spaniards to reach what are now southeastern California and southwestern Arizona, ascended the Colorado River, reaching a point somewhere near what are now known as Quartz Peak and the Trigo Mountains. There he met an elderly, probably Halchidhoma, man who could not possibly have had previous contacts with Europeans.[184] Alarcón, wishing to obtain information concerning conditions upstream, "told him" (it is not explained how he communicated) "that I would not ask another question other than that he mark on a piece of paper what he knew of that river, and what people lived on both of its banks. He accepted with pleasure."[185] Whatever the procedure might have been, it is almost certain that on his very first contact with Europeans the Indian made a map of the Colorado River for an unspecified distance above the point reached by Alarcón and that he did so willingly.

Also in New Mexico in 1540, Francisco Vásquez de Coronado, in search of the Seven Cities of Cibola (as a group of Zuni pueblos had been misidentified by the Spanish), arrived at a Zuni settlement, probably Hawikuh. He wrote:

> In this one where I am now lodged there are perhaps 200 houses, all surrounded by a wall, and it seems to me that, together with the others, which are not so surrounded, there might be in all 500 hearths.
>
> There is another town near by, which is one of the seven, but somewhat larger than this, and another of the same size as this; the other four are somewhat smaller. I am sending a sketch of them all, and of the route, to your Lordship [Antonio de Mendoza, viceroy of New Spain]. The skin on which the painting is made was found here with other skins.[186]

This account does not clarify whether the skin was painted before or after Coronado found it, but the Spaniard noted that "the natives here have some very well-dressed skins, and they prepare and paint them where they kill the cattle."[187] Though not referred to as a map, the painting was certainly interpreted as one, though whether it was done with the help of an Indian is not known.

As happened with the English, maps sketched on the ground for the Spaniards were part of the earliest encounter process. Marcos Farfán de los Godos, in what is now Arizona, seeking information about three rivers he had crossed in the fall of 1598, gathered together a large group of Yavapai Indians. Making "a sketch on the ground with a stick," they explained that the "three rivers and two others which joined them farther on, five in all, flowed together through an opening" to become a wide river with "numerous settlements of people who planted extensive fields of maize, beans, and calabashes in a very level country of fine climate."[188] It was the first indication the Spaniards had received of the Pima agricultural settlements in the lower valley of what they later and very appropriately named the Verde River. Inscribing in this way may have been resorted to frequently in the early contact period, when spoken language was inadequate for communicating geographical information to Euro-Americans.

RITUAL AND COSMOGRAPHIC MAPS

Failure to recognize that terrestrial and cosmographical content might coexist on one map caused Francisco de Escobar some reservations about reporting such content in his relation of an experience on the lower Colorado River in 1604 or 1605. Otata, a chief of the Bahacechas (Vacechas)[189] had told him of the peoples who lived on the lower Colorado River and around the Gulf of California "making a sketch of the land on a piece of paper, in which he indicated many nations of people so strange that only at great risk of not being believed do I venture to report these things."[190] As an educated Renaissance man, Escobar was cautious about improbable but assumedly real phenomena he could not verify. Among the peoples Otata told of were those "whose men had virile members so long that they wound them four times around the waist"; those "whose people had only one foot"; and those "who dwelt on the shore of a lake, and . . . slept under the water."[191] The people who slept beneath the waters of the lake were almost certainly a form of the water sprites

184. Vásquez de Coronado had reached the pueblo complex of Cibola only two months before, and that was in a quite different culture region more than five hundred kilometers to the east across difficult terrain. In the previous year Francisco de Ulloa had briefly reached the mouth of the Colorado River by sea but made no attempt to ascend it. The nearest sparsely settled Spanish territory, New Galicia, was more than one thousand kilometers to the southeast across the Sonoran Desert. William H. Goetzmann and Glyndwr Williams, *The Atlas of North American Exploration: From the Norse Voyages to the Race to the Pole* (New York: Prentice-Hall, 1992), 36–39.

185. George Peter Hammond and Agapito Rey, eds. and trans., *Narratives of the Coronado Expedition, 1540–1542* (Albuquerque: University of New Mexico Press, 1940), 153. The incident was also reported in Hakluyt, *Principal Navigations,* 9:315 (note 60).

186. Hammond and Rey, *Narratives of the Coronado Expedition,* 170–71.

187. Hammond and Rey, *Narratives of the Coronado Expedition,* 173.

188. George Peter Hammond and Agapito Rey, eds. and trans., *Don Juan de Oñate: Colonizer of New Mexico, 1595–1628,* 2 pts. (Albuquerque: University of New Mexico Press, 1953), pt. 1, 412.

189. Virtually nothing certain is known about the Bahacechas (or Vacechas). Kroeber says: "Along the Colorado from the Gila to the ocean all the Colorado nations were like the Bahacechas in dress and speech–that is, Yumans" (A. L. Kroeber, *Handbook of the Indians of California,* Bureau of American Ethnology Bulletin 78 [Washington, D.C.: United States Government Printing Office, 1925], 802).

190. Hammond and Rey, *Don Juan de Oñate,* 2:1024 (note 188).

191. Hammond and Rey, *Don Juan de Oñate,* 2:1025.

characteristic of the lore of Great Basin peoples. The Washoes still believe that sprites live at the bottom of Lake Tahoe, and people with one foot, mentioned by Otata, are also part of Washoe lore.[192]

Indians of the Southwest produced the best-known and most carefully observed examples of ritual maps incorporated in sandpaintings (also known as ground paintings and dry paintings). Some of the repertoire of formal sandpaintings incorporated celestial and terrestrial elements. Although the form was best known among the Navajos, the oldest sandpainters may well have been the Hopis and other Apachean speakers of Uto-Aztecan languages in the Southwest.[193]

Among the Navajos, the creation of sandpaintings was a part of rituals performed to restore health and secure blessings. The Navajo world consisted of two classes of people: Earth (human) People and Holy (supernatural) People. The universe functioned according to rules that both the Earth People and Holy People had to observe, and when the rules were not followed there would be disease and accidents. According to the precise nature of a disaster, a very formal ritual would be performed asking the Holy People to restore the balance in the universe. Sandpaintings, accompanied by the appropriate chant, were an important part of these rituals. On the floor of a hogan, a medicine man "painted" intricate traditional patterns by dexterously sprinkling appropriately colored dried, pulverized substances on a bed of sand. Several paintings might be made in the course of a chant, and paintings varied according to the chanter's interpretation. The sandpaintings were not permanent. None of the paintings were entirely cartographic, but some incorporated map elements.

Stars and constellations are common and important components of Navajo sandpaintings made in the course of chantway ceremonies. Griffin-Pierce classifies the depiction of stars and constellations into ten visual formats: Father Sky (with/without Mother Earth); night sky; stars reflected in oceans; the skies; as background/with people; earth and sky (not as figures); individually; in summer and winter skies; big stars; and star map.[194] Figure 4.44 shows stars depicted within the figure of Father Sky. The prominence of stars varies in different formats, and some paintings depict single stars rather than constellations.

An interesting, though not representative, work exists in the form of a drawing made by the early twentieth-century singer Sam Chief. Unlike other known sandpaintings, it represents only stars and constellations, with stars painted according to two or three orders of magnitude (figs. 4.45 and 4.46). Because of Sam Chief's unorthodox use of color and format, other chanters have

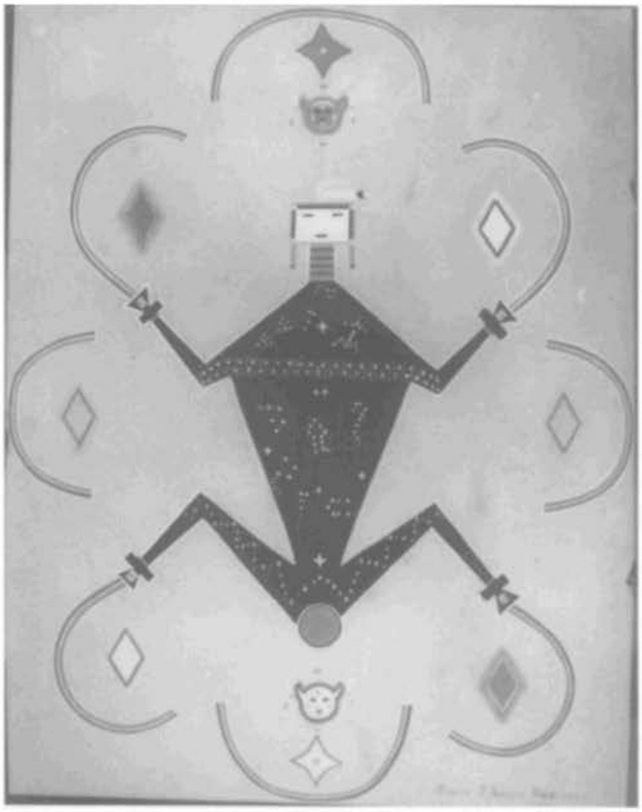


FIG. 4.44. THE CELESTIAL COMPONENT OF A NAVAJO SANDPAINTING. "Father Sky," 1935–36, painted by Franc J. Newcomb in 1953. East is at the top. The Milky Way stretches between the elbows, Venus is the bright star centered above the Milky Way, and the Pleiades is just above Venus. Polaris and Corvus are within the torso. Newcomb reproduced in sketches and paintings like this one hundreds of sandpaintings after witnessing the creation of the originals.
Photograph courtesy of the Wheelwright Museum of the American Indian, Santa Fe, New Mexico (P8 no. 16).

192. Sven Liljeblad, "Oral Tradition: Content and Style of Verbal Arts," in *Handbook of North American Indians*, ed. William C. Sturtevant (Washington, D.C.: Smithsonian Institution, 1978–), 11:641–59, esp. 653 and 655.

193. Gordon Brotherston, *Image of the New World: The American Continent Portrayed in Native Texts* (London: Thames and Hudson, 1979). Brotherston claims that "Mide writing [pictography] and Southwestern sandpainting, have a close affinity with the pre-Columbian scripts of Mesoamerica–Toltec and Maya" (17); and more specifically, that the sandpaintings of the Southwest are related to the Toltec screenfolds (65). "Athapaskans who emigrated from the Pacific Northwest, like the Apache [and] the Navajo are not the oldest practitioners of Southwestern sandpainting. That privilege belongs more likely to the Hopi and other relatives of the Nahua-speakers in the area" (98). Because of its ephemeral nature, almost nothing is known about the origin and evolution of sandpainting. More specifically, we do not know when cartographic components began to appear in the paintings. Brotherston's observations do, however, lead to a tentative hypothesis that sandpaintings may afford a link between what have hitherto been tacitly accepted as the different traditional cartographies of North America and Mesoamerica.

194. Trudy Griffin-Pierce, *Earth Is My Mother, Sky Is My Father: Space, Time, and Astronomy in Navajo Sandpainting* (Albuquerque: University of New Mexico Press, 1992), 104–26.

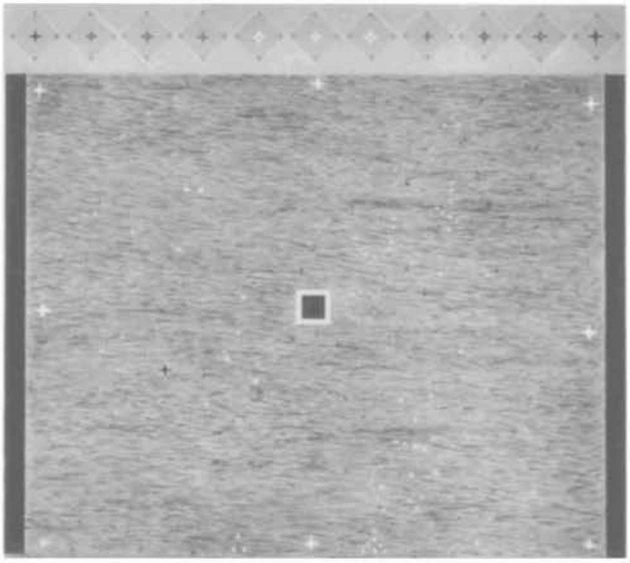


FIG. 4.45. DRAWING OF A NAVAJO SANDPAINTING, "THE SKY," BY YELLOW SINGER (SAM CHIEF), 1910–18. Copy by Clyde A. Colville. This may not have been traditional, because with the exception of "Opening beyond the Stars" at the center its content is entirely celestial. Sandpaintings normally have strong cosmographical content.
Photograph courtesy of the Wheelwright Museum of the American Indian, Santa Fe, New Mexico (P8B no. 14).

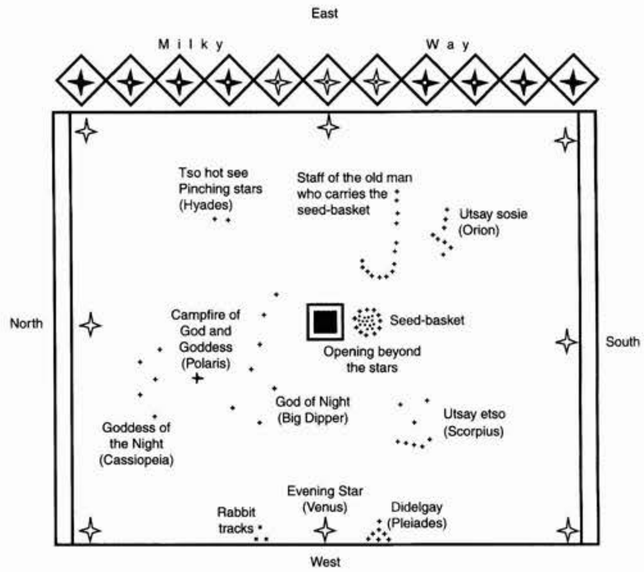


FIG. 4.46. INTERPRETATION OF "THE SKY" (FIG. 4.45).

questioned whether this and other drawings he made for the collector Louisa Wade Wetherill were really traditional sandpaintings. Leland Wyman suggests that he may have been inspired to innovate by the materials Wetherill supplied, or that he might have changed the designs to avoid human or supernatural reprisal for revealing sacred rituals.[195]

Celestial mapmaking was particularly important in sandpaintings associated with the Navajos' Male Shootingway. The chant commemorates an event in which the sun was visited by earth children. The sun instructed them in the arts of healing, of which making sandpaintings, including those of the sky, was an important part. The sandpainting known as "The Skies" depicts the sky at dawn, day, twilight, and night, each enclosed in a rectangle or trapezoid (plate 5). Stars, constellations, the Milky Way, sun, and moon are all depicted in the night sky (at the top of the painting), but in the eight versions Reichard and Newcomb collected the positions of these elements varied. The stars were represented as they appeared at the time the chant was sung; since Navajo ritual was not calendrical but was associated with needs, this could be at virtually any time of the year.[196]

Terrestrial features were also depicted in sandpaintings, generally landforms that were believed to be endowed with power. They were sometimes represented three-dimensionally, with heaped-up sand or clay cones for mountains and dishes or bottle caps sunk in the ground for lakes.[197] Among the Navajos, each of the four cardinal directions was associated with a mountain and a time of day, which in turn were symbolized by a stone or shell and a color: south, Mount Taylor, associated with noon and planning power and symbolized by turquoise and the color blue; west, San Francisco Peaks, associated with twilight and life power, symbolized by abalone and gold; north, Hesperus Peak, associated with night and faith, symbolized by jet and black; and east, Blanca Peak, associated with dawn, birth, and thought, symbolized by white shell and the color white.[198] The sacred mountains and their associations are the same for every Navajo pueblo irrespective of location. Color was particularly important in representing the cardinal directions in sandpaintings. Most Navajo sandpaintings are oriented with north at the top of the square, though not infrequently east is in that position. This characteristic also gives structure to cosmographical paintings incorporating terrestrial as well as celestial and mythical components. The key terrestrial components are the four sacred mountains, but other places associated with cosmographical events are also included.[199]

195. Griffin-Pierce, *Earth Is My Mother,* 120–22, and Leland C. Wyman, *Southwest Indian Drypainting* (Santa Fe, N.Mex.: School of American Research, 1983), 274–75, who also suggests that Sam Chief's style might represent a regional variation. Griffin-Pierce feels "they are probably not accurate reproductions of ceremonial sandpaintings" (121).

196. Franc J. Newcomb and Gladys A. Reichard, *Sandpaintings of the Navajo Shooting Chant* (New York: J. J. Augustin, 1937; reprinted New York: Dover, 1975), 58–59, and Gladys A. Reichard, *Navajo Medicine Man: Sandpaintings and Legends of Miguelito* (New York: J. J. Augustin, 1939; reprinted New York: Dover, 1977), 43–44 (fig. 2).

197. Griffin-Pierce, *Earth Is My Mother,* 52–53 (note 194).

198. Jimmie C. Begay, "The Relationship between People and the Land," *Akwesasne Notes* 11, no. 3 (1979): 28–29 and 13.

199. Griffin-Pierce, *Earth Is My Mother,* 53, 70–72, and 88–96 (note 194).

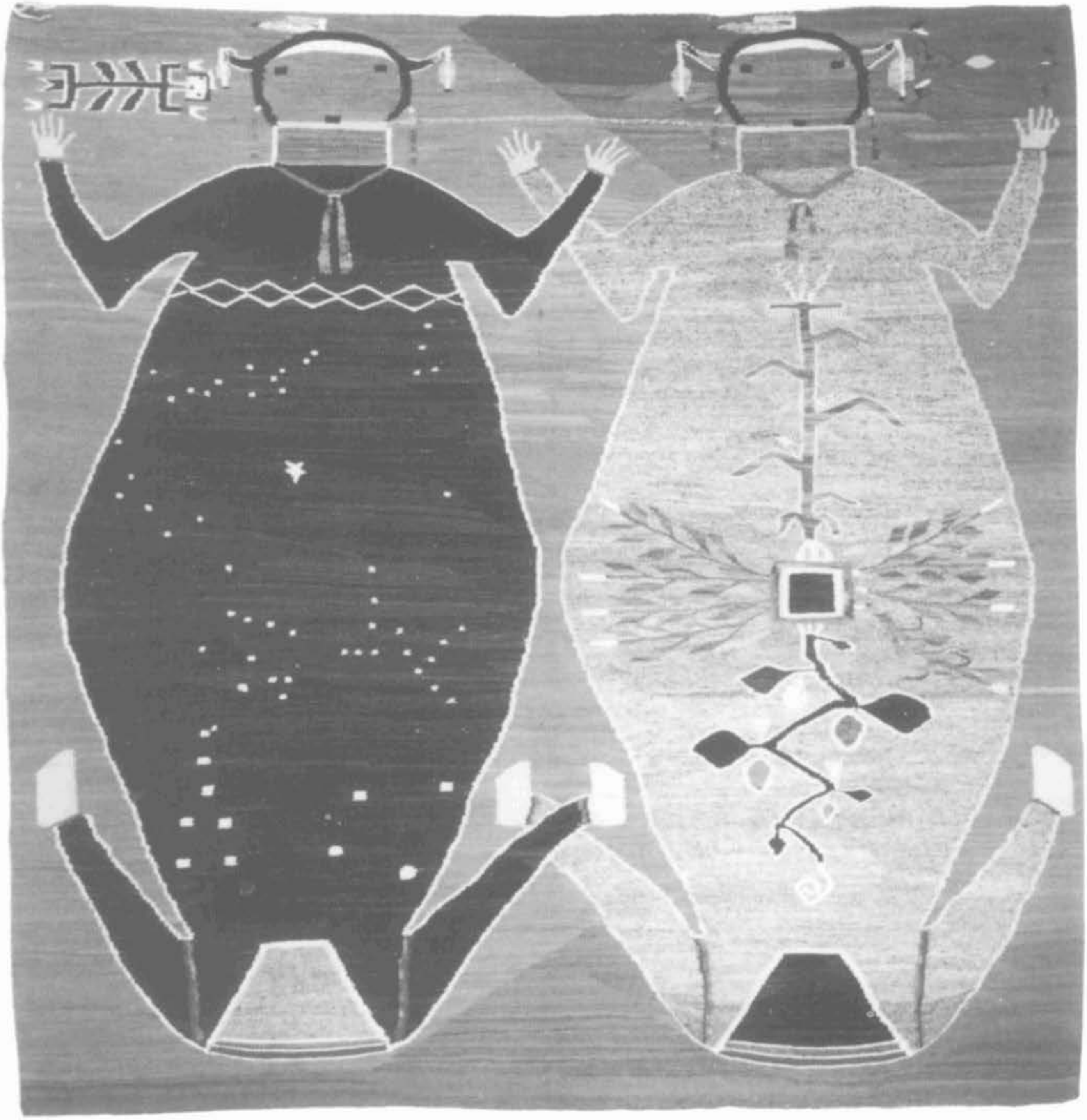


FIG. 4.47. FATHER SKY, INCORPORATING CONSTELLATIONS AND STARS, AND MOTHER EARTH IN A NAVAJO WOVEN RUG, BEFORE 1930. This is an example of an image's being transferred from a traditional medium (sandpainting) to a commercial medium (woven rug). Size of the original: 166 × 160 cm. Photograph courtesy of the Wheelwright Museum of the American Indian, Santa Fe, New Mexico (44/517).

In 1919 a Navajo medicine man, Hosteen Klah, began weaving sandpainting patterns in rugs and later taught the craft to his nieces.[200] A rug woven by one of the women in the 1920s or 1930s affords a good example of cartographic representation in commercial art (fig. 4.47). It depicts Father Sky and Mother Earth; the former incorporating the stars and constellations much as in figure 4.44.

Some of the Indians of southern California also prac-

200. Susan McGreevy, "Navajo Sandpainting Textiles at the Wheelwright Museum," *American Indian Art Magazine* 7 (1981): 54–61.

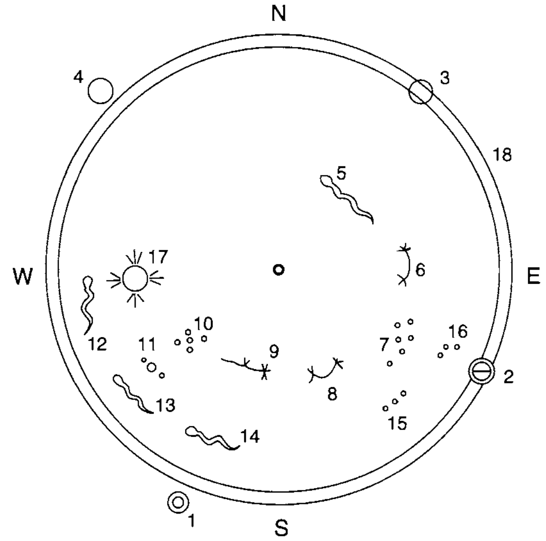


FIG. 4.48. REDRAWING OF A GROUND PAINTING OF THE CELESTIAL WORLD MADE BY MANUEL LACUSO, A DIEGUEÑO INDIAN, CA. 1900. The painting represented three major topographical features and one unidentified feature at or near the circular horizon as perceived from the Santa Ysabel region of southern California: (1) Atoloi, witch mountain on an island, identified by the informant with Coronado Island; (2) Nyapukxaua, mountain where people were created (unidentified and perhaps cosmographical); (3) Wikaiyai, San Bernardino Mountain (probably San Gorgonio Peak); and (4) Axatu, Santa Catalina Island. In addition, constellations and stars are shown (5–18, others are missing because the painter had forgotten their locations): (5) Awī, rattlesnake; (6) EteekurLk, wolf; (7) Xatea, Pleiades; (8) NamuL, bear; (9) Nyimatai, panther; (10) "Cross star"; (11) Saīr, buzzard star; (12) Xawitai, grass snake or blue garter snake; (13) Xilkaīr, red racer snake; (14) Awiyuk, gopher snake; (15) Watun, "shooting" constellation; (16) Amu, mountain sheep, three stars of Orion; (17) spitting hole, diameter about twenty centimeters (not a topographical feature, but a place on the map in which young boys were to spit–missing predicted a short life); (18) Horizon, forming the visible limits of the earth.
After T. T. Waterman, "The Religious Practices of the Diegueño Indians," *University of California Publications in American Archaeology and Ethnology* 8 (1908–10): 271–358, esp. pl. 24.

ticed sandpainting. According to A. L. Kroeber, this practice originated in the more complex ceremonialism of the Pueblos and Navajos.[201] In many of their sandpaintings, the Luiseños and Diegueños represented their world as circular. The circle represented the horizon. Within it were celestial, mythical, and terrestrial features. One such painting, done at the beginning of the twentieth century by an old Diegueño man of Santa Ysabel, placed four small circles on or near the horizon circle: Coronado Island, Santa Catalina Island, San Bernardino Mountain (probably San Gorgonio Peak), and Mountain of Creation (unidentified) (see fig. 4.48). Kroeber interpreted Diegueño ground paintings geographically, as presenting "a downright map of the mundane surface and the celestial sphere."[202] Kroeber does not comment on the significance of cosmographic features portrayed on the map such as the "mountain where people were created."[203]

MODELED MAPS

In addition to maps representing the cosmos, there are many accounts of maps made for more mundane, practical reasons. Nootkas of the Pacific Northwest Coast made a map on a beach in Clayoquot Sound on the west coast of Vancouver Island in preparation for attacking the village on Acktis Island, 150 kilometers to the north:

> The meeting adjourned to a smooth untrodden sand-beach in the neighbourhood. Here Quartsoppy, a Klah-oh-quaht, whose wife was a Ky-yoh-quaht woman [of the village to be attacked], was directed [by the chief] to describe on the sand the Island of Ocktees, on which the village of the Ky-yoh-quahts was placed. He immediately set to work and drew an outline of the island, then showed the coves, beaches, tracks; next the village with the different houses, divisions, and sub-divisions–referring now and then for confirmation to other natives who also knew the locality. Small raised piles of sand represented houses, one of which was Nancie's, the chief of the Ky-yoh-quahts, another belonged to Moochinnick, a noted warrior; others to chiefs of inferior repute. Quartsoppy, referring to his drawing, also showed, or otherwise informed his audience of the usual number of men in each division of the camp, their arms and supposed ammunition, the characteristics of the principal men, as their youth, age, courage, activity, or strength.
>
> All this time the warriors . . . stood round the delineator in a large circle, and questions were asked and eager conversation held. After several speeches had been made, a general plan of attack proposed by Setakanim [the chief] was adopted.[204]

At or near Honey Lake, California, sometime before 1850, an elderly Northern Paiute, responding to a request for information about a reported source of gold in a region that was still virtually unknown to Euro-Americans,

> took a pair of macheres [loose covers for a saddle] and

201. Kroeber, *Indians of California,* 661 (note 189).
202. Kroeber, *Indians of California,* 664.
203. See T. T. Waterman, "The Religious Practices of the Diegueño Indians," *University of California Publications in American Archaeology and Ethnology* 8 (1908–10): 271–358, esp. 350–51 (pl. 24 and explanation).
204. Gilbert Malcolm Sproat, *Scenes and Studies of Savage Life* (London: Smith, Elder, 1868), 191–92. A later annotated edition indicates this event occurred in 1855: Gilbert Malcolm Sproat, *The Nootka: Scenes and Studies of Savage Life,* ed. and annotated Charles Lillard (Victoria: Sono Nis Press, 1987), 127.

> sprinkled sand over them, drew a model map of the country there, and beyond it, some distance. He heaped up sand, to form buttes, and ranges of mountains; and with a straw, drew streams, lakes, and trails: then adjusted it to correspond with the cardinal points, and explained it. He pointed to the sun, and by signs made them understand, the number of day's travel from one point to another. On it he had traced, (as I found on their explanation,) Mary's river, Carson river, Pyramid lake, and the emigrant routes,–above and below. He moved his finger, explanatory of the revolutions of wagon wheels, and that white people travelled along, with guns, on the said routes [almost certainly the several variant routes used by gold seekers in 1849 in traveling by land to California]. On his map, he had exhibited the lake they were then at [Honey Lake], *and another in a deep basin, with 3 buttes beside it* [probably Gold Lake, some forty miles to the south-southwest], *and said that gold was plentiful there.*[205]

Although this particular case of modeling may not have been as elaborate as that of the Clayoquot group of Nootkas on the west coast of Vancouver Island, the Indians of the Great Basin made particular use of this medium. There was no suitable bark, animal skins were precious, but surficial materials were ubiquitous in the semiarid and often rocky environments. Like the one made near Honey Lake, their maps may have represented large areas because they lived in seminomadic bands and ranged over extensive territories.

In 1871 a party of George M. Wheeler's expedition was at Grapevine Springs, north of Death Valley, near the southwest edge of the Great Basin. Dr. W. J. Hoffman, an acting assistant surgeon, described how a Southern Paiute living there

> informed the party of the exact location of Las Vegas, the objective point. The Indian sat upon the sand, and with the palms of his hands formed an oblong ridge to represent Spring Mountain, and southeast of this ridge another gradual slope, terminating on the eastern side more abruptly; over the latter he passed his fingers to represent the side valleys running eastward. He then took a stick and showed the direction of the old Spanish trail running east and west over the lower portion of the last-named ridge.
>
> When this was completed the Indian looked at the members of the party, and with a mixture of English, Spanish, Pai-Uta, and gesture signs, told them that from where they were now they would have to go southward, east of Spring Mountain, to the camp of Pai-Uta Charlie, where they would have to sleep; then indicating a line southeastward to another spring (Stump's) to complete the second day; then he followed the line representing the Spanish trail to the east of the divide of the second ridge above named, where he left it, and passing northward to the first valley, he thrust the short stick into the ground and said, "Las Vegas."[206]

OTHER EPHEMERAL MAPS

Within the Great Basin, not all maps were modeled or even made on the ground. Other forms of ephemeral maps were encountered here and throughout the Far West. The Yavapais who sketched the map for Marcos Farfán de los Godos in 1598 were from just outside its southern limit, in the Southwest culture region. In the opposite direction, the Klamaths, who in 1843 drew for Frémont "upon the ground" part of the complex drainage catchment of the Klamath River, were from just outside its northwestern limit, in the Plateau culture region.[207] In 1769, just outside the Great Basin to the southwest, members of the Fernandeño group of the Gabrielinos "drew on the ground" for Father Juan Crespí and Miguel Costansó, members of Gaspar de Portolá's expedition, "the shape of the [Santa Barbara] channel with its islands, marking the route of the [Spanish] ships."[208]

A map described by John C. Frémont included part of California as well as the Great Basin. At the beginning of 1844 he was trying to obtain information about possible routes westward through the northern Sierra Nevada to northern California. Near the inflow of the Truckee River into Pyramid Lake near the northwestern edge of the Great Basin he was unsuccessful in attempts to obtain information from a group of Northern Paiutes, until they began to make

> on the ground a drawing of the river, which they represented as issuing from another lake in the mountains three or four days distant, in a direction a little west of south; beyond which, they drew a mountain; and further still, two rivers; on one of which they told us that people like ourselves travelled. Whether they alluded to the settlements on the Sacramento, or to a party from the United States which had crossed the Sierra about three degrees to the southward, a few years since, I am unable to determine.[209]

205. Georgia Willis Read and Ruth Gaines, eds., *Gold Rush: The Journals, Drawings, and Other Papers of J. Goldsborough Bruff,* 2 vols. (New York: Columbia University Press, 1944), 2:925; see also 2:1098–99 n. 11.

206. Mallery, "Pictographs of the North American Indians," 157–58 (note 4).

207. John C. Frémont, *Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in the Years 1843–'44* (Washington, D.C.: Blair and Rives, 1845), 206.

208. Herbert Eugene Bolton, ed., *Fray Juan Crespi: Missionary Explorer on the Pacific Coast, 1769–1774* (Berkeley: University of California Press, 1927; reprinted New York: AMS Press, 1971), 151; see also Frederick John Teggart, ed., *The Portolá Expedition of 1769–1770, Diary of Miguel Costansó* (Berkeley: University of California Press, 1911), 25.

209. Frémont, *Report of the Exploring Expedition,* 219 (note 207).

In the following year, Frémont was to follow this route.

In 1834, near what was to become Yellowstone Park, a North Shoshone "drew a map of the country around us on a white Elk Skin with a piece of Charcoal."[210] It almost certainly represented the area to the north of Yellowstone Lake, its canyons, and the open section of the valleys around what is now Livingstone, as well as one of the Yellowstone River's tributaries, the Lamar. Interestingly, no reference is made in the account of the map to the thermal springs and spectacular mineralized features near the center of what was to become the park. From the perspective of traditional cartography, however, the significance is twofold: it is a rare example of an Indian map from within the Rocky Mountains and, although Great Basin in terms of culture, one almost certainly influenced by the traditional cartography of the Plains region immediately to the east.

Another map of part of the Rocky Mountains was made in 1863 by a Shuswap woman for two lost English adventurers. Like the elkskin map, it was of rivers and routes through very rugged terrain. Unfortunately, nothing more is known about it than that it was a route map and was "traced" and "rude." By inference from the text, it probably represented the upper Fraser and Canoe Rivers and the Thompson River from its source down to Kamloops.[211]

THE LEWIS AND CLARK EXPEDITION

The Lewis and Clark expedition of 1804–6 passed through the Plateau culture region in what now comprises Montana, Idaho, Washington, and Oregon. The journals often mention Indians making maps. The most authoritative published edition reproduces eight of these, cautiously consolidating them in the atlas volume as "Sketches from Indian Information" and not as "Indian Maps." The reason given is that

> some of the Indian sketches were no more than rude drawings on animal skins or stick scratches in the dirt to show rivers, with small mounds of earth piled up to represent mountains. Perhaps a number of the native drawings were never transferred to paper, and today not one of them exists in its original form. What we have in available maps is a combination of shared knowledge. Terrain was recorded on paper from the actual observations of the Corps [of Discovery], with peripheral areas added on the basis of data supplied by the most reliable Indian informants the Captains [Meriwether Lewis and William Clark] could quiz along the trail.[212]

In total, however, the "peripheral areas" were enormous. Clark's final cartographic compilation contains considerable topographic and hydrographic information for vast areas between the traverses and to the north and south of them.[213] Incorporations of Indian information was far more frequent and embraced much larger areas than has been generally recognized, but it is often difficult to distinguish between European and Euro-American, native, and modified inputs.

Stylistically, too, it is difficult to pinpoint Indian contributions. Observations on terrain representation based mainly on transcripts can never be the foundation for firm conclusions. For example, several of the transcripts of Indian maps made by Lewis and Clark have linear sequences of hill-in-profile pictographs not dissimilar to those on the extant copies of maps by Ki oo cus (fig. 4.62 below) and of Meatonabee and Idotlyazee (fig. 4.81 below), but they are remarkably similar to the terrain representations on many of the sketch maps made by Lewis and Clark themselves. Since the explorers merely made traverses, however, with remarkably few lateral journeys, it is arguable that most of the content of their sketch maps was derived from unacknowledged Indian information.[214] The evidence is inconclusive.

A rare North American example of a cartographic artifact on horn or bone is also associated with the Lewis and Clark expedition. There is a tradition that Sacagawea, the Shoshone wife of a member of the Lewis and Clark expedition, made an engraving on moose antler that had maplike qualities (fig. 4.49). The supposed cartographic component is a sequence of 112 drilled holes approximately paralleling the distal and lateral edges of the antler, with approximately every tenth hole larger than its neighbors. According to the tradition associated with the extant artifact, the sequence represents the progress of the expedition as experienced by Sacagawea. The

210. Aubrey L. Haines, ed., *Osborne Russell's Journal of a Trapper* (Portland: Champoeg Press for Oregon Historical Society, 1955), 27.

211. William Fitzwilliam Milton and Walter B. Cheadle, *The North-west Passage by Land,* 8th ed. (London: Cassell Petter and Galpin, 1875), 262.

212. Gary E. Moulton, ed., *The Journals of the Lewis and Clark Expedition,* 8 vols. (Lincoln: University of Nebraska Press, 1983–93), 1:10–11.

213. William Clark, A Map of Part of the Continent of North America (1810), manuscript, 73.7 × 129.5 cm, William Robertson Coe Collection, Yale University. Reproduced in Moulton, *Lewis and Clark Expedition,* vol. 1, map 125.

214. See James P. Ronda, "'A Chart in His Way': Indian Cartography and the Lewis and Clark Expedition," in *Mapping the North American Plains: Essays in the History of Cartography,* ed. Frederick C. Luebke, Frances W. Kaye, and Gary E. Moulton (Norman: University of Oklahoma Press, 1987), 81–91. Most of the maps relating to the expedition are reproduced in Moulton, *Lewis and Clark Expedition,* vol. 1 (atlas). The lines of hill-in-profile symbols on, for example, "Sketch given us May 8th 1806 by the *Cut Nose,* and the brother of the *twisted hair,*" and "This Sketch was given by Sundery Indians of the Chopunnish Nation together on the 29th 30th and 31st of May 1806 at our Camp on the Flat Head River" (maps 98 and 101) are not significantly different from those on the explorers' own route maps (e.g., maps 75 and 104).

holes, however, are not arranged in a pattern that even approximates the geometry of the route, a round-trip journey of 498 days, in which the return trip was nearly 50 percent different from the outgoing one. The holes are too few to have recorded each day of the expedition and too many to have recorded the number of lunar months. They could have been a record of the number of camps, but that does not explain the larger holes or their fairly regular spacing. If the drilled moose antler is genuine and was made by Sacagawea to record her progress on the expedition, it seems much closer in function to mnemonic devices for recalling sequences of stopping places than to records of the route connecting them.

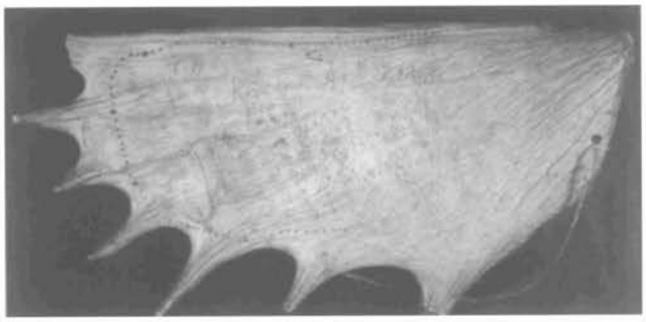


FIG. 4.49. MOOSE ANTLER SUPPOSEDLY ETCHED WITH A RECORD OF A JOURNEY, PERHAPS 1805–6. Etched moose antler, with a series of drilled holes around its edge, said to have been made by the Shoshone Sacagawea, wife of Toussaint Charbonneau. Sacagawea accompanied her husband on the Lewis and Clark expedition and supposedly kept the antler as a record of the experience. Even if authenticated, this seems to be more a calendric record than a map.
Current location unknown. Photograph courtesy of the University of California Library, Berkeley (Map Collection).

OTHER MAPS ON PAPER

The larger of two maps made in 1869 by Kohklux, a Chilkat chief from the Northwest Coast culture area, represented the route he took with his father in 1852 from the Chilkat River in northern British Columbia to attack and burn Fort Selkirk in the Yukon Territory (fig. 4.50). Drawing the map took him three days, assisted by his two wives, all "lying upon their stomachs making the drawing and discussing every feature." Although "he had never held a pencil and paper before . . . [he] betrayed no sign of satisfaction but his wives were evidentl[y] exultant."[215] The first part of the journey was through spectacularly glaciated mountains, and these appear to be depicted as profiles proportional to their mass and appearance as seen from adjacent valleys or plains. Sawtooth and occasional rounded profiles are named in what are presumably transliterations of Tlingit (Chilkat) toponyms. Furthermore, the profiles are shaded in pencil down to the level of the valley floor. For some reason, which might be apparent in the field, there are subtle gradations in the density of the shading (see detail, fig. 4.51). The general impression the map gives is of varying land form and mass.

Ishi, the last of the Yahis, drew a map of the northeastern part of California at the University of California, Berkeley, about 1914 (fig. 4.52). Essentially straight parallel rivers, rising in the Sierra Nevada, flow west into a straight, north-south oriented Sacramento River. There is some evidence that rivers separated native territories, for example, Battle Creek separating the Gari'sis (Galice) from the Southern Yanas and Butte Creek separating the Maidus from the Feather River Maidus. Even if this was the case, however, at least two of the creeks enter the territory of another group in their lower courses. Unfortunately these speculations cannot be tested on the evidence of the map alone. The original is not extant, and the published line drawing of 1925 has the characteristics of a period when clarity took precedence over authenticity and letter styles proliferated, often for no obvious reason.[216]

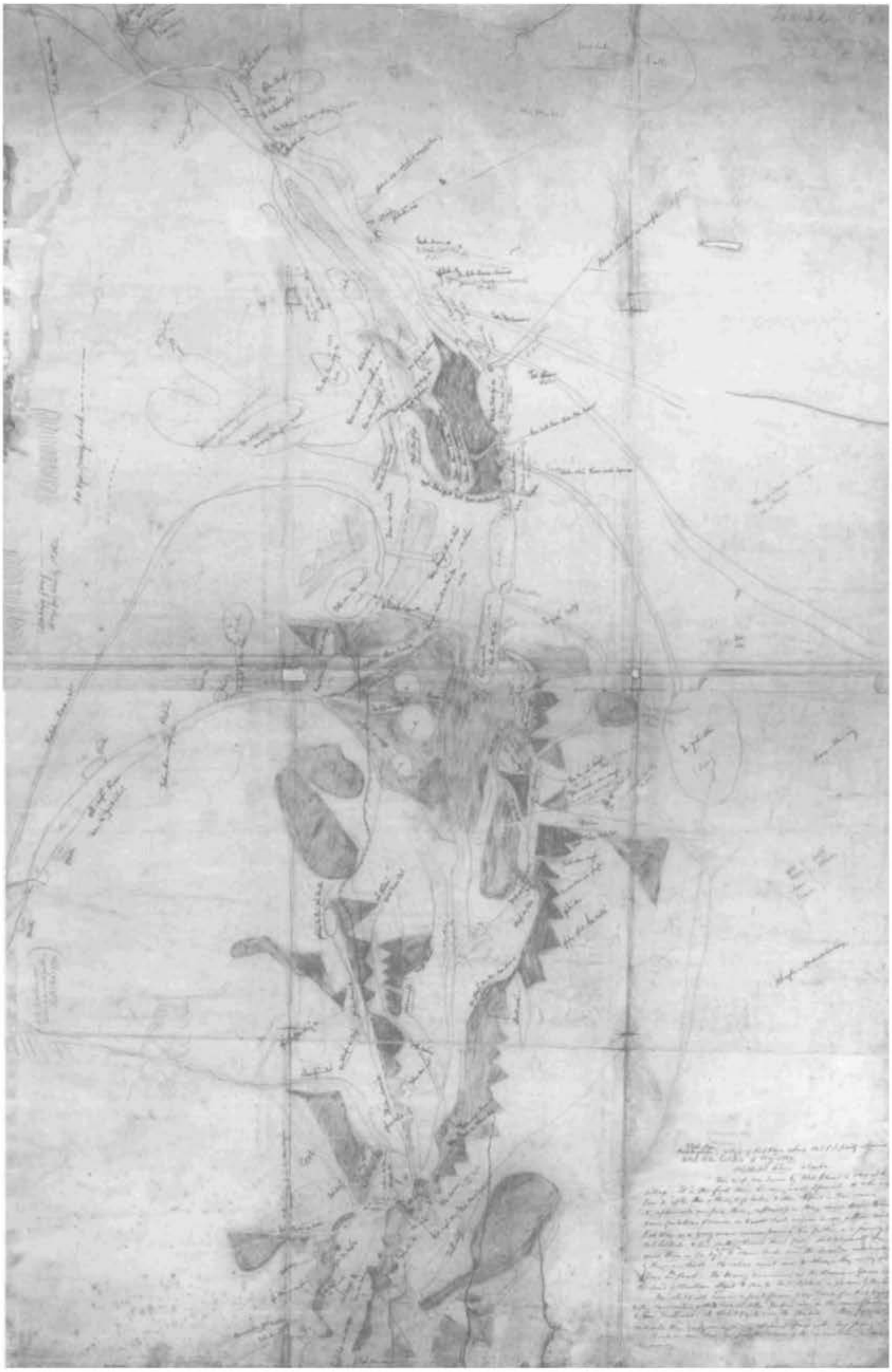
GREAT PLAINS AND CANADIAN PRAIRIES

The most distinctive cartographic artifacts among the Indians of the Plains are part of a rich tradition of pictorial depiction of historical and contemporary events in this region. Experiences of hunting and war were traditionally painted on animal hides, although all surviving pictorial works with maplike features were made after European contact. In the nineteenth century, men (figurative art was exclusively in the male domain) also made similar drawings on paper in watercolor or colored pencil, referred to generically as "ledger art" because the drawings were often made in notebooks.[217] Some of these records on hide or paper use cartographic principles to give spatial struc-

215. George Davidson, "Koh-Klux Map of 1869. first draft. Oct./97," Davidson Papers, Bancroft Library, University of California, Berkeley, carton 8 (pp. 8–9). A transcript of the map, with a briefer account of its making, was later published: George Davidson, "Explanation of an Indian Map," *Mazama* 2 (1900–1905): 75–82.

216. Kroeber, *Indians of California,* 344–46 (note 189). See also Theodora Kroeber, *Ishi in Two Worlds: A Biography of the Last Wild Indian in North America* (Berkeley: University of California Press, 1961), 215.

217. See *The Arts of the North American Indian: Native Traditions in Evolution,* ed. Edwin L. Wade (New York: Hudson Hills Press, 1986), especially Gloria A. Young, "Aesthetic Archives: The Visual Language of Plains Ledger Art," 45–62. See also Janet Catherine Berlo, ed., *Plains Indian Drawings, 1865–1935: Pages from a Visual History* (New York: Harry N. Abrams in association with the American Federation of Arts and the Drawing Center, 1996), esp. 219. Although Plains Indians produced most of the pictorial maps, and by far the best ones, a few earlier examples are known from elsewhere. See, for example, figure 4.27 and also the account of the two transcripts of the Chickasaw map of about 1723, where it is conjectured that the presence of two pictographic drawings could be construed to mean the original contained more.



(*Facing page*)
FIG. 4.50. MAP MADE BY KOHKLUX AND HIS TWO WIVES OF HIS JOURNEY ACROSS THE COAST MOUNTAINS AND YUKON PLATEAU, 1869. Manuscript map in pencil with annotations in ink by George Davidson. Kohklux was a Chilkat (Tlingit) chief. "This map was drawn by Kohklux in 1869 at his village. It is the first time he ever used a pencil" (from endorsement on map). The map represents Kohklux's journey of seventeen years before; the outward and return routes between the Chilkat River, northern British Columbia, and Fort Selkirk, Yukon Territory. Kohklux and his father had taken the outward route in 1852 on their way to burn Fort Selkirk, some five hundred kilometers to the north. The first part of the journey of 1852 was through spectacularly glaciated mountains, hence the preponderance of serrated profiles in this part. If it can be demonstrated that the profiles do represent the views as seen from the valley floors, then they reflect remarkable feats of memory. Most of the route was to the north of Tlingit (of which the Chilkat were members) territory.
Size of the original: 109 × 67 cm. Photograph courtesy of the Bancroft Library, University of California, Berkeley (G4370 1852.K6 case XD).

FIG. 4.51. DETAIL OF THE SOUTH-CENTRAL SECTION OF FIGURE 4.50. This is the heavily, and in places actively, glaciated part of the Coast Mountains around the head of Lynn Canal. "Coal" (lower left) was perhaps the first indication of bituminous coal later to be proved in the area.
Size of the detail: ca. 28 × 26 cm. Photograph courtesy of the Bancroft Library, University of California, Berkeley (G4370 1852.K6 case XD).

ture to their message. Other maps on hide and paper, few in number but particularly interesting, appear to elucidate cosmographic beliefs about the relation between heaven and earth, although there is still much to learn about the provenance of these maps. As in other regions of North America, there is also a body of maps created in the process of contact and conquest, made at the request of explorers and surveyors or to document territorial claims.[218]

PICTORIAL MAPS

The earliest known example of a pictorial work with cartographic elements is an eighteenth-century painted bison hide representing Indian warriors following a route to attack and defeat their enemies (plate 6). Although there is uncertainty about some of the places and events depicted, it shows

> two feathered calumets, a battle between Indians, a scalp dance in which men and women are participating, four Indian villages, a French village or fort, and representations of the sun and moon. Above three of the villages are written the words Ackansas, Ouzovtovovi, Tovarimon, and Ovoappa. Ackansas (Arkansas), of course, is the generic name that the Illinois Indians (and thus the French) applied to the Quapaw Indians; the other words are the names of the three Quapaw villages of the eighteenth century.[219]

The villages and fort are arranged around the two flanks and hindquarters of the skin; hence they are not planimetrically organized. They are, however, linked by a line that apparently represents a journey undertaken by a group of Quapaws from three villages via a French settlement to confront another group of Indians in an area of trees beyond which is another village. The toponyms may have been added later for each of the Indian villages; the French settlement is almost certainly Arkansas Post. The battle is probably one (or perhaps an amalgam) of several in which the Quapaws defeated the Chickasaws in the mid-1740s.[220]

218. For an earlier review of the maps of this region see Lewis, "Indian Maps" (note 2). There is a recent, detailed analysis of two nineteenth-century pictorial maps by a Northern Cheyenne scout: Glen Fredlund, Linea Sundstrom, and Rebecca Armstrong, "Crazy Mule's Maps of the Upper Missouri, 1877–1880," *Plains Anthropologist* 41, no. 155 (1996): 5–27.

219. Morris S. Arnold, "Eighteenth-Century Arkansas Illustrated," *Arkansas Historical Quarterly* 53 (1994): 119–36, esp. 119. For an expanded and revised analysis, see the same authors' "Eighteenth-Century Arkansas Illustrated: A Map within an Indian Painting?" in *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use*, ed. G. Malcolm Lewis (Chicago: University of Chicago Press, 1998), chap. 8.

220. Arnold, "Arkansas Illustrated" (1994).

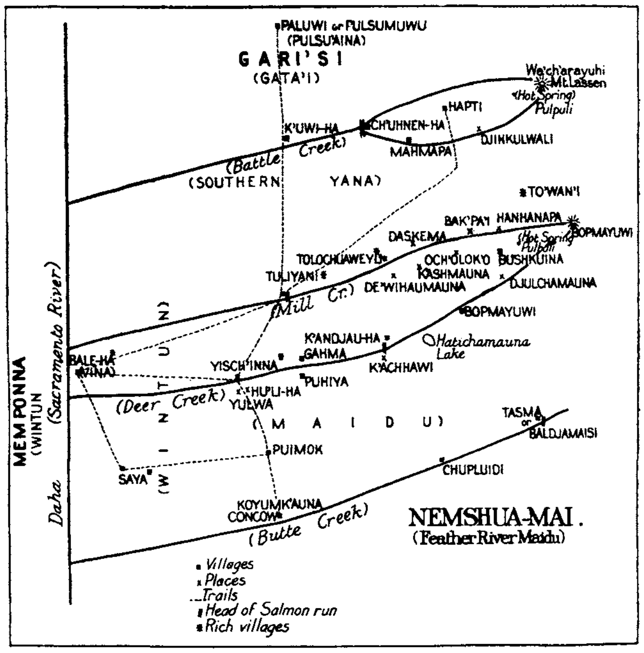


FIG. 4.52. MAP OF INDIAN TERRITORIES TO THE EAST OF THE UPPER SACRAMENTO RIVER, CALIFORNIA, BY ISHI. Discovered near Oroville in 1911, Ishi, the last of the Yahis, was taken to the Museum of Anthropology, San Francisco, where he died of tuberculosis five years later. During these years, he supplied information to Alfred L. Kroeber and T. T. Waterman, cultural anthropologists at the University of California, Berkeley. In 1914 Ishi was a member of an expedition to his people's former territory between Mill Creek and Deer Creek. The expedition "led by Ishi . . . covered a large part of Yahi ancestral territory, mapped it in detail, with village sites, trails, hidden brush shelters, and the smoke-lined caves . . . exactly located and named. On the maps were more than two hundred native place names" (Theodora Kroeber, *Ishi in Two Worlds: A Biography of the Last Wild Indian in North America* [Berkeley: University of California Press, 1961], 215–16). The precise nature of Ishi's mapping input is unknown. The field maps have apparently not survived. Either they or a smaller map by Ishi seem to have been the basis for the map shown here.
From A. L. Kroeber, *Handbook of the Indians of California*, Bureau of American Ethnology Bulletin 78 (Washington, D.C.: United States Government Printing Office, 1925), 344 (fig. 32).

In the nineteenth century, examples of cartographic elements in ledger art can be seen in two works by the Southern Cheyenne Howling Wolf the Nostalgic (Honanistto). In 1875 Howling Wolf and his father, Chief Minimic (Eagle Head), were among seventy-two members of an alliance of Kiowas, Comanches, Cheyennes, and Arapahos sent from Indian Territory for confinement at Fort Marion (in St. Augustine) on the Atlantic coast in northeast Florida. Their "crime" was refusing to be assigned to a reserve. The captives were offered the material and opportunity to produce artworks for sale. Some, mainly the younger men and those with a tradition of figurative art, took up the offer, including Howling Wolf, who continued to draw and paint after his return to Indian Territory in 1878.[221]

In 1877 Howling Wolf was sent by sea from Fort Marion to Boston, Massachusetts, for treatment to his eyes. En route north along the Florida–Georgia–South Carolina coast he sent a one-cent prepaid postcard to his father at Fort Marion, addressed by an unknown person care of "Capt. Pratt, U.S.A., St. Augustine" (fig. 4.53).[222] Drawn in pencil (the numbers in ink relating to an explanatory key were added later), the message is a pictorial event map representing Howling Wolf's observations and experiences as far as a point off the South Carolina coast somewhere north of Savannah. The delineation of the coast is a bold and undifferentiated line with a pattern not readily relatable to the actual coastline between St. Augustine and a point north of Savannah. Three exaggerated estuaries are shown: probably the St. Johns River, perhaps the Altamaha, and almost certainly the Savannah.

A series of pen and watercolor sketches recording prereservation life made by Howling Wolf between 1878 and 1881 are considerably more elaborate than the informational picture map sent to his father. The first two, painted on facing pages in the ledger book, use landscape and directional elements to set the stage for historical events (figs. 4.54 and 4.55). The setting of figure 4.54 is a classic Plains landscape: a meandering river with floodplain on one side, undercut bluffs with trees on the other, and plateau plains beyond. Bison are shown moving single file from the plateau plains either to the shelter of the trees or to water by the river. Contemporary captions written by Ben Clark, the translator at Fort Reno, identified the first two paintings as "the first white man" at the Missouri River and "the first horses" acquired by the Cheyennes.[223] Recent scholarship, however, has questioned the accuracy of Clark's captions, suggesting instead that the event recorded in the second sketch is the 1840 peace settlement among Plains Indians on the Arkansas River, identified by a flint arrowpoint pictograph. Szabo suggests that the first and second sketch may be parts of a single composition, with the first showing preparation for the gift exchange that accompanied the treaty.[224]

221. Joyce M. Szabo, *Howling Wolf and the History of Ledger Art* (Albuquerque: University of New Mexico Press, 1994), 67–68, 85–95. Several of Howling Wolf's drawings are reproduced in Berlo, *Plains Indian Drawings* (note 217), of which catalog numbers 50 and 55 are in part cartographic.

222. Reproduced with detailed caption in Karen Daniels Petersen, *Plains Indian Art from Fort Marion* (Norman: University of Oklahoma Press, 1971), pl. 43 (p. 224); biographical details on 221–22.

223. Karen Daniels Petersen, *Howling Wolf: A Cheyenne Warrior's Graphic Interpretation of His People* (Palo Alto, Calif.: American West, 1968), 34–40.

224. Szabo, *Howling Wolf*, 131–35 (note 221).

FIG. 4.53. PICTOGRAPHIC MESSAGE REPRESENTING A VOYAGE OF HOWLING WOLF. The message, dated July 1877, was drawn on a postcard sent from the Cheyenne Ho-nanistto (Howling Wolf the Nostalgic), at sea off the coast of South Carolina, to his father, Chief Minimic (Eagle Head) at Fort Marion, St. Augustine, Florida. The voyage was along the coast of northeastern Florida, Georgia, and southeastern South Carolina. The inked numbers were added later. Several aspects of the drawing are important from the perspective of cartography. Howling Wolf's father, Minimic, would recognize himself by his totem: the eagle head (2). He would also know to mentally situate himself in Fort Marion because of three distinctive landscape features: a striped lighthouse, watchtower, and cleated flagpole, the last two on a rampart (1). The number and spread of dots and dashes around the single building representing each of the five urban settlements (3s and 4) probably indicated Howling Wolf's perception of the towns' importance, extent, or population. Finally, on a coastline extending for approximately 250 kilometers, disregard for linear scale is revealed by the representation in some detail of Howling Wolf's transshipment on the quay at Savannah (4), involving a walk (dashed line) from a smaller to a larger steamer (5). The howling wolf totem over the latter would leave Minimic in no doubt about who was on board, and the steamer's orientation would confirm that his son was still sailing away from Fort Marion.
Size of the original: 7.7 × 13.3 cm. Photograph courtesy of the Massachusetts Historical Society, Boston (Francis Parkman Papers).

A picture map made between 1890 and 1913 by Amos Bad Heart Bull, an Oglala Sioux, retrospectively depicts the location of several groups of Plains Indians assembled in 1876 for the Black Hills Peace Talks (fig. 4.56). Representatives of six nations are assembled in eight camps on a broad bench separating the foot of the Pine Ridge escarpment from the shallow but steep-sided inner valley of the White River. Other topographic details include tributary creeks of the main river and several insular buttes. Vegetation is represented by symbols: a coniferous tree symbol (pine) on Pine Ridge and the flanks of Crow Butte; a deciduous tree symbol (cottonwood) in the inner valleys of the White River and its creeks. Although the original, which was mostly in black ink with touches of six colors, is recorded only in a black-and-white photograph,[225] it is fairly certain that the conifers were depicted in one color (perhaps dark green), the cottonwoods in a lighter color (perhaps light green), and the benchlands in a third color. It is a portrayal of what ecologists later recognized as the three classic ecosystems of the Great Plains, each closely associated with a distinctive site. To

225. Amos Bad Heart Bull's drawings were made in a ledger between 1891 and his death in 1913. The ledger was inherited by his sister, Dollie Pretty Cloud, and buried with her on her death in 1941. The ledger was studied by Helen Blish, University of Nebraska, between 1927 and 1940 and was photographed in black and white in 1927. Blish compiled information about the colors and techniques used in the drawings; see Amos Bad Heart Bull, *A Pictographic History of the Oglala Sioux,* text by Helen H. Blish (Lincoln: University of Nebraska Press, 1967), 513–27 (appendix).

FIG. 4.54. SKETCH FROM THE FIRST PAGE OF HOWLING WOLF'S LEDGER, CA. 1880. Although said by a contemporary non-Indian to represent the first meeting of the French with the Cheyennes, which took place on the upper Missouri River about 1743, it may instead represent, with figure 4.55, a Plains Indian peace conference in 1840. Whereas most of the sketch is in profile or oblique perspective, the river and tracks–bison, dog, and human–appear to be in plan. Ink and watercolor on paper.
Size of the original: 19 × 26 cm. Photograph courtesy of the Joslyn Art Museum, Omaha (JAM.1991.19, gift of Alexander M. Maish in memory of Anna Bourke Richardson).

Bad Heart Bull these were part of the topographical background to an important event in his nation's history, placing it in the context of a landscape that still existed.

The expression of cosmographical beliefs is another part of the pictorial tradition of Plains Indians. Because such beliefs are now neither completely known nor understood, their expression in maps may remain unrecognized. A case of cosmographic content recently revealed can be seen in another work by Bad Heart Bull, which is primarily a depiction of place rather than event. Drawn sometime between 1891 and 1913, it is centered on the Black Hills, South Dakota (fig. 4.57). The drainage pattern of the area is represented with great accuracy, together with meridians 103° and 104° west. These are derived from Euro-American constructions and in complete contrast to the dense and pictographic representation of the Black Hills at the center. Blish described this central component as a "typically imaginative, topographical representation" and pointed to the gross error whereby uniquely shaped Devils Tower (called Maṫo tip̄i p̄aha [Bear Lodge Butte] by the Lakotas), in reality sixty kilometers northwest of the Black Hills and to the north of the upper Belle Fourche River (North Cheyenne), is represented well within the confines of the Black Hills and just to the south of the middle section of the river.[226] A recent interpretation, however, has revealed that it was not an error but an expression of the cosmographical principle of mirroring. The Lakotas

> felt a vivid relationship between the macrocosm, the star world, and their microcosmic world on the plains [of South Dakota]. There was a constant mirroring of what is above by what is below. Indeed, the very shape of the earth was perceived as resembling the constellations. For example, the red clay valley which encircles

226. Bad Heart Bull, *Pictographic History*, 289–90.

FIG. 4.55. SKETCH FROM THE SECOND PAGE OF HOWLING WOLF'S LEDGER, CA. 1880. See figure 4.54. Size of the original: 19 × 26 cm. Photograph courtesy of the Joslyn Art Museum, Omaha (JAM.1991.19, gift of Alexander M. Maish in memory of Anna Bourke Richardson).

> the Black Hills looks like (and through Oral Tradition is correlated with) a Lakota constellation which consists of a large circle of stars.[227]

The great circle of stars formed by Sirius, Procyon, Castor, β Aurigae, Capella, Pleiades, and Rigel is called the Race Track or Sacred Hoop. Its mirror on earth is the red clay valley encircling the entire Black Hills, which forms a sacred enclosure. In Lakota theology all of life occurs within an unending circle of time, space, matter, and spirit. Hence the Black Hills are viewed as the microcosmic hoop out of which new life is born each year. Specific topographic features within the hills are equated with celestial features and the traditions associated therewith. In addition, one landmark outside the Black Hills also has such an association–Devils Tower. A constellation consisting of eight of the stars in Gemini, just within the Race Track, is associated with the tradition whereby Fallen Star saved a brother and sister from being attacked by bears, and this tradition on earth is associated with Devils Tower.[228] In placing that feature within the valley, Amos Bad Heart Bull was acknowledging that the spiritual world was superior to the intellectual or physical world. In short, theology overrode topology. For Euro-Americans, confusion between the natural and spiritual-mythological worlds could lead to serious misunderstandings of Native American representations. A more enlightened interpretation now recognizes that terrestrial, celestial, and mythological worlds can coexist.[229]

A late example of a map depicting historical events was produced by Sitting Rabbit, a Mandan, in 1906 as part of a commission from the State Historical Society of North Dakota (fig. 4.58). The genesis of this map of the Missouri River in North Dakota, and the fact that its eleven segments correspond to a sectional chart published by the Missouri River Commission between 1892 and

227. Goodman, *Lakȟota Star Knowledge,* 1 (note 18).

228. Goodman, *Lakȟota Star Knowledge,* 4 and 7.

229. For example, in some southwestern sandpaintings.

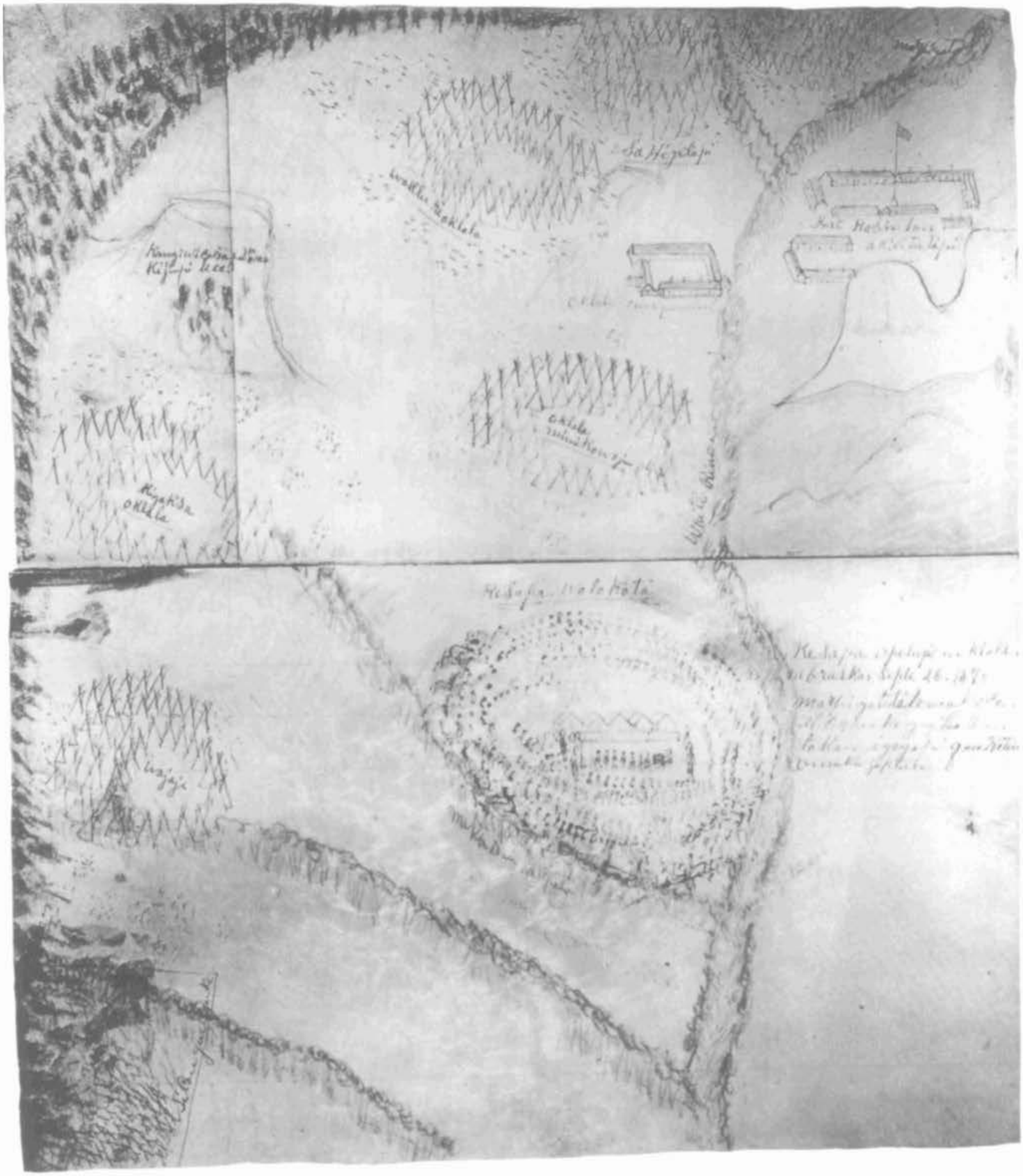


FIG. 4.56. AMOS BAD HEART BULL'S MAP OF THE SETTING OF THE BLACK HILLS CONFERENCE OF 26 SEPTEMBER 1876. Oglala Sioux, manuscript, ink and crayon on paper, drawn between 1891 and 1913. Fort Robinson, the several camps of participating Indians, and the peace talks on the upper White River, in what is now southwestern South Dakota, are presented in the context of three classic western Great Plains ecosystems: pine-covered escarpments and buttes, grassy benchlands, and cottonwood-floored valleys. The original was interred with Bad Heart Bull's sister.

Size of the original: probably 35.6 × 30.5 cm. Reproduced from Amos Bad Heart Bull, *A Pictographic History of the Oglala Sioux,* text by Helen H. Blish (Lincoln: University of Nebraska Press, 1967), 287 (no. 197), by permission of the University of Nebraska Press. Copyright © 1967, renewed 1995, by the University of Nebraska Press.

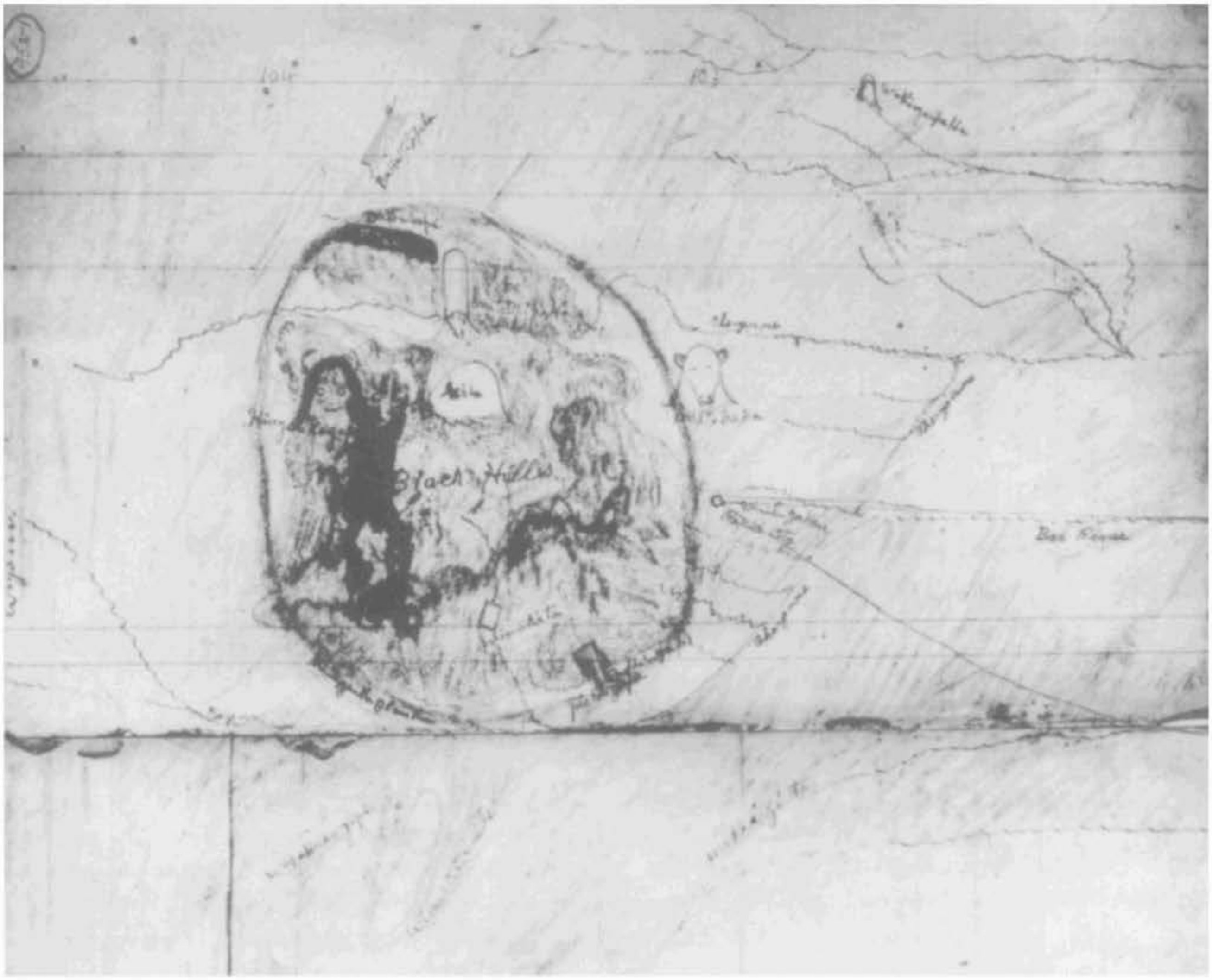


FIG. 4.57. AMOS BAD HEART BULL'S PARTLY PICTOGRAPHIC MAP OF THE BLACK HILLS, SOUTH DAKOTA, AND THE SURROUNDING PLAINS. The map is black ink and five colors of crayon in a large ledger, which was interred in 1947 with Bad Heart Bull's sister, Dollie Pretty Cloud, but it had been photographed in 1927. Oglala Sioux and made between 1891 and 1913, the map is a highly stylized, undoubtedly traditional, cosmographical representation of the Black Hills, placed in the spatial context of a surrounding drainage network copied, modified, or recollected from a survey map with American names, meridians, and survey lines.
Size of entire original: ca. 35.6 × 30.5 cm. Reproduced from Amos Bad Heart Bull, *A Pictographic History of the Oglala Sioux,* text by Helen H. Blish (Lincoln: University of Nebraska Press, 1967), 289 (no. 198), by permission of the University of Nebraska Press. Copyright © 1967, renewed 1995, by the University of Nebraska Press.

1895, suggests a strong Euro-American influence. Nonetheless, it represents in considerable detail conditions and events at several locations.[230]

CELESTIAL MAPS

Although only one example exists in a museum collection, Plains Indians also depicted celestial features on hides. These share their medium and a cultural and ritual purpose with early pictorial works. The extant example, made by the Skiri band of Pawnees, is part of a collection of ritual objects obtained from them at Pawnee, Oklahoma, in 1906, soon after they had moved there from the Platte Valley, and is known as the Big Black Meteoric Star

230. Thomas D. Thiessen, W. Raymond Wood, and A. Wesley Jones, "The Sitting Rabbit 1907 Map of the Missouri River in North Dakota," *Plains Anthropologist* 24, pt. 1 (1979): 145–67. In part, the purpose of that paper was to evaluate the utility of Sitting Rabbit's map as a source of archaeological information. For an evaluation of Indian maps as sources of archaeological information in another region, see Gregory A. Waselkov, "Indian Maps of the Colonial Southeast: Archaeological Implications and Prospects," in *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis (Chicago: University of Chicago Press, 1998), chap. 9.

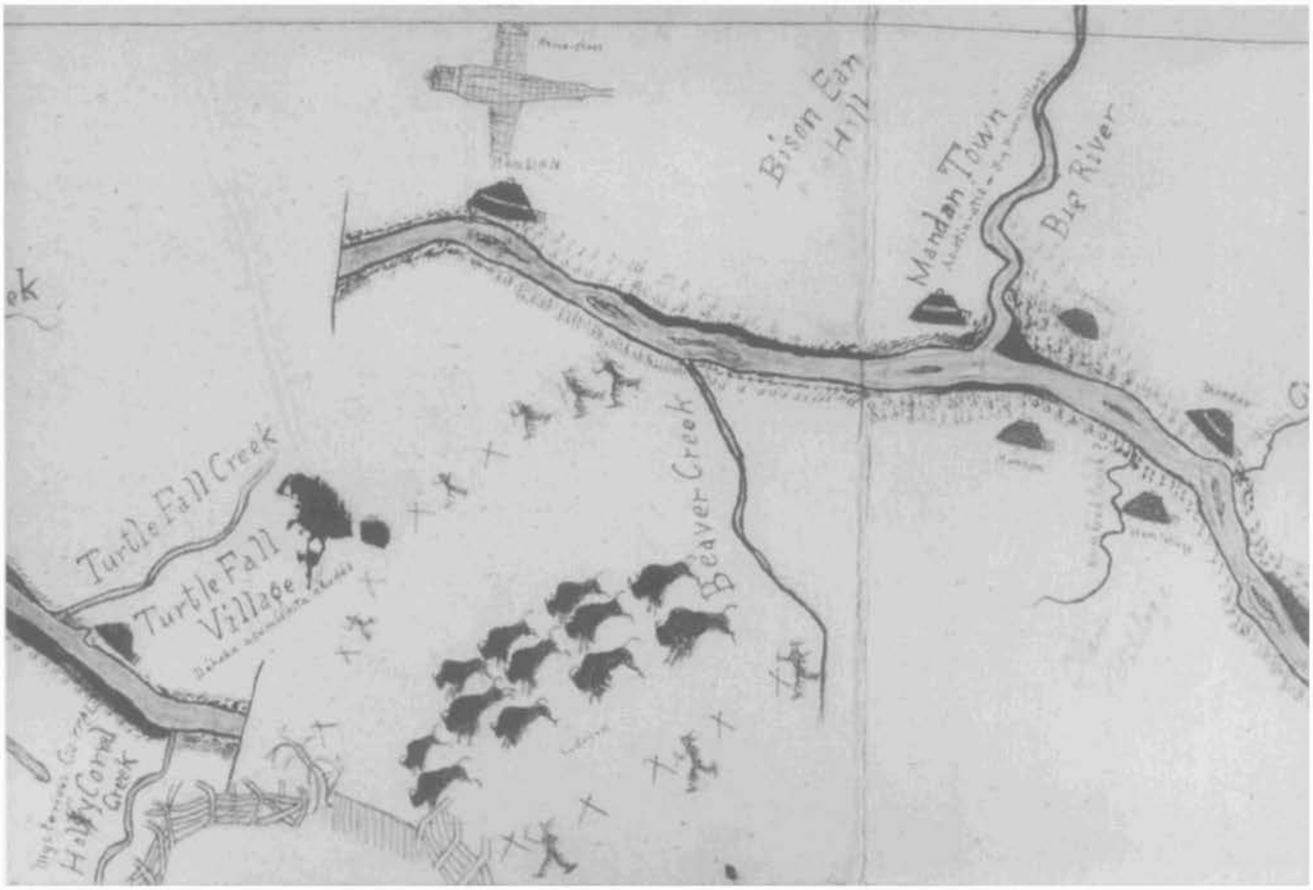


FIG. 4.58. DETAIL FROM A MAP PAINTED BY SITTING RABBIT OF THE MISSOURI RIVER IN NORTH DAKOTA, 1906–7. Mandan, untitled painting by Sitting Rabbit (I Ki Ha Wa He, also known as Little Owl) of the Missouri River from the Standing Rock Reservation to the mouth of the Yellowstone River. The Missouri River is represented in eleven discontinuous sections on one canvas. The planimetry was derived from the sheets of a sectional chart published for the War Department by the Missouri River Commission in 1892–95, but the other content is original. Content on this detail includes bison moving into a funnel of fencing and men and about to fall over a jump into a stockaded pound below near what is now Little Beaver Creek on the eastern side of the Missouri River opposite Standing Rock Indian Reservation; it also shows numerous former village sites, mainly Mandan, each represented by the profile of one or more earth lodges, some identified by their totems (for example, the crossed pair of snowshoes). Other parts of the map, not shown here, depict a trading post, symbolized by the end elevation of a log cabin; pictographs for several natural features, for example, a knife for Knife River and a bison head for Buffalo Head Hill; and grid patterns to indicate the plans of Euro-American settlements and Indian agencies.
Size of the entire original: 45.5 × 707 cm. Size of this detail: ca. 45.5 × 80 cm. Photograph courtesy of the State Historical Society of North Dakota, Bismarck (no. 679).

Bundle. The bundle was said to have existed before the band knew of Euro-Americans or even Europeans.[231] When acquired by the Field Museum of Natural History, Chicago, it contained what was identified as a star chart painted on skin (plate 7). It is not known when the chart came to be associated with the bundle, but its role is certainly long established and complex.

Among the Pawnees, sacred bundles were kept and used by priests who mediated between the people and the deities–stars and other celestial phenomena that controlled the weather and plant growth. Each bundle was cared for between ceremonies by the wife of its keeper, and there were strict rules about how it was to be kept.

> There were several types of these bundles, but, regardless of the type, they all had in common an origin that traced back to an earlier supernatural experience or encounter. . . . Contents common to all bundles

231. James R. Murie, *Ceremonies of the Pawnee*, 2 pts., ed. Douglas R. Parks, Smithsonian Contributions to Anthropology, no. 27 (Washington, D.C.: Smithsonian Institution Press, 1981), pt. 1, 96. The earliest direct contacts between Europeans and the Pawnee were by the French in 1714 (Etienne de Véniard, sieur de Bourgmont) and 1719 (Claude Du Tisne) and by the Spanish in 1720 (Pedro de Villasur). The Pawnees, however, probably knew of French activities in the middle Mississippi Valley as early as 1673, when Louis Jolliet and Jacques Marquette became the first Europeans to see the confluence of the Missouri River with the Mississippi.

were a pipe, tobacco wrapped in the pericardium of a buffalo, a braid of sweetgrass, paint, one or more ears of corn (referred to as "Mother Corn"), the skins of various birds and animals, and sometimes a scalp. Each bundle had additional contents that varied with the symbolism of its history and the particular needs of its rituals.[232]

Ralph Linton of the Field Museum described the star chart associated with the Big Black Meteoric Star Bundle:

a soft tanned skin, but the tanning has not been done very well, since patches of both the epidermis and the inner membrane still adhere. The skin appears to be antelope or deer, not buffalo. The chart is painted on what was the hair side. The outline of the chart and the stars are painted black. A narrow strip at one end (top) of the chart is painted red. At the opposite end there is a similar strip which seems to have been painted yellow or light brown. In the left hand sector is an oval figure, 1 inch (2.54 cm) long and ¾ inch (2 cm) wide, its long axis parallel to that of the chart, which seems to have been drawn with a heated bone point since the surface is depressed somewhat. Further, the chart seems to have been heavily coated with red paint, most of which has now worn off. Around its edges there are many small slits through which a drawing string was originally passed. Only a fragment of the string remains. The discolorations on both sides of the chart show that the edges were drawn as for a bag.[233]

Although known as a star chart, the painted hide was meant not primarily to show the locations of stars and constellations, but to serve as a mnemonic for mythology and cosmology, both closely tied to astronomical phenomena.[234]

In order to comprehend indigenous maps, it is necessary to understand indigenous architecture, material culture, and ritual. The Pawnee star chart is not merely a map of the celestial sky. Its direct uses are as a beacon for heavenly forces, as an earthly guide, as a symbol of cosmological unity, and as a flag of identity during the Thunder and/or Great Washing ceremonies. However, it is symbolically associated and interchangeable with the artifacts from the Big Black Meteoric Star bundle and the Pawnee earth lodge. Therefore, the Pawnee star chart must be taken as a package with those items.[235]

A recently published discussion of celestial maps among the Lakota has shed further light on the principles and practices behind cosmographical mapmaking. Research for a book on Lakota stellar theology uncovered the existence of paired earth and sky maps on tanned hides, which, in the words of the elder Stanley Red Bird, "were really the same, because what's in the stars is on the earth, and what's on the earth is in the stars." On another hide, star and earth maps are said to be combined, with earth sites represented by a triangle pointing up and celestial sites by an inverted triangle. "These shapes are not to be understood as flat triangles, but as cones, as vortices of light." The unnamed keeper explained that "without proper instruction it wouldn't even be recognized as a star map. Asked to explain why, he replied that this was partly because the stars as they are drawn on the robe look like a pie wedge or long triangle. He added that the shape on earth they most resemble is the cottonwood leaf twisted into the form of a tip̄i."[236] This interpretation underscores the importance of individuals who preserved both artifacts and interpretations. Like the Ojibwas', Plains Indians' traditions were often preserved by specially appointed custodians, and there is occasional evidence that this custom continues. The late date at which knowledge of the paired maps came to light is evidence of the secrecy with which artifacts like these are preserved. The practice, long concealed from Euro-Americans, of correlating patterns of stars seen in the sky with spatial patterns of earth features that were too extensive to have been seen in perspective must have been constructed in the course of accumulated experience over many generations.

For both the Lakotas and the Skiri Pawnees, star charts represented a celestial macrocosm that was mirrored in part by their microcosm: the architectural structures and lodge distribution patterns of their village world. The function of Plains Indians' sky charts was primarily, if not exclusively, to record cosmographic principles for succeeding generations.

MAPS MADE FOR EURO-AMERICANS: THE SEVENTEENTH CENTURY

As in other regions, there is a body of maps made by Plains Indians to communicate with Euro-Americans. Those that are extant survive only as transcripts made by the authorities they were drawn for. The earliest example (indeed, the earliest extant for all of North America) was drawn in April 1602 by a captive Plains Indian called Miguel, who was being interrogated in Mexico City by Don Francisco de Valverde. Valverde was conducting an inquiry into the Juan de Oñate expedition, which had captured Miguel the previous autumn. In the course of

232. Murie, *Ceremonies of the Pawnee,* pt. 1, 13.

233. Murie, *Ceremonies of the Pawnee,* pt. 1, 180 n. 46.

234. Von Del Chamberlain, *When Stars Came down to Earth: Cosmology of the Skidi Pawnee Indians of North America* (Los Altos, Calif.: Ballena Press, 1982), 184–205; Parks, "Interpreting Pawnee Star Lore," 63–64 (note 14); and Chamberlain, "Chief and His Council," 231–32 (note 12).

235. Gartner, "Pawnee Cartography," 40 (note 15).

236. Goodman, *Lakota Star Knowledge,* 16 and 18 (note 18).

the interrogation, Miguel drew a map, and a manuscript transcript of it was made on 11 May 1602 (fig. 4.59).[237] The orthography of Indian names and the referents of several named rivers have never been satisfactorily resolved. The main network of rivers and trails seems to link places, peoples, and features as far apart as the upper Pecos Valley, either an east bank tributary of the Arkansas River in what is now northeast Oklahoma or the Trinity River south of Dallas, and another Texas river, and there is also an inset map (center left) of a reported placer gold mining region somewhere in what must have been Mexico. Excluding this Mexican detail, Miguel's map probably embraced more than 200,000 square kilometers. Since we do not have the original that Miguel drew, we can only speculate on what it looked like. Transcribing no doubt screened out indigenous iconography and unwanted or ambiguous information from Miguel's original when it was transcribed a few weeks later by Hernando Esteban, the royal notary.

The transcript of the interview with Miguel reported that when asked to mark "the pueblos of his land," he drew circles, "some larger than others," connecting them with a network of "caminos" (trails). Miguel later supplemented the map gesturally. He noted that the pueblos contained "many people, emphasizing their number by gestures." He also showed how far it was between the various places in days of travel. He apparently indicated this not on the map but by "counting the days with kernels of corn."[238] The map contains a key: one very large circle representing the population of the city of Mexico and three smaller but approximately equal ones representing the three settlements in what is now northwestern Mexico, via which Miguel's captors had brought him to their city. Assuming the contemporary transcript is a reasonable copy of Miguel's original, the message seems to be that none of the settlements in his land were as populous as Mexico City; they differed only slightly among themselves; and they were comparable to or slightly smaller than the three settlements in northwestern Mexico. Although Miguel may have had a precise knowledge of the population sizes of the pueblos of his lands, his experience of the three settlements in northwestern Mexico could only have been brief and his knowledge of them must have been impressionistic.

Another mapping event was described at the same inquiry. Asked why the Oñate expedition had turned back, Juan Rodríguez stated that "it was because of the information they had received of so many people in the settlement as well as farther on and because there were reports that many people were assembling to attack us." The information had been given by unspecified Plains Indians who "told of the large settlements toward the north [and] marked them by placing seventeen kernels of corn on the settlement where they were, and seven hundred on each of those in the north, thereby giving us to understand that they were that much larger than the settlement we had discovered. They also traced many rivers on a piece of paper that the maese de campo gave them, saying that those settlements were located on them." The small settlement where the map was made was almost certainly depicted on the Rasguño de las Provincias del Nuevo Mexico, a 1602 manuscript map by Enrico Martínez that was "apparently the earliest map now still in existence portraying actual, on-the-spot observation of any part of the American Transmississippi West."[239] The European map represents the small settlement, identified as "pueblo de nuevo descubrim[to]," by means of twenty-three small triangles, not seventeen as the reported number of kernels might have led one to expect. Most, but not all, of the other settlements on the map are represented by European-style symbols.[240]

Another event is associated with French exploration into the interior. In 1688 or 1689, Louis Armand de Lom d'Arce, baron de Lahontan, ascended the lower Minnesota River. On his return trip he was visited by a large party of Gnacsitares, accompanied by four Mozeemlek slaves, from the northeastern edge of the Great Plains. The slaves gave him "a Description of their Country, which the *Gnacsitares* represented by way of a Map upon a Deer's Skin."[241] The skin did not survive, but the map

237. Hammond and Rey, *Don Juan de Oñate,* 2:871–77 (note 188). Surprisingly, the map was not reproduced in this definitive edition, yet it had been available in a modern transcript from since the early twentieth century: Woodbury Lowery, *The Lowery Collection: A Descriptive List of Maps of the Spanish Possessions within the Present Limits of the United States, 1502–1820,* ed. Philip Lee Phillips (Washington, D.C.: Government Printing Office, 1912), 104–5. The original was not reproduced until 1982: William W. Newcomb and T. N. Campbell, "Southern Plains Ethnohistory: A Re-examination of the Escanjaques, Ahijados, and Cuitoas," in *Pathways to Plains Prehistory: Anthropological Perspectives of Plains Natives and Their Pasts,* ed. Don G. Wyckoff and Jack L. Hofman (Duncan, Okla.: Cross Timbers Press, 1982), 29–43, esp. fig. 1. See also Lewis, "Indian Maps" (note 2).

238. Hammond and Rey, *Don Juan de Oñate,* 2:872–73, 874.

239. Hammond and Rey, *Don Juan de Oñate,* 2:867–68.

240. Carl I. Wheat, *Mapping the Transmississippi West, 1540–1861,* 5 vols. (San Francisco: Institute of Historical Cartography, 1957–63), vol. 1, map 34 and p. 29. The map is preserved in the Archivo General de Indias, Seville. Juan Rodríguez gave unspecified information to Enrico Martínez, the king of Spain's Mexican cosmographer, that provided at least some of the information for this map of the central or southern Great Plains (or both). Rivers on the map extend beyond the village where the expedition turned back, possibly on the authority of the map the Indians traced on paper.

241. Lahontan, *New Voyages,* 1:124 (note 93); French edition: Louis Armand de Lom d'Arce, baron de Lahontan, *Nouveaux Voyages de Mr le baron de Lahontan dans l'Amerique Septentrionale,* 2 vols. (The Hague: Chez les Fréres [*sic*] l'Honoré, 1703). According to the map, the Gnacsitares and Mozeemleks occupied the upper valleys of the Minnesota and Big Sioux Rivers, respectively. Neither group has been linked conclusively with Indians known in later postcontact times, but the eastern escarpment of the Coteau des Prairies may already have be-

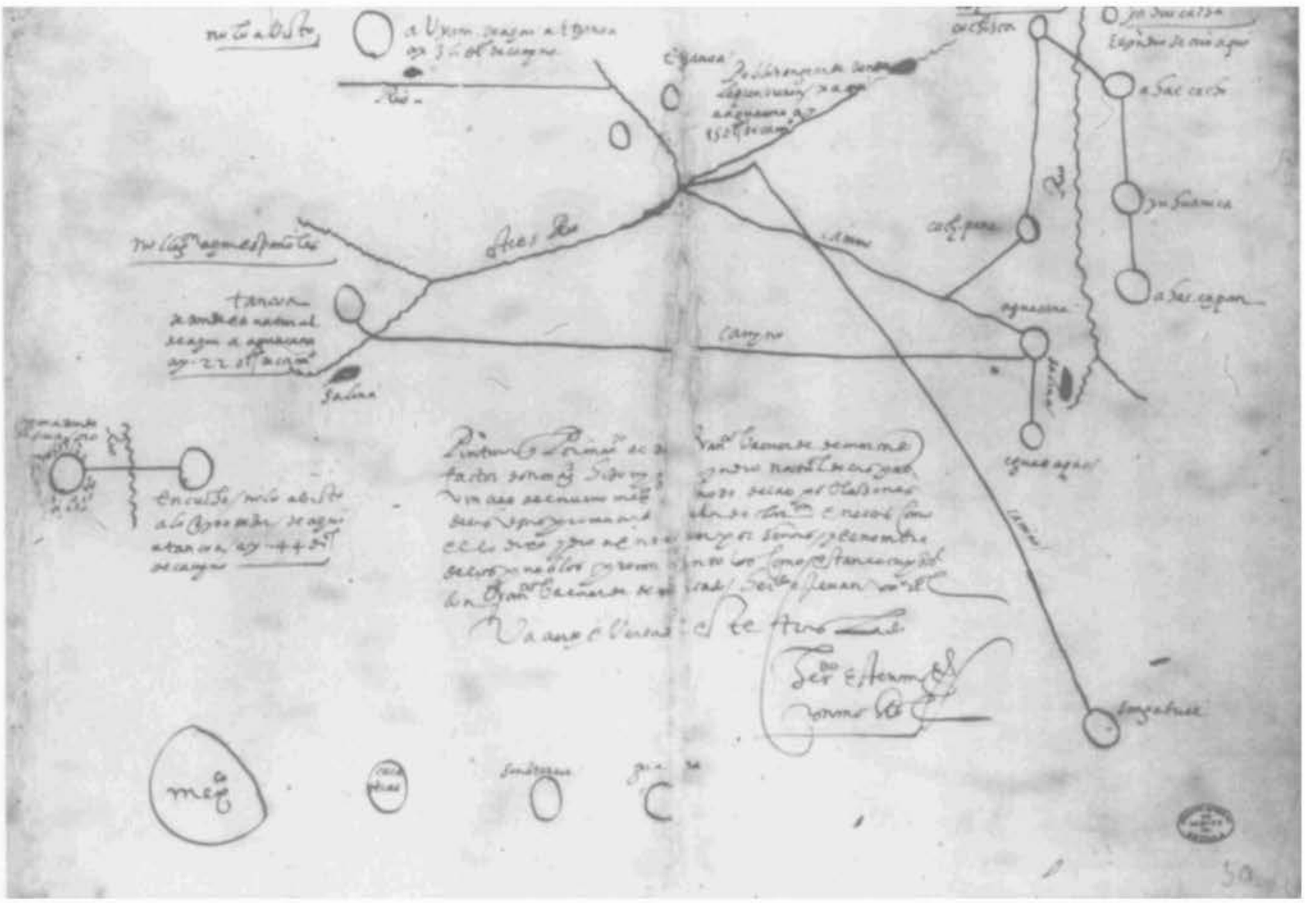


FIG. 4.59. CONTEMPORARY MANUSCRIPT COPY OF INDIAN MAP MADE IN 1602 SHORTLY AFTER FIRST CONTACT WITH EUROPEANS. "Pintura q Por man^{do} de don Fran^{co} Velverde mercado factor de su mag^{d} hizo myguel yndio de las pro vincias del nuevo mex^{co}" (Sketch which, by order of Don Francisco Valverde de Mercado, factor of His Majesty, was made by Miguel, an Indian, native of the provinces of New Mexico, of the relative position of the towns of the said provinces. Don Francisco Valverde de Mercado/ Hernando Esteban–This transcript is ([certified] correct and truthful [by] Hernando Esteban.) The original map was made by Miguel, probably an Indian from the southern Plains, on 22 April 1602, and this transcript was made on 11 May 1602. Excluding possible maps in rock art and incorporations on a few maps made by Europeans, this is the oldest extant transcript of a North American Indian map.
Size of the original: 31 × 43 cm. Photograph courtesy of the Ministerio de Cultura, Archivo General de Indias, Seville (Mapas y Planos, México, 50).

content was incorporated in the printed map accompanying both the French and English editions of Lahontan's accounts of his travels (fig. 4.60).[242] There seems little doubt that the deerskin map represented the lakes through which the Minnesota River flows in its upper reaches, the steep-sided Coteau des Prairies to the west of them, and the headwater region of the Big Sioux River beyond. The French and English editions of the printed map refer respectively to "peaux de Cerfs" and "Stag skins," probably of a white-tailed deer. The use of the plural ("peaux" and "skins") on the maps is in contrast to Lahontan's text, where the singular is used. The use of one skin seems most likely–an original made on two or more deerskins would have been very large.

A range of boldly drawn hills is prominent on the left side of the printed map. Lahontan did not reach this area but reported that the watershed was described as "Mountains . . . six Leagues broad, and so high that one must cast [in the hunting context of to spread out and search for a lost scent] an infinity of Windings and Turnings before he can cross 'em. Bears and wild Beasts are their only Inhabitants."[243] This alpine image and the bold hill symbols on the engraved map, identified as "High Mountains" on the English version, may in part have been consequences of translating, transcribing, and engraving.

come a critical boundary between two Sioux: perhaps the Santees and Yanktonais.

242. In the French edition: "Carte que les Gnacsitares ont Dessine sur des peaux de Cerfs" (this title is on the left half of the map and is separated from the second title by a double dotted line) "Carte de la Riviere Longue et de quelques autres"; Lahontan, *Nouveaux Voyages*, vol. 1.

243. Lahontan, *New Voyages*, 1:124–25 (note 93).

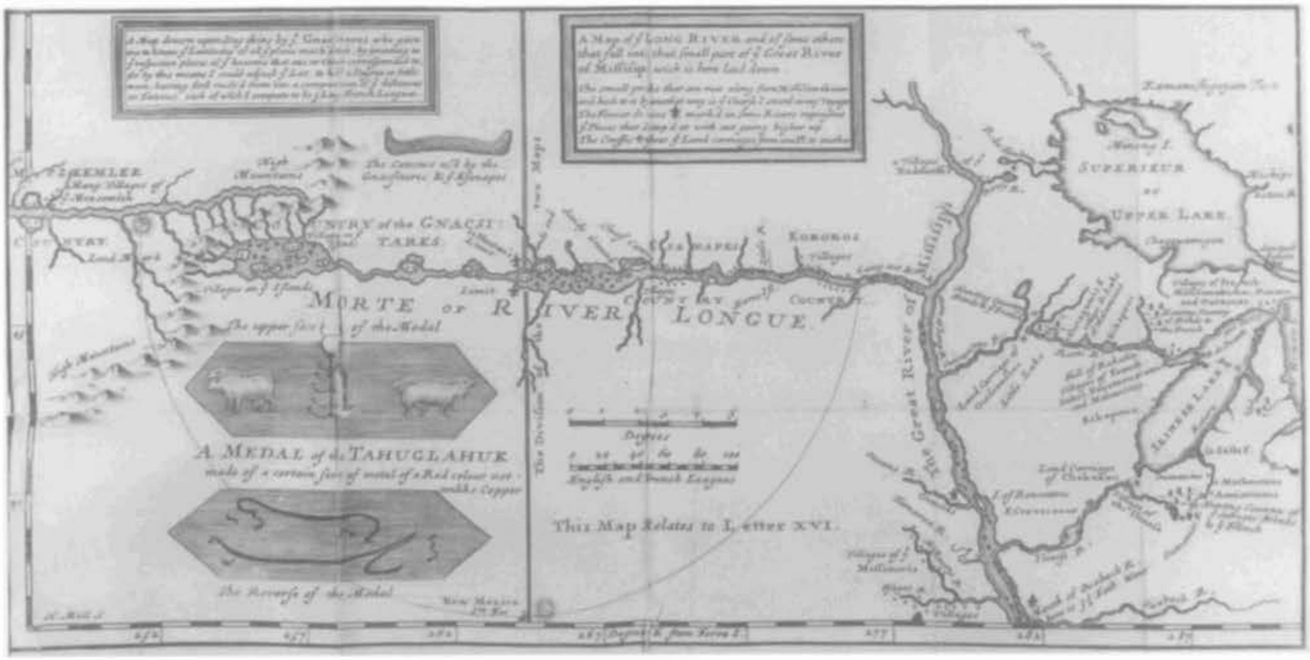


FIG. 4.60. ENGRAVED COPY OF A MAP OF THE COTEAU DES PRAIRIES BASED ON AN INDIAN MAP ON SKIN. The title for the map on the left third of the sheet ("A Map drawn upon Stag skins by y^{e} Gnacsitares") is separated from the one on the right ("A Map of y^{e} Long River") by a thick line labeled "The Division of the two Maps." The line has two small fleurs-de-lis indicating the upstream limit of Lahontan's voyage. There has never been agreement about the identity of the Gnacsitares, but because Lahontan met them in the upper-middle Minnesota River, it is assumed that they were Siouan people from the eastern Plains.
Size of the original: 16.5 × 34 cm. From Louis Armand de Lom d'Arce, baron de Lahontan, *New Voyages to North-America,* 2 vols. (London: H. Bonwicke and others, 1703). Photograph courtesy of the State Historical Society of Wisconsin, Madison (WHi [X3] 50545).

Nevertheless, there is little doubt that the hills were a dominant element on the original deerskin. The range was probably the 230-meter-high eastern escarpment of the Coteau des Prairies. This feature was given emphasis because it contained the only prominent hills in a fairly flat region, but also because the hills marked a cultural divide. Approached from the east they marked the beginning of a new resource region in which bison were prolific.

The map depicts a large lake at the edge of the "High Mountains" fed by a series of short streams draining into it and situated near the source of the "Morte or River Longue" (Minnesota River). "Villages on ye Islands" are represented by a large number of dots. In its upper reaches, the Minnesota River does indeed open out into a series of narrow, relatively long lakes. To represent them all would have been impossible. To exclude them would have been to omit an important part of the cultural heartland of the Gnacsitares. Amalgamation of several narrow lakes into one wide one, placing a few stylized islands thereon, and locating dots on the larger of these created a visual impression of power.

NINETEENTH-CENTURY EPHEMERAL MAPS

Nineteenth-century ephemeral maps from this region are recorded both for internal briefing and for geographical communication with Euro-Americans. One late nineteenth-century account describes a cartographic briefing with ephemeral maps among the Comanches of western Texas, who, beginning in the eighteenth century, frequently mounted raids into northern Mexico for slaves, horses, and women,[244] sometimes traveling as far as four thousand kilometers round-trip. Such raids probably reached their peak between approximately 1830 and 1845, before Texas became a state.[245] Richard Dodge was told how the older men would

> assemble the boys a day or two before the start for instruction. All being seated in a circle, a bundle of sticks is produced, marked with notches to represent the [journey] days. Commencing with No. 1, the stick with one notch, each is taken in succession. A rude map is drawn on the ground with finger or piece of wood illustrating the journey of the day represented by the notched stick. The larger rivers and streams are indicated, the hills, valleys, ravines, hidden water holes in dry countries, every natural object, peculiar or striking. When this was understood, the stick representing

244. Waldman, *Atlas of the North American Indian,* 151 (note 165).
245. William W. Newcomb, *The Indians of Texas, from Prehistoric to Modern Times* (Austin: University of Texas Press, 1961), 349–50.

> the next day's march [presumably ride] was illustrated in the same way, and so on to the end. He [Dodge's informant, Pedro Espinosa] further stated that he had known one party of young men and boys, the oldest not over nineteen, and none of whom had ever been into Mexico, to start from the main camp on Brady's Creek in Texas, and make a raid as far into Mexico as the City of Monterey, solely by memory of information fixed in their minds and represented by such sticks.[246]

Monterrey is more than six hundred kilometers from Brady Creek, through difficult terrain; yet by implication at least, the raid and therefore the cartographic briefing were successful.

Maps on the ground made for Euro-Americans were sometimes misunderstood. In 1820 near the western edge of Mesa de Maya in what is now southeastern Colorado, a Kiowa-Apache drew a map in the sand for geologist Edwin James that was "a minute account of the situation of the spring, and of the surrounding country, stating that the salt existed in masses at the bottom of a basin-like cavity, which contained about four and a half feet of reddish water. Thus far we had not found a single feature of the country to correspond, in the slightest degree, to his descriptions, and as we had been careful to follow the general direction of the course pointed out to us, it was probably his intention to deceive."[247] It may well be that, rather than intending to deceive, the Indian was representing the great salines, four to five hundred kilometers down the Cimarron River to the east and on the Salt Fork of the Arkansas River, not a nearby feature as James expected.

Sometimes Plains Indians made maps on the wooden floors of buildings erected by settlers. In 1858, at Fort Ellice in what is now southwest Manitoba, the explorer James A. Dickinson wanted to obtain the Indian names for the tributaries he had observed in passing down the Qu'Appelle River. An old Indian, probably Plains Cree or Assiniboine, drew a map on the floor with a piece of charred wood showing "every little creek so accurately that I easily recognised them."[248]

In 1833 the Wah paa Koo ta and other bands of Sioux disputed an article in the treaty made three years before at Fort Tecumseh. Acting on their account, Lawrence Taliaferro wrote to Elbert Herring enclosing a transcript "hastily tho imperfectly" taken from a map "Marked with Charcoal on the floor of the Agency Office" by a Wah paa Koo ta Sioux. The transcript contains no evidence of pictographs, and the original was evidently large. The map was presented as evidence disputing the surveying of a straight line delineating land they had supposedly agreed to cede in the treaties of 1825 and 1830 (fig. 4.61). William Clark, who had been appointed superintendent of Indian affairs at St. Louis after returning from leading the Lewis and Clark expedition, forwarded the letter to Herring. He reported that in his opinion the map was "very inaccurate," revealing how even someone with considerable direct experience with Indians might fail to evaluate native maps on their own terms.[249]

NINETEENTH-CENTURY MAPS MADE ON PAPER

Other extant copies of maps on paper contain considerably more information, including natural, cultural, and political features and historical events, some of them similar to those found on the pictorial maps considered earlier. In the early nineteenth century, several maps by Plains Indians were solicited by Peter Fidler, a surveyor for the Hudson's Bay Company. The Blackfoot chief Ki oo cus (the Little Bear) drew a map of the Missouri and South Saskatchewan Rivers headwaters regions in 1802, of which a transcript made by Fidler exists (fig. 4.62). Fidler's transcript contains considerable information about vegetation and landscape features in inscriptions in Blackfoot and English. Examples of landscapes include "high rocks, little poplar" and "a round hill, woods below, none at top." Elsewhere the emphasis is on vegetation as a resource: "little poplar and berries," "berries," and "plenty of berries." Fidler's transcript also denoted the "woods edge" between the forests and grasslands (as distinct from the woods edge much farther north between the forests and the tundra). Ki oo cus is the only Indian known to have placed that particular biogeographic boundary on a map, though several fur traders did so, probably based on information received from Indians. Given the homeland of the Blackfeet, Ki oo cus would have been almost as familiar with the spruce and fir forests, aspen groves, and wheatgrass prairies of what is now southeast Alberta as with the dry-belt prairies of northern Montana where he made the map.

The map also represents cultural features. Single dashed lines represent routes across and along interfluvial plateau lands, along which are placed small circles repre-

246. Richard Irving Dodge, *The Plains of the Great West and Their Inhabitants* (New York: G. P. Putnam's Sons, 1877), 414.

247. Edwin James, *Account of an Expedition from Pittsburgh to the Rocky Mountains,* 2 vols. and atlas (Philadelphia: Carey and Lea, 1822–23), 2:80–81.

248. Henry Youle Hind, *North-west Territory: Reports of Progress* (Toronto: Lovell, 1859), 59.

249. Letter from Lawrence Taliaferro, Indian Agent at St. Peters, to William Clark, Superintendent of Indian Affairs, St. Louis, and to Elbert Herring, Commissioner of Indian Affairs, Washington, D.C., both dated 5 July 1833, and letter from Clark to Herring, dated 21 July 1833; "Letters Received from St. Peters Agency 1824–70," National Archives, Washington, D.C., Records of the Bureau of Indian Affairs, RG 75 (microfilm roll 757, M 234). The map accompanied Taliaferro's letter to Herring but was sent via Clark, who supplemented it. Wah paa Koo ta is probably the Wahpekute band of Dakota proper (Eastern Sioux).

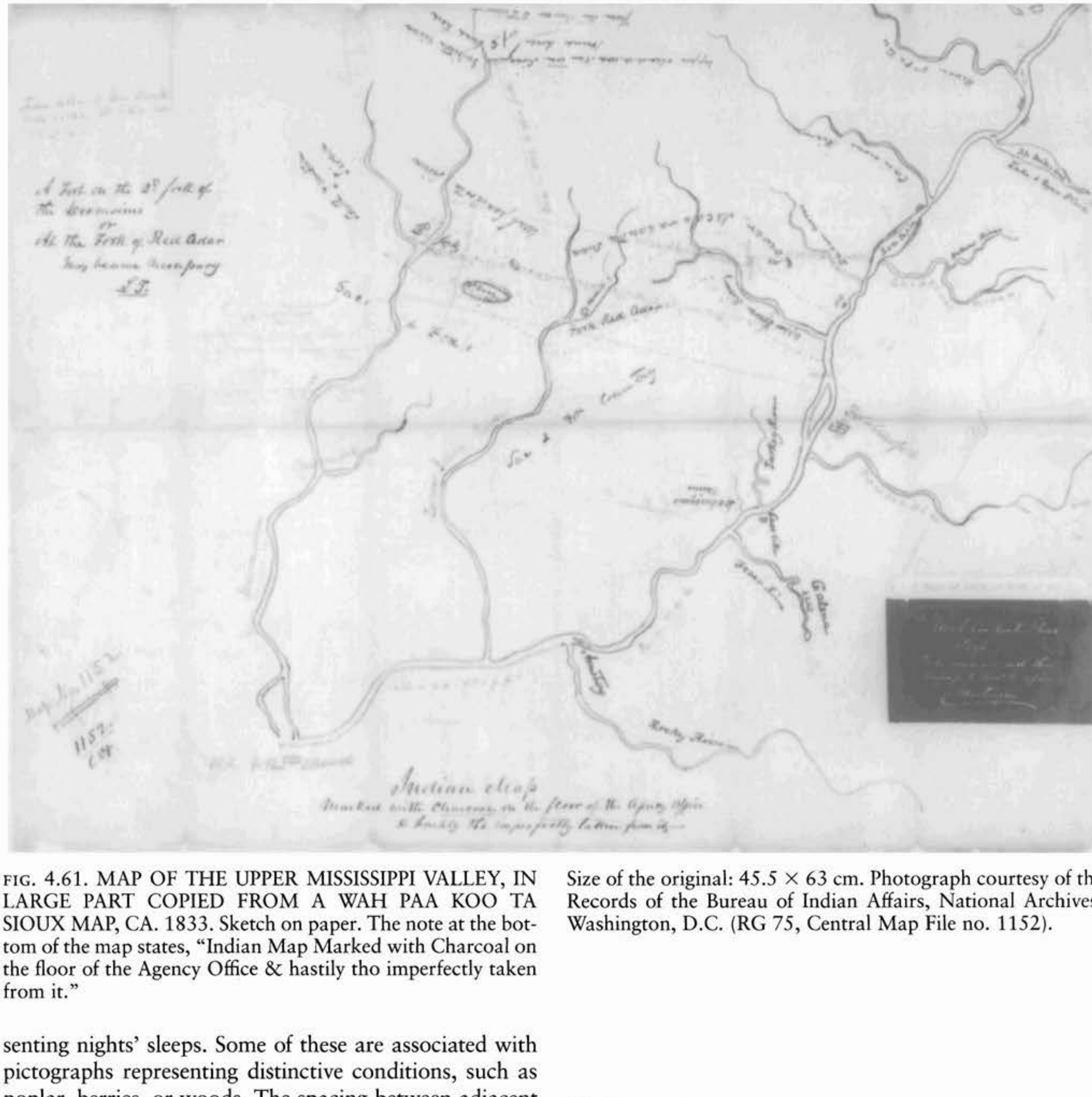


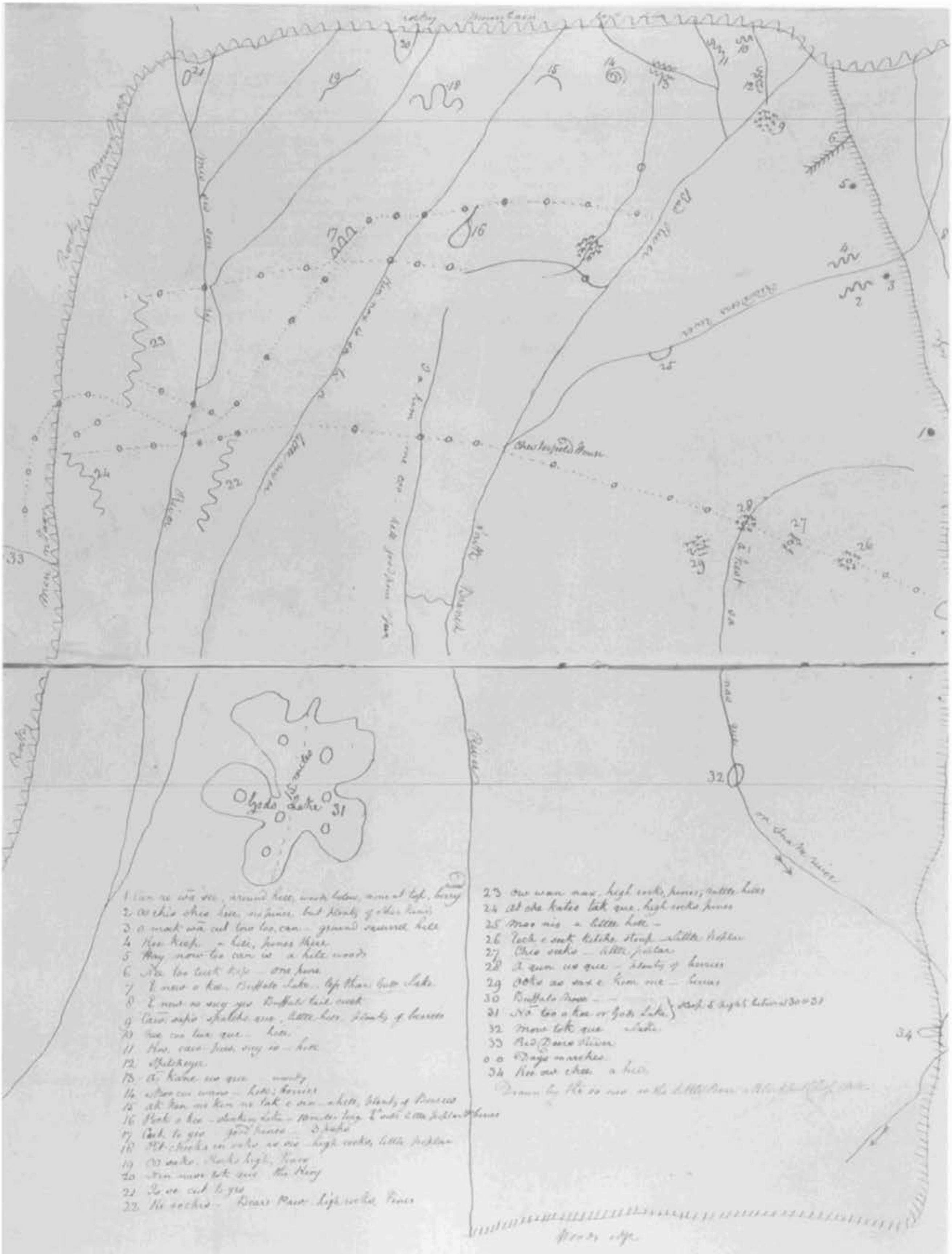
FIG. 4.61. MAP OF THE UPPER MISSISSIPPI VALLEY, IN LARGE PART COPIED FROM A WAH PAA KOO TA SIOUX MAP, CA. 1833. Sketch on paper. The note at the bottom of the map states, "Indian Map Marked with Charcoal on the floor of the Agency Office & hastily tho imperfectly taken from it."
Size of the original: 45.5 × 63 cm. Photograph courtesy of the Records of the Bureau of Indian Affairs, National Archives, Washington, D.C. (RG 75, Central Map File no. 1152).

senting nights' sleeps. Some of these are associated with pictographs representing distinctive conditions, such as poplar, berries, or woods. The spacing between adjacent dots varies, perhaps as a consequence of varying terrain. Whether the circles on Ki oo cus's map were used to represent tipis in plan is not known.

In the Appalachians, with their even, tree-covered ridge crests, it would have been surprising if Indians had found it necessary to represent specific summits.[250] The peaks of the Rocky Mountains at the edge of the Plains were more distinctive, however, and their summits were important not merely as landmarks, but as mythically endowed or totemic sites. Ki oo cus's map represented the Rocky Mountains as a smooth line with a superimposed wavy

250. For example, figure 4.43.

(*Facing page*)
FIG. 4.62. KI OO CUS'S MAP OF THE PRAIRIES AND ROCKY MOUNTAIN PIEDMONT IN WHAT ARE NOW NORTHERN MONTANA AND SOUTHERN ALBERTA. Map of the Missouri and South Saskatchewan headwaters, Blackfoot, 1802. Untitled map of the area from the Red Deer River south to the Missouri River "Drawn [for Peter Fidler] by Ki oo cus or the Little Bear, a Blackfoot Chief 1802." Ink over pencil on paper. This is perhaps the last in a tradition of maps representing the grassland-forest transition as a boundary line–the "woods edge." The Hudson's Bay Company Archives possesses another contemporary transcript of this map in a post journal (B39/a/2, fols. 85v–86).
Size of the original: 48.5 × 38 cm. Photograph courtesy of the Hudson's Bay Company Archives, Provincial Archives of Manitoba, Winnipeg (E3/2, fols. 104d–105).


Rocky Mountains
Chesterfield House
Buffalo Lake
30 Buffalo Pound
33 Red Deer River
0 0 Days marches

line on the border of the map, apparently a simpler stylized form of the hill-in-profile pictograph, but it also contains several less stylized hill-in-profile pictographs. Representing individual foothills of the eastern Rockies, each is unique in shape, suggesting that Fidler's transcript was fairly close to the original. Numerically keyed to an explanatory text, "3 paps" are represented by three breastlike profiles, "little hill" by a small semicircle, and "the King" as the largest and most peaked of all the symbols.

Two similar maps made for Fidler by another Blackfoot Indian, Ac ko mok ki (the Feathers, also known as the younger Old Swan), in 1801 and 1802 identify individual peaks in the Rockies. Fidler's transcript of the earlier of the two represents the Rocky Mountains from what is now central Wyoming to southern Alberta. The Rocky Mountains are represented by a closely spaced pair of essentially straight lines, along which semicircles and points indicate peaks. These are named by Fidler in an "Explanation" in both Blackfoot and English.[251] The map is well known and has been authoritatively interpreted.[252] Several of the peaks are still known by Fidler's English translations.

The second, less widely known, map made by Ac ko mok ki in the following year showed a somewhat smaller area but included most of the same stretch of the Rocky Mountains (fig. 4.63). This second map was less rich, and Fidler's explanation was much shorter, but in some respects his transcript appears to have been closer to the original. In particular, it retains totemic pictographs for summit features. There are five of these along the Rocky Mountains: in sequence, from south to north, a heart, a tooth, a pap, a second heart, and a "human" head and shoulders in profile. Respectively, these have been identified as Heart Mountain in the central front of the Absaroka Range, Beartooth Mountains farther north in the same range, Teton Peak (*teton* means breast or pap) on the upper waters of the Teton River in northwest Montana, Heart Butte in the central foothills of the Lewis Range, and Devil's Head Mountain at the east end of Lake Minnewanka, Alberta.[253]

An Oto map of the northern and central Plains made in 1825 by Gero-Schunu-Wy-Ha represents activities involving Euro-Americans (two details are illustrated here, figs. 4.64 and 4.65). The legend on the map states that Gero-Schunu-Wy-Ha was a member of the Oto war party whose route was traced on the map. The Indian–Euro-American councils marked on the map relate to the Atkinson-O'Fallon peace expedition of 1825. That expedition was seeking to improve relations and make treaties with the Indian nations of the Missouri with the intention of protecting and stimulating the fur trade.[254] The extant transcribed version of the map has descriptive annotations, but the events are also represented pictographically. Events on the upper Arkansas River are marked by dots: in carefully drawn lines to show the outward and return traces of "a war party of five Ottoes against the Arapahoes," and in a cluster, near what is almost certainly the watershed between the headwaters of the Huerfano River to the north and those of the Canadian and Cimarron Rivers to the south, to mark the "battle ground" where presumably the "Three Arapahoes were Killed & five more taken." Somewhat unusual for an Indian map, the terrain to the southwest is represented in profile (fig. 4.64). The pictography on this southern part of the map is less rich and varied than for the Missouri River section shown in figure 4.65, where a line of directionally oriented hoof-shaped symbols indicates the "Trace of Capt Armstrongs troop & the three indians" and elsewhere "Capt Armstrongs trace." (Armstrong's contingent of forty men, along with three Indians including Gero-Schunu-Wy-Ha, accompanied the land-based part of the Atkinson-O'Fallon expedition ascending the Missouri River.) The hoof-shaped symbols go from Council Bluffs (just north of what is now Omaha, Nebraska) up the Missouri River to a council of Indians held somewhere near the present site of Pierre, South Dakota. One aspect of

251. "An Indian map of the Different Tribes that inhabit on the East & west side of the Rocky Mountains with all the rivers & other remarkable places, also the Number of Tents. &e. Drawn by the Feathers or ac ko mok ki–a Blackfoot chief–7th Feby. 1801–reduced ¼ from the Original Size–by Peter Fidler." Endorsement on transcript drawn on paper, 37.2 × 47 cm, Hudson's Bay Company Archives, Winnipeg (G1/25); there is also a transcript of this map in the archives (E3/2, fols. 106d–107).

252. D. Wayne Moodie and Barry Kaye, "The Ac Ko Mok Ki Map," *Beaver,* outfit 307 (spring 1977): 4–15.

253. This interpretation is derived from Moodie and Kaye, "Ac Ko Mok Ki Map," 6–9 (based on the earlier 1801 map); Judith Hudson Beattie, "The Indian Maps Recorded by Peter Fidler, 1801–1810," unpublished paper presented at the Eleventh International Conference on the History of Cartography, Ottawa, July 1985, esp. 2–3; and idem, "Indian Maps in the Hudson's Bay Company Archives: A Comparison of Five Area Maps Recorded by Peter Fidler, 1801–1802," *Archivaria* 21 (1985–86): 166–75, esp. 170 and 174. The Hudson's Bay Company Archives possesses another contemporary transcript of the map: "Drawn by the Feathers or ak ko mok ki a Blackfoot Chief 1802" (E3/2, fol. 104). It is reproduced and the circumstances of its making are used as evidence in a paper arguing that "among most Native groups in Canada, the local or residential band, not the tribe, was the basic social, political, and economic entity." Theodore Binnema, "Old Swan, Big Man, and the Siksika Bands, 1794–1815," *Canadian Historical Review* 77 (1966): 1–32, esp. 1 and 23–24 including fig. 2. Ac ko mok ki's maps and maps by other Blackfeet have been used as evidence in arguing the case that "twentieth-century historians of cartography could discover the richness of mapping conventions very different from their own if they opted for intercultural dialogue rather than translation." Barbara Belyea, "Inland Journeys, Native Maps" (note 2).

254. R. Raymond Wood, comp., *An Atlas of Early Maps of the American Midwest* (Springfield: Illinois State Museum, 1983), pl. 16, and Russell Reid and Clell G. Gannon, eds., "Journal of the Atkinson-O'Fallon Expedition," *North Dakota Historical Quarterly* 4 (1929): 5–56, esp. 7.

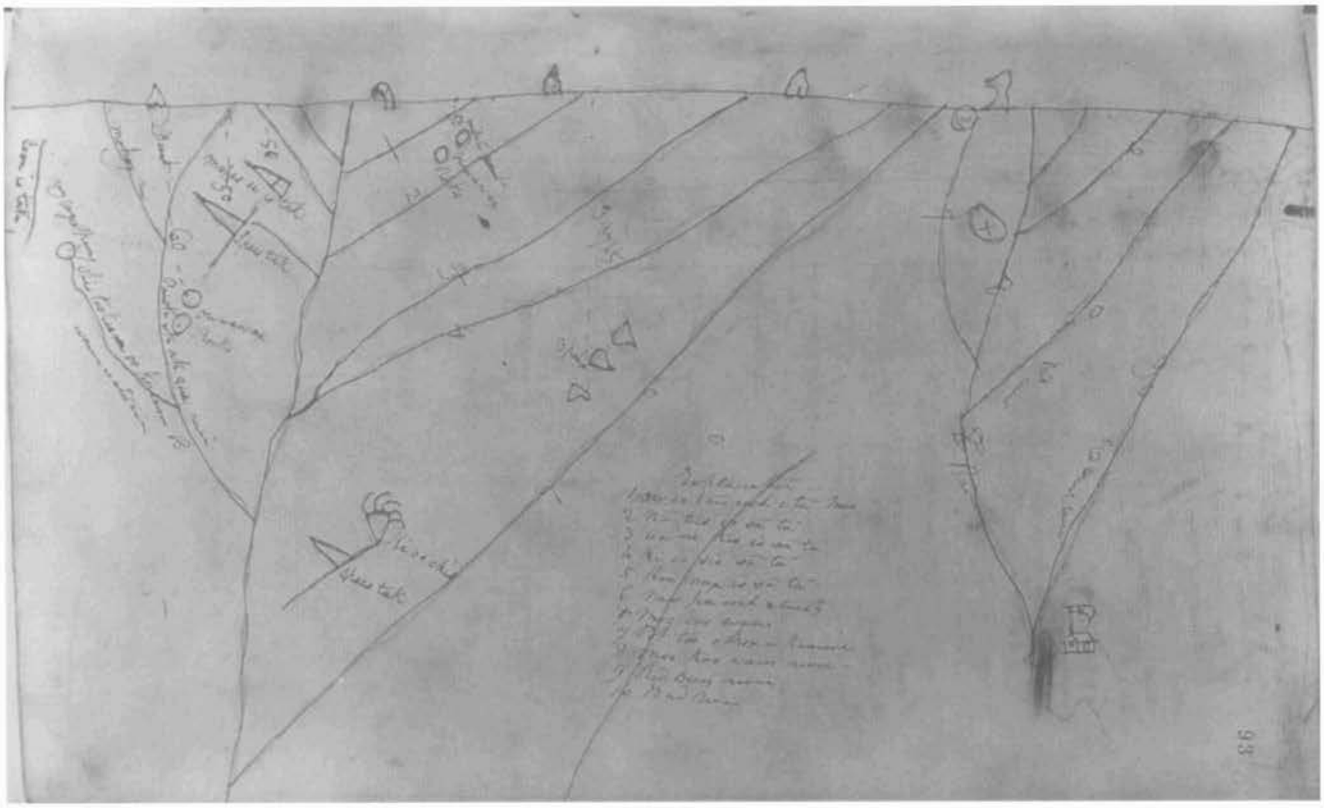


FIG. 4.63. AC KO MOK KI'S MAP OF THE UPPER MISSOURI AND UPPER SASKATCHEWAN RIVERS AND THEIR SOURCES IN THE ROCKY MOUNTAINS, 1802. Unendorsed transcript drawn in post journal by Peter Fidler, ink on paper, of a map of the upper Missouri and upper South Saskatchewan River catchments in the northern Rocky Mountains, originally drawn by Ak ko mok ki (also known as the Feathers and, after the death of his father, as the younger Old Swan), a Blackfoot chief. The most basic of three contemporary copies, the retention of totems and the exclusive use of Indian names are significant. All five totemic peaks are in the eastern front ranges of the Rocky Mountains, on or close to the primary watershed, and visible on the western horizon from Blackfoot territory on the grassy plains or plateaus to the east.
Size of the original: 20 × 32 cm. Photograph courtesy of Hudson's Bay Company Archives, Provincial Archives of Manitoba, Winnipeg (B39/a/2, fol. 93).

this is intriguing. A return journey is shown, but only for a very short distance.[255] See figure 4.66 for identification of the hydrographic features on Gero-Schunu-Wy-Ha's map.

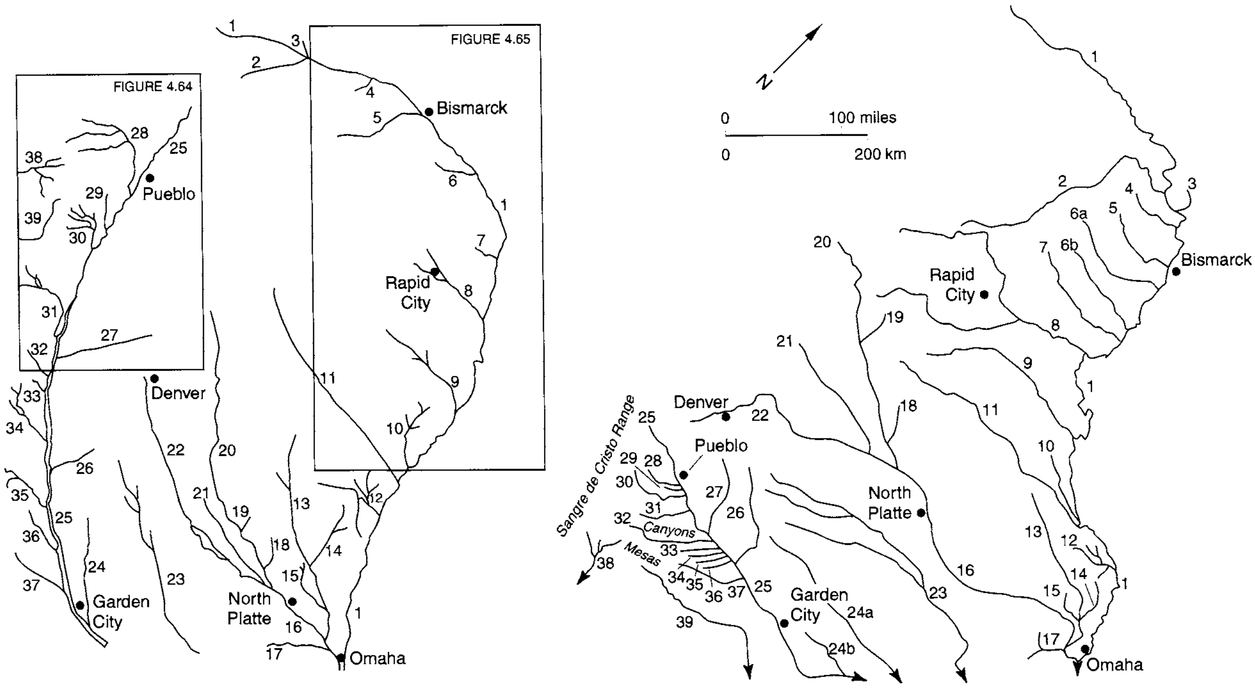
Permanent villages of named Indian nations are represented by clusters of dots, the number differing from village to village. Most villages have an inner cluster of dots surrounded by a circle with an outer scatter of further dots. Whether the dots represent the population or permanent lodges and the significance of their arrangement is not clear. Temporary camp and council sites are represented by clusters of acute V-shaped tipi symbols. One of these, a council between the Mandans, Gros Ventres, and Crows, has pictographic drawings of Indians on horseback associated with it (see the top of fig. 4.65). The extant map is almost certainly a transcript, presumably done by the person responsible for the annotations. If so the pictographs may have lost some of their original detail, and hence meaning. Nevertheless, together with the tipi and hoof symbols and the pictographic terrain profiles, they are closely related in style to nineteenth-century Plains Indian art, especially paintings on bison robes. Part of the map represents that section of the Missouri River painted by Sitting Rabbit eighty years later (fig. 4.58 above). Gero-Schunu-Wy-Ha's map is stylistically and structurally more indigenous then Sitting Rabbit's. This is what one would expect for a region that in 1825 had barely begun to be acculturated by contacts with Euro-Americans but by the early twentieth century had experienced the full impact of that remorseless process.

255. Another interestingly marked route can be found on a published transcript of a Hidatsa map of a horse-stealing expedition from Fort Berthold to Fort Buford on the upper Missouri River. It represents the outward journey on foot by means of dashes that are neither shaped or positioned in relation to each other as having been made by a biped. The direction of the journey is interpretable only in the context of the message as a whole; including the return journey, represented by the directionally oriented hoof marks of the captured horse(s). Mallery, "Picture-Writing," fig. 452, p. 342 (note 4).

FIG. 4.64. DETAIL FROM GERO-SCHUNU-WY-HA'S MAP OF THE CENTRAL AND NORTHERN GREAT PLAINS, 1825. "This Map was sketched by an Otto [Oto] indian Called in that language Gero-schunu-wy-ha i.e. the man that is very sorry–He was a member of the war party traced heron [*sic*]–Aug. 12 1825 Missouri River," annotated transcript in ink on paper. The map combines in approximately equal proportions the characteristics of utilitarian line maps and the artistically richer pictorial tradition. This section shows the activities of a war party in the valley of the upper Arkansas River above Horse Creek.
Size of the entire original: 53 × 42 cm; size of detail: ca. 25 × 14 cm. Photograph courtesy of the National Archives, Washington, D.C. (RG 75, map 931).

FIG. 4.65. ANOTHER DETAIL FROM GERO-SCHUNU-WY-HA'S MAP, SHOWING EVENTS ON THE MISSOURI RIVER. The complicated events may have been associated with the several treaties agreed in this region in the summer of 1825, some of them witnessed by Captain William Armstrong. This detail is of the Missouri Valley above the Niobrara confluence.
Size of the entire original: 53 × 42 cm; size of detail: ca. 35 × 19 cm. Photograph courtesy of the National Archives, Washington, D.C. (RG 75, map 931).

A map by Non-Chi-Ning-Ga, an Iowa Indian, was presented at a council between several native groups held in Washington, D.C., in 1837 to show "the land we have always claimed." The center on the map (fig. 4.67) is the area between the Mississippi and Missouri Rivers in what is now mainly Iowa and northern Missouri. Placed central to the sheet of paper, this interriverine area contains the routes of the Iowas' late prehistoric migrations and, though not identified as such, the lands ceded to the United States by the Iowas and others at the treaty of 15 July 1830. The Iowas were still in dispute with the



1. Missouri River
2. Little Missouri River
3. Douglas Creek
4. Knife River
5. Heart River
6. Cannonball River (6a) or Grand River (6b)
7. Moreau River
8. Cheyenne River
9. White River
10. Ponca Creek
11. Niobrara River
12. Bow Creek
13. Elkhorn River
14. North Fork Elkhorn River
15. Maple Creek
16. Platte River
17. Salt Creek
18. Blue Creek
19. Rawhide Creek
20. North Platte River
21. Lodgepole Creek
22. South Platte River
23. Republican River
24. Smoky Hill River (24a; misconnected) or Walnut Creek (24b)
25. Arkansas River
26. Big Sandy Creek
27. Horse Creek
28. Charles River
29. Sixmile Creek
30. Huerfano River
31. Apishapa River
32. Purgatoire River
33. Rule Creek
34. Caddou Creek
35. Mud Creek
36. Clay Creek
37. Two Butte Creek
38. Canadian River (headwaters)
39. Cimarron River (headwaters)

FIG. 4.66. INTERPRETATION OF THE HYDROGRAPHY OF GERO-SCHUNU-WY-HA'S MAP OF THE CENTRAL AND NORTHERN GREAT PLAINS. On the left is a tracing of Gero-Schunu-Wy-Ha's map and on the right a modern map of the same area; northwest is at the top. See also figures 4.64 and 4.65.

United States government about aspects of the treaty and were to remain so until 19 October 1838, when the maker of the map was the second of six Iowas to sign a clarifying treaty.[256] A notable characteristic of the map is the relatively straight river courses. Dots ranging in number from two to eight within circles represent former settlement sites. Figure 4.68 shows the area depicted on the map.

Subarctic

The native people of the Subarctic are Athapaskan and Algonquian speakers occupying much of present-day Canada and the interior of Alaska. Perhaps now there are no more than sixty thousand people, divided among many small bands and scattered across some 3.2 million square kilometers.[257] Traditionally they were hunters and fishermen, with a nomadic lifestyle closely linked to the seasonal migrations of the caribou. Only briefly, in the summer, did the small bands rendezvous in larger groups, but loose affiliations between bands were important, especially in maintaining networks of communication. Migrations of caribou herds were generally predictable, but unexpected deviations were quickly detected by dispersed bands that could "report on the direction of movement, dispersal and concentration of the caribou."[258] Whether or not they were communicated cartographically, the messages were eminently spatial. Animal distributions and migrations were among the most important of the maplike elements discerned in scapulimancy and produced in birchbark biting.

MAPS ON BARK AND SKIN

As in the Northeast, Indians in the Subarctic used the bark of the paper birch for many purposes, including

256. The two treaties can be found in Charles J. Kappler, comp. and ed., *Indian Affairs: Laws and Treaties,* 5 vols. (Washington, D.C.: United States Government Printing Office, 1904–41), 2:305–10 and 518–19.

257. Colin Taylor, "The Subarctic," in *The Native Americans: The Indigenous People of North America* (New York: Smithmark, 1991), 182–203, esp. 182.

258. James G. E. Smith, "Economic Uncertainty in an 'Original Affluent Society': Caribou and Caribou Eater Chipewyan Adaptive Strategies," *Arctic Anthropology* 15, no. 1 (1978): 68–88, esp. 68.

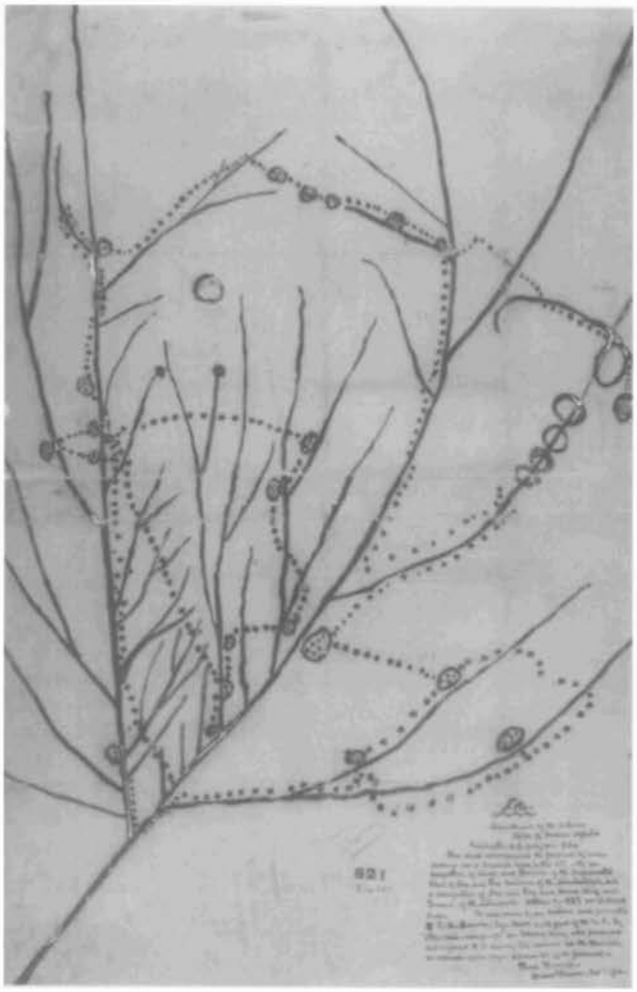


FIG. 4.67. NON-CHI-NING-GA'S MAP OF THE MIGRATION OF HIS INDIAN ANCESTORS, 1837. Untitled manuscript map on paper of the upper Mississippi and Missouri Rivers drainage systems between Lake Michigan and the northern Great Plains. The map shows "the route of my [Iowa] forefathers–the land we have always claimed." The original was presented by Non-Chi-Ning-Ga at a congress in Washington, D.C., 7 October 1837. The Sauks and Foxes were about to sell a vast area of prime farmland, and the Iowas were afraid they in turn would be pressured by their dispossessed but powerful neighbors.
Size of the original: 104 × 69 cm. Photograph courtesy of the Cartographic Branch, National Archives, College Park, Maryland (RG 75, map 821, tube 520).

making maps. One account of the construction of a birch-bark map for cartographic briefing suggests the way such maps may have been used among Indians before European contact. In the summer of 1861, Henry Youle Hind was leading an expedition up the Moisie River in eastern Quebec. The abbé Ferland, of Laval University, Quebec, had showed him a chart constructed by seven Montagnais Indians. "The chart exhibited the route followed by these Indians from Hamilton Inlet on the Atlantic coast [of Labrador] . . . to a great lake in the interior . . . to near the head waters of the east branch of the Moisie, which they reached by crossing a low water parting, and descended to the Gulf of St. Lawrence."[259]

One of the expedition's goals was to test the accuracy of the Montagnais map, about which nothing else is known. Evidently it was not adequate to travel by. Louis and Pierre, Hind's Montagnais and Abenaki guides, soon became unsure of the way ahead. Still on the lower Moisie River, Louis tried to persuade Domenique (a Montagnais man) and an unnamed Naskapi youth to serve as guides to and beyond its headwaters. He then advised Hind to give the two a good meal and allow them to rest, after which the following exchange took place:

> "Where are you going to, Louis?" some one enquired, as the Indian was rolling off into the woods with a torch of birch-bark, about an hour after supper.
> "Get birch-bark for map."
> "What map?"
> "Domenique going to make map of portages, to show us the way. To-morrow," continued Louis, with a knowing leer, "I speak to Domenique about young Nasquapee; Domenique well pleased–like supper, like tobacco, like everything. Think he will let young Nasquapee go."
> . . . Louis returned with the sheet of fresh birch-bark for Domenique to draw his map on.[260]
> We sat by the fire till a late hour talking to Domenique and the young Nasquapee. The lad appeared to be very intelligent, and apparently knew the upper country well. He and Domenique together constructed a map of the Moisie and the old Montagnais route, as far as the dividing ridge [watershed]–showing the point where the Ashwanipi [Ashuanipi] River took its rise, and began its long course of several hundred miles to Hamilton Inlet, on the Atlantic coast of Labrador.
> He put in all the portages, and explained the map to Louis and Pierre. The latter took charge of the map, and before we rose went over every little detail to see if he understood it perfectly.[261] [See figs. 4.69 and 4.70]

Maps were also made on skin. There is a mention of one made in 1722 by two Chipewyans "on parchment with charcoal."[262] It appears to have represented a large area: the west coast of Hudson Bay from Churchill and in all probability the Arctic coast of what is now mainland Canada as far west as the Coppermine River. It is possible that it was only one of the generation of maps

259. Henry Youle Hind, *Explorations in the Interior of the Labrador Peninsula, the Country of the Montagnais and Nasquapee Indians*, 2 vols. (London: Longman, Green, Longman, Roberts, and Green, 1863), 1:10.

260. Hind, *Explorations in the Interior*, 1:83–84.

261. Hind, *Explorations in the Interior*, 1:88.

262. Johann Reinhold Forster, *History of the Voyages and Discoveries Made in the North* (London: G. G. J. and J. Robinson, 1786), 388.

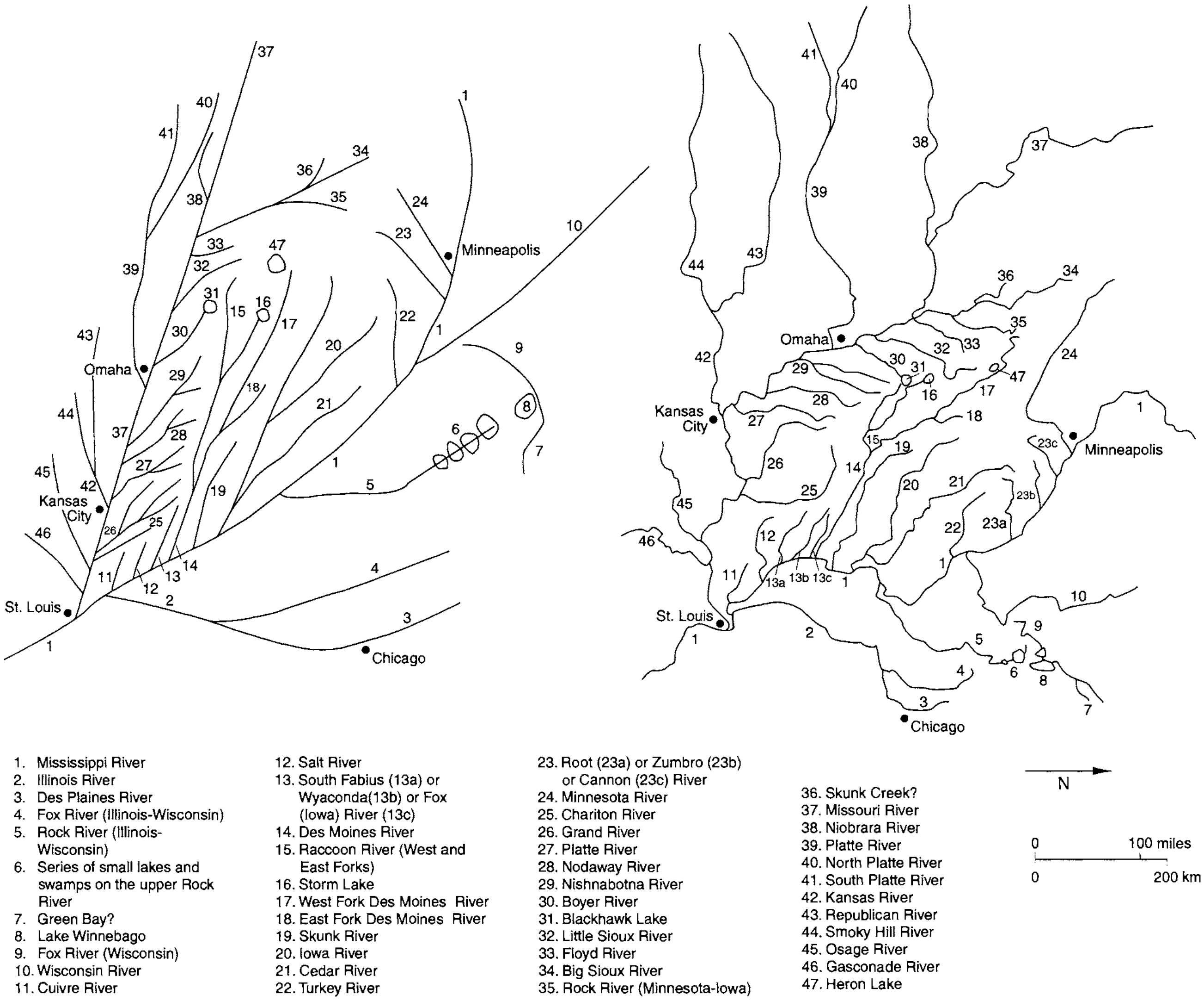


FIG. 4.68. INTERPRETATION OF THE HYDROGRAPHY OF NON-CHI-NING-GA'S MAP. On the left is a tracing of Non-Chi-Ning-Ga's map and on the right a modern map of the same area; west is at the top.

that John Barrows referred to as "rude charts painted on skins by the Indians, which, though without scale or compass, mark the inlets from Hudson's Bay with tolerable accuracy, and carry the coast without interruption to the Coppermine River." A footnote indicates that "one of these charts is in the Hudson's Bay House."[263] This probably refers to the map on parchment endorsed on the back: "Moses Nortons Drt. of the Northern Parts of Hudson's Bay laid dwn on Indn. Information & bro[t]. Home by him anno 1760" (figs. 4.71 and 4.72). It is not, however, "painted" but is done in pencil with toponyms and annotations in ink. The pencil work may or may not have been done by the Chipewyans who supplied the information to Norton, a Hudson's Bay Company official. There is no doubt that the skin is genuine, and it is probably the oldest extant skin map from the Subarctic.[264]

Falls and rapids, significant as obstacles and hazards to canoe travel and as locations for fishing and for trapping small mammals that preyed on fish, are marked on the map by one or more transverse strokes, but it is not clear what determines the number or spacing of sets of strokes. One line per fall might seem probable, but present-day evidence suggests that the strokes may have subtly conveyed information about the characteristics of falls and rapids and not necessarily their number.[265] If this subtle

263. John Barrow, *A Chronological History of Voyages into the Arctic Regions; Undertaken Chiefly for the Purpose of Discovering a North-east, North-west, or Polar Passage between the Atlantic and Pacific* (London: John Murray, 1818), 376.

264. The oldest from North America, the unauthenticated "map" on skin dated "Moi 1607," fig. 4.31, is more like a profile than a map.

265. In April 1975 Henry Kakekayash, a Weagamow Lake Ojibwa, drew eight types of rapids, distinguishing between them on the basis of a mix of characteristics: length, water speed, presence or absence of

FIG. 4.69. PAINTING OF DOMENIQUE DRAWING A MAP ON BIRCHBARK, 1861. By William George Richardson Hind (1833–89) while on an expedition to the Moisie River, eastern Quebec, led by his brother Henry Youle Hind. At the first rapids, the Naskapi guides sought the advice of a Montagnais, Domenique, concerning the route ahead. He is here shown in a detail from the painting making a map of the upper Moisie River as the first stage in his response.
Size of the original: 27.9 × 40.6 cm; this detail: ca. 12 × 12 cm. Photograph courtesy of the Metropolitan Toronto Reference Library (John Ross Robertson Collection, T31956).

FIG. 4.70. MONTAGNAIS CHIEF DOMENIQUE EXPLAINING HIS MAP ON BIRCHBARK TO NASKAPIS, 1861. Watercolor and graphite with scraping, on commercially prepared colored paper. In this painting, William George Richardson Hind shows Domenique using the map he made (fig. 4.69) to advise the Naskapi guides, Louis and Pierre, concerning the route to the source of the Moisie River, and across the watershed into the Churchill River system of Labrador. In this he was assisted by an unnamed Naskapi youth, presumably the kneeling figure in profile.
Size of the original: 17.8 × 26.6 cm; this detail: ca. 11 × 12 cm. Photograph courtesy of the Art Gallery of Hamilton, Ontario (Bert and Barbara Stitt Family Collection, 84.STI.61).

and variable pictography was used in the eighteenth and nineteenth centuries, it is possible that Europeans may not have recognized its significance and hence may have made simplified transcripts. Although particularly characteristic of the Subarctic, lines for falls and rapids were not unique to that region (see, for example, their use to denote the falls on the Susquehanna River on fig. 4.18 above).

Another map on skin was revealed in relatively recent times but appears to exemplify a much older tradition. Formal hearings were held between Beaver Indians and officials of the Northern Pipeline Agency in the early winter of 1979–80. These concerned the likely impact of the proposed pipeline on the Indians' traditional life and economy in northeastern British Columbia, and many specially prepared thematic maps had been exhibited. At the end of the day, when the officials considered the proceedings to be over, a husband and wife brought a moosehide bundle into the hall:

> Neither Aggan nor Annie had spoken earlier in the day, but they went directly to the table at which the elders had sat. There they untied the bundle's thongs and began very carefully to pull back the cover. At first sight the contents seemed to be a thick layer of hide, pressed tightly together. With great care, Aggan took this hide from its cover and began to open the layers. It was a magnificent dream map.
>
> The dream map was as large as the table top, and had been folded tightly for many years. It was covered with thousands of short, firm, and variously coloured markings. The [Indian] people urged the chairman and other white visitors to gather round the table. Abe Fellow and Aggan Wolf explained. Up here is heaven; this is the trail that must be followed; here is a wrong direction; this is where it would be worst of all to go; and over there are all the animals. They explained that all of this had been discovered in dreams.

rocks, suitability for canoe travel, potential for fish, suitability for constructing fish traps, and access for mammalian predators. The subtly variable spacing of ladder-like lines drawn transverse to rivers (with lakes, confluences, etc.) as represented in plan is reminiscent of transcripts of eighteenth- and nineteenth-century Indian maps. Edward S. Rogers and Mary B. Black, "Subsistence Strategy in the Fish and Hare Period, Northern Ontario: The Weagamow Ojibwa, 1880–1920," *Journal of Anthropological Research* 32 (1976): 1–43, esp. 8 (fig. 2).

> Aggan also said that it was wrong to unpack a dream map except for very special reasons. But the Indians' needs had to be recognized; the hearing was important. Everyone must look at the map now. Those who wanted to might even take photographs. They should realize, however, that intricate routes and meanings of a dream map are not easy to follow. There was not time to explain them all. The visitors [mainly non-native Canadians and Americans] crowded around the table, amazed and confused. The centre of gravity had suddenly shifted away from procedural concerns, pipelines and terms and conditions, to the Indians' world.
>
> A corner of the map was missing and one of the officials asked how it had come to be damaged. Aggan answered: someone had died who would not easily find his way to heaven, so the owner of the map had cut a piece of it and buried it with the body. With the aid of even a fragment, said Aggan, the dead man would probably find the correct trail, and when the owner of the map died, it would all be buried with him.[266]

Much larger than other known skin maps, the Beaver Indians' dream map was a truly indigenous artifact. Such artifacts, made on durable hides and carefully preserved, would have the potential for long life, but they would be lost to view on the death of their owners. Presumably there have been many such maps.[267]

Among the Beaver Indians, and perhaps other northern Athapaskans, models of the cosmos are painted on the skin heads of shamans' ceremonial drums. Typically these portray the shamanic cosmic structure familiar in many societies: a central vertical *axis mundi* joining the upper and lower supernatural worlds (sky and Underworld) with the natural world of the earth. The horizontal axis consists of the four cardinal points in the earth plane, whose center is the gateway to the upper and lower worlds through which the shaman magically flies into the hidden inner experiential dimension. Each of the cardinal directions is associated with a color, a time of day, a season, a gender, and a quality (e.g., good, dangerous). At the center, all these attributes (male and female, warm and cold, benevolent and harmful) meet and are joined in one whole. A clockwise progression around the circle of directions symbolizes infancy, childhood, and the adolescent vision quest.[268] In figure 4.73, reproducing a circular model painted about 1915, the cross at the center symbolizes the place of creation: the Beaver Indians' creation myth involves the Creator's drawing a cross on the surface of the water and sending animals down to find land. When the muskrat came up with a speck of dirt under his nail, the Creator took it and placed it as the earth at the center of the cross on the water and told it to grow. The two inner circles represent the two supernatural worlds. The lines slanted outward from the cross lead to the hatched path to heaven, discovered by the culture hero Saya on his vision quest.[269]

SCAPULIMANCY

Scapulimancy is a form of divination in which random cracks and burns are induced on the scapula (shoulder blade) of a mammal (fig. 4.74). It was practiced in Eurasia as well as northern North America. Patterns were usually produced by heat (pyroscapulimancy), but percussion could also be used. In other cases divination could be based on the natural shape, color, and veining of the scapula. Divining often involved recognizing maplike patterns and relating these to known geographical features, usually lakes and rivers. True pyroscapulimancy was not reported in North America before the mid-nineteenth century,[270] though it may well have been practiced unknown to Euro-Americans.

An early description of scapulimancy was written by Napoleon A. Comeau based on a lifetime of experience with the Montagnais. Comeau described a "custom . . . known as 'outlickan meskina,' the literal translation of which is 'shoulder blade track,'" rarely practiced in the presence of outsiders. The scapula of the caribou was preferred as "the most truthful, and most far-seeing."[271] The scapula was held over red-hot coals for a few seconds, causing the bone to crack in various directions, and the cracks were then interpreted. Some were "read" noncartographically; for example, a short zigzag without branches meant much trouble and hardship. Much of the

266. Brody, *Maps and Dreams*, 266–67 (note 24).

267. Though there is no evidence that they were supposed to be destroyed on the death of their owners, the maps made in 1762 on skin by a Delaware preacher in the upper Ohio Valley appear to have had a very similar purpose (p. 91). Like the Beaver Indians in the late 1970s, the Delawares' lifestyle in 1762 was under pressure from European and Euro-American settlers, and their preacher's maps showed the relation between their former home, the land in the upper Ohio Valley to which they had been displaced, and the afterworld, to which the route was difficult (see fig. 4.34).

268. Robin Ridington and Tonia Ridington, "The Inner Eye of Shamanism and Totemism," *History of Religions* 10 (1970): 49–61, esp. 51–52.

269. Robin Ridington, "Beaver," in *Handbook of North American Indians*, ed. William C. Sturtevant (Washington, D.C.: Smithsonian Institution, 1978–), 6:350–60, esp. 354, and Ridington and Ridington, "Inner Eye."

270. With the exception of a brief mention in 1634 of the practice among the Algonquian-speaking natives around Quebec; see John M. Cooper, "Scapulimancy," in *Essays in Anthropology Presented to A. L. Kroeber in Celebration of His Sixtieth Birthday, June 11, 1936*, ed. Robert H. Lowie (Berkeley: University of California Press, 1936; reprinted, 1968), 29–43, esp. 29.

271. Napoleon A. Comeau, *Life and Sport on the North Shore of the Lower St. Lawrence and Gulf*, 3d ed. (Quebec: Telegraph Printing, 1954), 264.

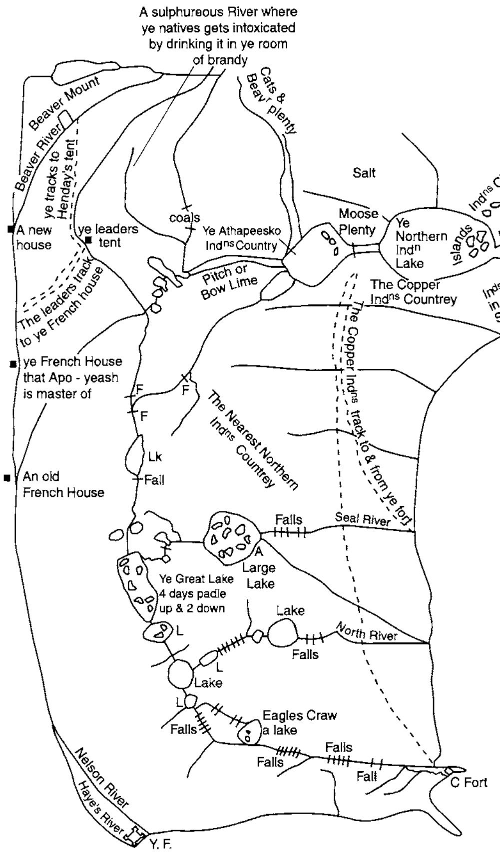


FIG. 4.72. REDRAWING OF A MAP OF HUDSON BAY (FIG. 4.71).
After John Warkentin and Richard I. Ruggles, eds., *Manitoba Historical Atlas: A Selection of Facsimile Maps, Plans, and Sketches from 1612 to 1969* (Winnipeg: Historical and Scientific Society of Manitoba, 1970), 89.

divining, however, was in relation to hunting strategy and involved reading part of the pattern of cracks and burns as a map. The largest burned spot always indicated the camp at which the divination was taking place, and smaller burned spots indicated game. Cracks leading to parts having burns were interpreted as maps of tracks, and these were followed on the ground.[272]

Scapulimancy using the bones of various animals was described by Speck among the Naskapis and the Mistassini Crees, to the north and west of the Montagnais.[273] Tanner, writing on the Crees, suggested that divination

(*Facing page*)
FIG. 4.71. ENHANCED MAP ON ANIMAL PARCHMENT OF AN EXTENSIVE AREA WEST OF HUDSON BAY, CA. 1760. Probably Chipewyan. Made for or compiled by Moses Norton, who took the map to London to inform the Hudson's Bay Company's Governors of potentially valuable commercial information concerning water routes in a virtually unknown area.
Size of the original: 88.5 × 64.5 cm. Photograph courtesy of the Hudson's Bay Company Archives, Provincial Archives of Manitoba, Winnipeg (Map G2/8).

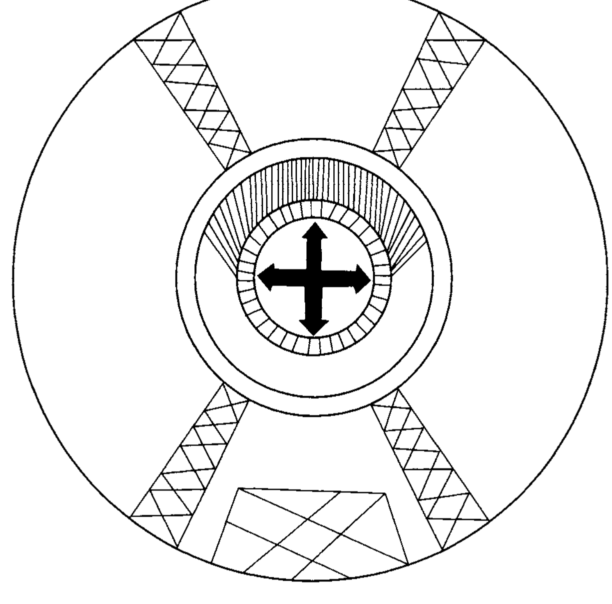


FIG. 4.73. COSMOGRAPHICAL DESIGN ON BEAVER INDIAN DRUMHEAD. This design on a shaman's drum shows the world divided into four quarters. The cross in the center fixes the middle of the earth and defines the cardinal directions (horizontally), each with Beaver totemic associations. Its center is the link between the Upperworld and the Underworld (vertically).
From Robin Ridington and Tonia Ridington, "The Inner Eye of Shamanism and Totemism," *History of Religions* 10 (1970): 49–61, esp. 52 (fig. 1).

differed according to the animals used. The scapulae of large mammals, such as moose and caribou, were more difficult, and perhaps more dangerous, to read than those of smaller animals. Larger bones were used only in times of the greatest meat shortage and, at the time Tanner wrote, by a dwindling number of people.[274] In one case Tanner was told that the narrow end of a pear-shaped scapula represented north and that the longitudinally arranged ridge (lateral process) on one side of the bone might separate east from west.[275]

Whatever the conventions and however the evidence was interpreted, patterns on scapulae were often related to terrain and hydrological patterns on the ground. Speck concluded that "scapulimancy is often cartographic."[276] He reproduced a native sketch of scapular divination,

272. Comeau, *Life and Sport,* 265–66; a photograph of a cartographically interpreted scapula is between 264 and 265.

273. Frank G. Speck, *Naskapi: The Savage Hunters of the Labrador Peninsula* (Norman: University of Oklahoma Press, 1935), 138–64.

274. Adrian Tanner, *Bringing Home Animals: Religious Ideology and Mode of Production of the Mistassini Cree Hunters* (New York: St. Martin's Press, 1979), 122–24.

275. Tanner, *Bringing Home Animals,* 118.

276. Speck, *Naskapi,* 146 (note 273).

FIG. 4.74. SCAPULA USED FOR DIVINATION. These hare shoulder blades were collected by Frank G. Speck, Lac Saint-Jean, Quebec, in 1931.
Sizes of the originals: ca. 5.5 × 3 cm and 5.9 × 3.2 cm. Photograph courtesy of the University of Pennsylvania Museum, Philadelphia (31-7-171 and 31-7-172; neg. 54-102140).

showing a Lake St. John Montagnais hunter which branch of a river he should hunt, along with a birchbark map made by the same Indian of the hydrological referents: the "Atikwabe'o" and its tributary the "Kak~ste'namickcipic, 'Black Beaver River'" draining into Lake St. John (Lac Saint-Jean).[277]

The ecological and social functions of scapulimancy are matters of debate. Moore has argued that among the Naskapis it randomized hunting patterns, so that the caribou could not learn to anticipate the behavior of the hunters.[278] Henriksen thinks it probable that the Naskapis practiced scapulimancy only in critical decision-making situations, when it externalized the decision of where to seek caribou. "In this way, good hunters could blame a possible failure on the shoulder-blade and hence safe-guard themselves; it would then become easier to take the initiative to go hunting in critical situations."[279] Whatever the indirect consequences and however important they may have been ecologically and socially, they stemmed from reading as maps the patterns randomly induced on bone.[280]

DESIGN BITING

Other randomly produced patterns that were sometimes read as trail maps were made by an indigenous process known as birchbark biting or design biting. Practiced by Subarctic Algonquian groups and usually done by women, it involved folding a thin sheet of birchbark and compressing it between the teeth to make symmetrical patterns (fig. 4.75). In recent times at least, descriptions by the Montagnais of chance or error patterns sometimes involved the concept of a trail map: "started to make trees, but trails came out"; "hunter's trails"; and "tents and connecting trail."[281] Neither the regional extent nor the historical origins of birchbark biting are known, but in the twentieth century it has been reported as far west as the Southern Ojibwas of northern Minnesota and the West Wood Crees of northern Saskatchewan.[282] There is no way of determining whether early examples of bitten barks contained patterns intended to be or interpreted as trail maps, however.

Whereas pyroscapulimancy and birchbark biting are undoubtedly old and indigenous practices, it is not possible to demonstrate conclusively that recognizing maps in

277. Speck, *Naskapi*, 140–42 and 145–46, esp. figs. 12A and 14D. (Although Speck says they were done by the same hunter, the hunter is named Cimon in one place and Cibic in the other.)

278. Omar Khayyam Moore, "Divination–A New Perspective," *American Anthropologist* 59 (1957): 69–74, esp. 71.

279. Georg Henriksen, *Hunters in the Barrens: The Naskapi on the Edge of the White Man's World* (St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland, 1973), 49.

280. Related to scapulimancy were the divination practices now known as scrying and pyromancy. Scrying involved peering for long periods at a smooth surface (traditionally, almost always water) to "see" distant things, viewed in something like plan, in order "to locate some feared enemy, stranger, or being in the bush"; John M. Cooper, "Northern Algonkian Scrying and Scapulimancy," in *Festschrift, publication d'hommage offerte au P. W. Schmidt,* ed. William Koppers (Vienna: Mechitharisten-Congregations-Buchdruckerei, 1928), 205–17, esp. 210. Scrying is mentioned in Thwaites, *Jesuit Relations,* 15:178, 17:210 (both in 1639), 33:192–94 (1648), and 39:20 (1653). Pyromancy, divination by fire, was observed by French Jesuits in the seventeenth century and sometimes had a cartographic function. In 1647 the Attikamek north of Trois-Rivières, Quebec, were reported to use it "to find animals in the woods, to discover if some enemy has not entered their lands, and for other similar purposes." In or just before 1635, the Jesuit Jean de Brébeuf saw an old woman foretell the fate of an Iroquois raid by means of small fires near a map of Lake Ontario drawn in the dirt. Thwaites, *Jesuit Relations,* 8:125 and 31:211 (note 113).

281. Frank G. Speck, *Montagnais Art in Birch-Bark, a Circumpolar Trait,* Indian Notes and Monographs, vol. 11, no. 2 (New York: Museum of the American Indian, 1937), 74–80, esp. pl. XIII. In the early twentieth century, of twelve experimental patterns made by biting folded pieces of birchbark, seven were interpreted to be maps of trails. The original bitten barks are in the Museum of the American Indian, New York (items 19/5763–19/5771, 19/5773–19/5775).

282. Accounts of bitten bark and birchbark biting, though not necessarily the recognition of maps on bark, include J. G. Kohl, *Kitchi-Gami: Wanderings Round Lake Superior* (London: Chapman and Hall, 1860), 412–14; Frances Densmore, *Chippewa Customs,* Bulletin of the Smithsonian Institution Bureau of American Ethnology 86 (Washington, D.C.: United States Government Printing Office, 1929), 184–85; and Harry Moody, "Birch Bark Biting," *Beaver,* outfit 287 (spring 1957): 9–11. The earliest account is found in Thwaites, *Jesuit Relations,* 63:291 (note 113), in a 1687 letter by Thierry Beschefer. The source of the bitten barks was not given, but Beschefer's sphere of influence was such that it could have been anywhere between the Maritimes and Lake Superior.

the chance patterns was equally old and entirely indigenous. Although it is unlikely, we cannot discount the possibility that it emerged after contact with Europeans and their maps. Furthermore, the practices were apparently characteristic of only one major North American region.

MAPS MADE DURING EUROPEAN-INDIAN INTERACTION

Some Subarctic Indian groups had sustained contact with Europeans, notably employees of the Hudson's Bay Company, starting in the eighteenth century. It is through this connection that many of the extant maps made by Subarctic Indians have survived. The company's efficient but secretive record-keeping preserved for posterity about three-quarters of the 837 manuscript maps (mostly on paper) known to have been made for it between 1670 and 1870. Of these, most are of Subarctic areas, and almost all are still in the company archives in Winnipeg. They include 16 maps drafted by native persons and 20 based on sketches or descriptions provided by natives. Most of these 36 maps were made by Subarctic Indians, and all were made after 1766.[283] Many are of very large areas, combining two types of accumulated experience: north-south knowledge derived over many generations of following the caribou, and east-west knowledge derived over fewer generations of annual travel, often covering long distances, to bring pelts to the company's posts on the shores of Hudson Bay (see figs. 4.62, 4.63, 4.71, 4.78, 4.81, and 4.83).

Of the ephemeral maps Subarctic Indians produced for European explorers, several were notable for covering extremely large areas. In 1789, on the lower Mackenzie River, a Hare or Dogrib Indian who had been promised some beads drew for Alexander Mackenzie "upon the Land" a map apparently of what is now Yukon Territory and Alaska.[284] Some three decades later, Indian guides, including a métis who had grown up with the Dogribs and Yellowknives, "drew a chart . . . on the floor with charcoal" for John Franklin "exhibiting a chain of

FIG. 4.75. BITTEN PATTERNS ON BIRCHBARK, SOME INTERPRETED AS MAPS OF TRAILS. Lake St. John band of Montagnais, early twentieth century. These interpretations suggest an intuitive appreciation of "map" by the mainly female biter-interpreters. The figures from top to bottom are: trees and trails, trails, tents and connecting trail, and crossing trails.
Courtesy of the National Museum of the American Indian, Smithsonian Institution, New York (no. 19/5764–19/5767).

283. Ruggles, *Country So Interesting,* 193–255 and 266 (note 25). There is a substantial literature on these maps; in addition to Ruggles, see, for example, Judith Hudson Beattie, "Indian Maps in the Hudson's Bay Company Archives," *Association of Canadian Map Libraries Bulletin* 55 (1985): 19–31; idem, "Five Area Maps Recorded by Peter Fidler" (note 253); D. Wayne Moodie, "Indian Map-Making: Two Examples from the Fur Trade West," *Association of Canadian Map Libraries Bulletin* 55 (1985): 32–43; John Warkentin and Richard I. Ruggles, eds., *Manitoba Historical Atlas: A Selection of Facsimile Maps, Plans, and Sketches from 1612 to 1969* (Winnipeg: Historical and Scientific Society of Manitoba, 1970), 66–71, 86–105; and David H. Pentland, *Cree Maps from Moose Factory* (Regina: Privately printed preliminary edition, 1978), five pages and twenty photocopied manuscript maps.

284. W. Kaye Lamb, ed., *The Journals and Letters of Sir Alexander Mackenzie,* Hakluyt Society, extra ser., no. 41 (Cambridge: Cambridge University Press, 1970), 213.

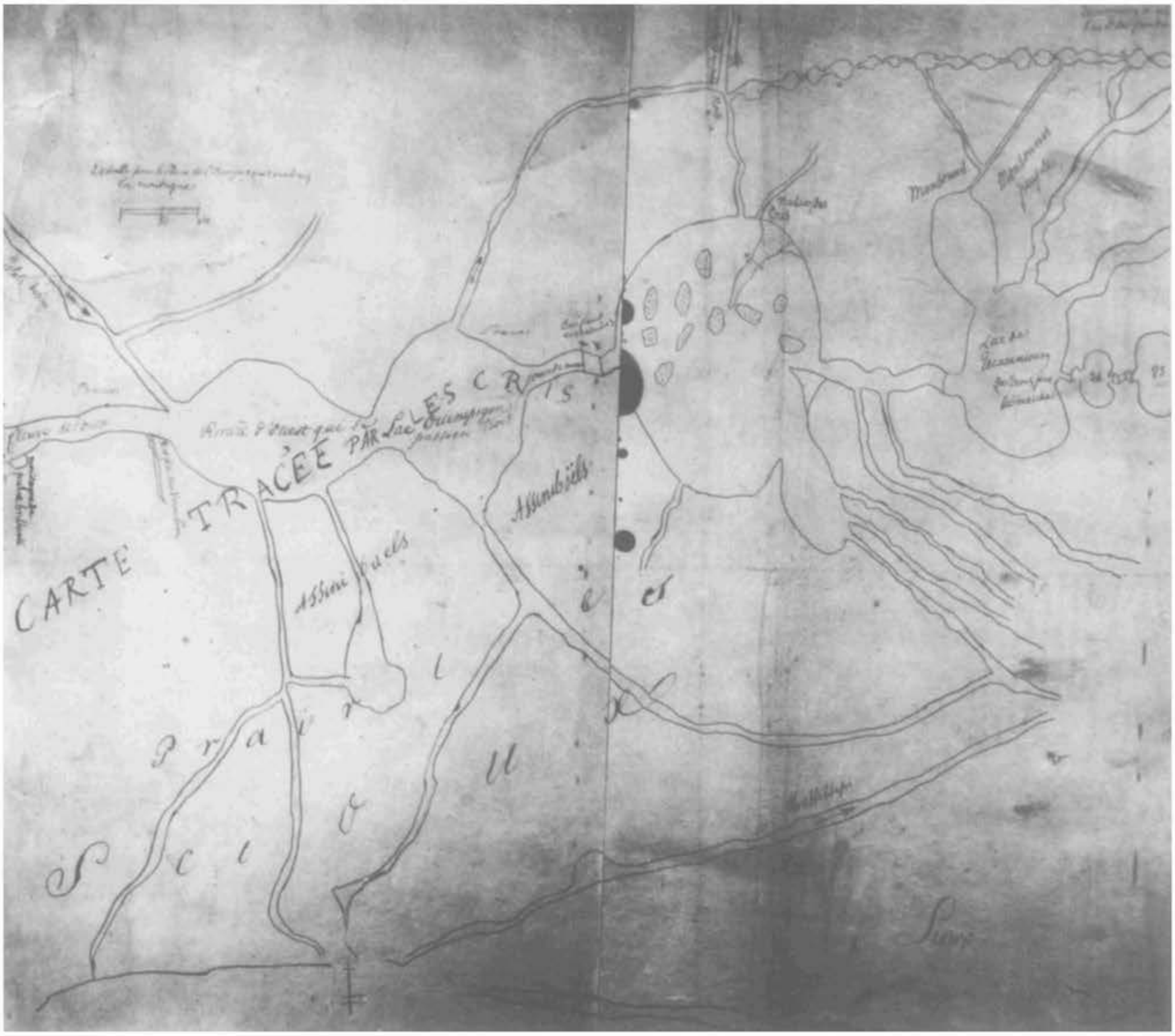


FIG. 4.76. MAP OF WHAT IS NOW MAINLY SOUTHERN MANITOBA BASED ON CREE MAPS. This is the left part of an untitled manuscript, ink on paper, almost certainly compiled in 1728 or 1729 by Pierre Gaultier de Varennes et de La Vérendrye. According to La Vérendrye's accompanying report, the map was derived from three Cree maps. This portion depicts Lake Winnipeg (Lac Ouinipigon), Lake of the Woods (large, unlabeled lake), Rainy Lake (Lac de Tecacamiouen), and associated rivers and lakes, and it is generally referred to as "Carte Tracée par les Cris" after the bold inscription on the left. This is a photograph of what was probably the original. Size of the entire original: 25.5 × 73.5 cm. Photograph courtesy of the National Archives of Canada, Ottawa (NMC 24556). Original held in the Centre des Archives d'Outre-mer, Aix-en-Provence (Archives Nationales, France), E 199, dossier Gaultier de la Verendrye de Varenne (Pierre).

twenty-five small lakes extending towards the north."[285] It covered the region to the east of that in the map made for Mackenzie, extending north from Great Slave Lake to Great Bear Lake and beyond to Coronation Gulf. Neither of the maps was copied, but together they probably represented more than one million square kilometers.

A map "chalkt out" on a dining room floor in London in 1742 or 1743 gave rise to one of the best-known mid-eighteenth-century printed maps of western and northern Canada. The map chalked by Joseph La France, son of a French fur trader and an Ojibwa woman, was incorporated as a major component of Arthur Dobbs's "A New Map of Part of North America." The making of La France's map was an example of a procedure in which Europeans or Euro-Americans and natives interacted, questioning and modifying each other's information until a consensus was reached.[286] The facility with which Indians

285. John Franklin, *Narrative of a Journey to the Shores of the Polar Sea,* 3d ed., 2 vols. (London: John Murray, 1824), 1:318–19.

286. Christian Brun, "Dobbs and the Passage," *Beaver,* outfit 289

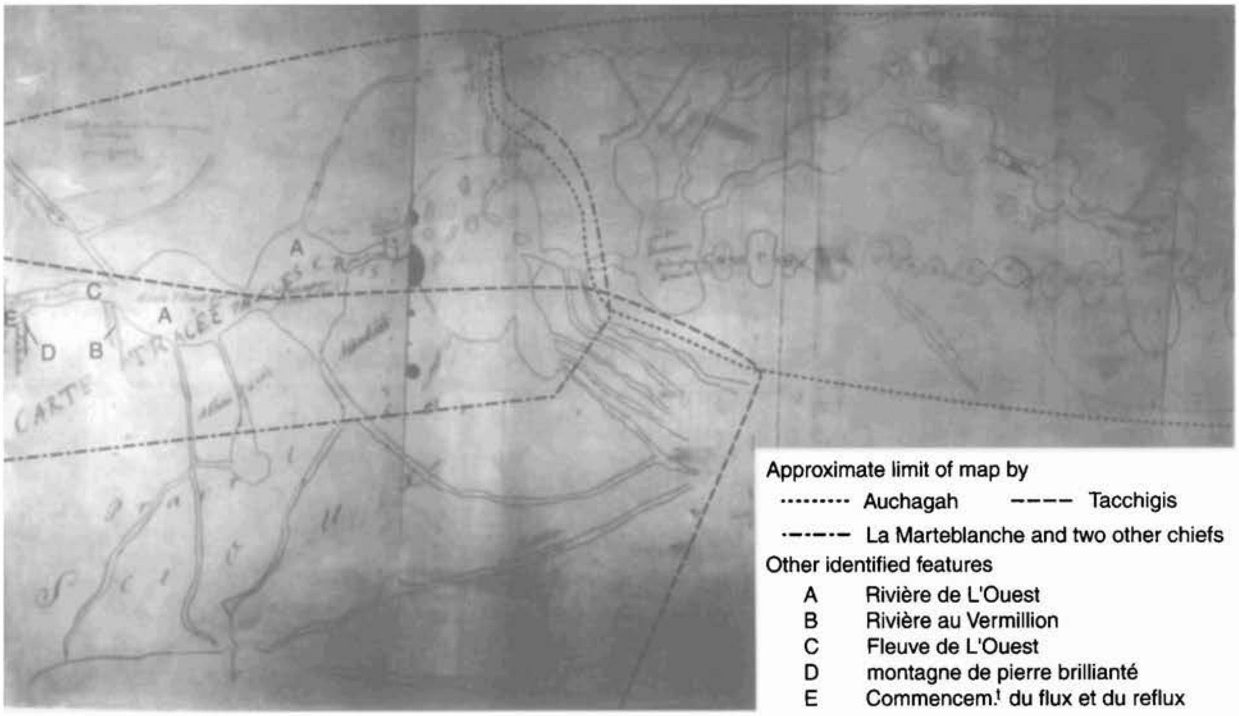


FIG. 4.77. INDIAN SOURCES FOR FIGURE 4.76. La Vérendrye's map was an integral part of his submitted report of 1729: "Continuation of the Report of the Sieur de La Vérendrye Touching upon the Discovery of the Western Sea." The report supplies information on the three Cree maps (made by Auchagah, La Marteblanche and two other chiefs, and Tacchigis–none of these maps survive) that were the source of figure 4.76. Derived from evidence in his report, this illustration shows the probable native map sources for the left and central parts of La Verendrye's composite map.

extended Europeans' maps of rivers and coastlines beyond the limits of the latter's explorations suggests that the procedure may well have been used traditionally between different groups of Indians.

The contribution of Indian maps, most of which did not survive, to the compilation of European and Euro-American manuscript and printed maps can frequently be inferred from the stylized and simplified representations of lakes and rivers. For example, on many printed presurvey maps of the Canadian Shield, the complex, irregular hydrography is represented as straight sequences of small circular shapes, rather like beads on a lightly stretched necklace. Such patterns were characteristic of maps made by Inuit as well as Subarctic Indians, whose concern was not with distance, direction, or planimetric shape, but with river inflows, lake outflows, and sequences of features along frequently used water routes.[287] Occasionally portions of Euro-American maps can be easily matched with corresponding native maps, but many more examples of native content incorporated on Euro-American maps doubtless remain to be demonstrated.

Features of particular importance to Indians and of characteristically Indian style persisted on maps made at the request of outsiders. Inconspicuous but culturally important features were often represented on maps that were relatively empty. Pierre Gaultier de Varennes et de La Vérendrye's composite map of 1729, compiled from three Cree maps, is a good example (fig. 4.76; fig. 4.77 shows its Indian sources).[288] Among the somewhat sparse details toward the left (approximately northwest and remotest from the French sphere) are a "Rivière au Vermillon" and a "montagne de pierre brillanté." The representation of the solitary river in a region of many rivers may have arisen from its importance as a source of onaman: colored sacred sand that was used as medicine. The "montagne de pierre brillanté" was a similarly exceptional feature, described by one of the Indian informants as "a small mountain, the stones of which sparkle night and day . . . the Dwelling of the Spirit, no one ventures to go near it." The Crees may well have been focusing on

(autumn 1958): 26–29, esp. 29, reproduces the account by Walter Bowman (a friend of Dobbs) of La France's drawing. The map was published in Arthur Dobbs's politically controversial work, *An Account of the Countries Adjoining to Hudson's Bay* (London: J. Robinson, 1744).

287. There are two good examples of such representations to the west of Lake Superior on "A Plan of Captain Carver's Travels in the interior Parts of North America in 1766 and 1767," almost certainly incorporating Indian information, first published in Jonathan Carver, *Travels through the Interior Parts of North-America, in the Years 1766, 1767, and 1768* (London, 1778).

288. Lewis, "Misinterpretation of Amerindian Information," and idem, "La Grande Rivière" (both note 2), discuss this map, its sources, and its influence.

these features in response to La Vérendrye's inquiries about placer gold and mountains far to the west.[289] Their responses, however, were with reference to small features endowed with cultural importance.

The reasons for the representation of specialized features on maps drawn by Subarctic Indians is not always immediately apparent. For example, the 150-kilometer limestone escarpment ("same ridge as Limestone Rapid–Nelson River & Big Fall Churchill River–a large hill [Big Fall]") and two old beach lines of Hudson Bay ("a ridge of Gravel & a hill of Wood") are clearly represented on an otherwise fairly empty early nineteenth-century Cree map of what is now northeastern Manitoba (fig. 4.78). A possible explanation is that they were land routes across what was undoubtedly difficult terrain; but in that case, why weren't they indicated as paths or trails?

The reason for including a similar feature on a more detailed map drawn of the same area in 1894 is more obvious. Two Chipewyans, Jimmy Anderson and Curly Head, represented sand ridges to the north of the lower Churchill River; these were almost certainly some of the eskers and kames deposited during the last (Wisconsin) glaciation (fig. 4.79). Since the map was made for the geologist J. B. Tyrrell, for whom the geologic features would have been of particular interest, he may have asked that they be noted on the map. The Chipewyans also delineated the "Edge of Woods" for Tyrrell on the 1894 map, marking with a dashed line the boundary between the spruce-and-fir forests in what are now northern Manitoba and Saskatchewan and the tundra with occasional patches of trees and shrubs farther north, distinctively different but equally familiar environments. Indeed, in drawing the "Edge" they were following in a long Chipewyan tradition represented in composite by figure 4.80. The earliest evidence is on three contemporary transcripts of mid-eighteenth-century maps (fig. 4.81 and 4.83; fig. 4.71 above). Seen together and interpreted in the contexts in which they were made, it is clear that the Chipewyan mapmakers were keenly aware of the two ecologically different worlds.

Meatonabee, one of the Indians who drew the original of the map illustrated in figure 4.81, led Samuel Hearne on his third and successful attempt to reach the sources of low-grade copper in the valley of the lower Coppermine River. Hearne reported the strategic significance that Meatonabee consciously gave to the "woods edge" in planning the route to be followed and in scheduling the various stages of the proposed journey in relation to seasonal conditions. Hearne's manuscript map of 1772, which had been compiled in part on a "Strict enquiry of the natives," clearly depicted "The Woods Edge" by means of a dotted line ornamented at regular intervals by a coniferous-tree symbol.[290] Undoubtedly Meatonabee was one of Hearne's informants concerning this feature, which is approximately two thousand kilometers long. Figure 4.81 shows, between the Coppermine River and Fort Churchill, "The leaders track in coming to ye fort," but there is no other line that could be inferred to generalize the tundra-forest transition zone. In two places, however, the absence of woods is indicated near the coast, and the largest, but not boldest, word on the map is "Woods" in pencil, well inland close to the marked track.[291]

This transcript of Meatonabee and Idotlyazee's map, probably made by Moses Norton, uses a scalloped line to show the boundary between the Back Lowlands–Thelon Plain and the uplands and mountains of the shield proper, extending through the interior from the head of Chesterfield Inlet almost to the mouth of the Coppermine River. On the same map, five short segments of the same pattern represent the bolder Bathurst Hills: the "Stoney Mountains." The scalloped line was a simplified version of the hill-in-profile pictograph commonly used by North American Indians to represent mountains (see fig. 4.82).

A remarkable feature of two eighteenth-century maps by Subarctic Indians, which is also found on two Inuit maps (see below, figs. 4.94 and 4.95), is the extraordinary generalization of up to four thousand kilometers of the continental coastline of what are now the Canadian Northwest Territories. The coastline is represented as essentially straight although it has two enormous peninsulas (Melville and Boothia) and one major change in over-

289. Lewis, "La Grande Rivière," 72–78; the description by the Indian informant can be found in Pierre Gaultier de Varennes de La Vérendrye, *Journals and Letters of Pierre Gaultier de Varennes de La Vérendrye and His Sons,* ed. Lawrence J. Burpee (Toronto: Champlain Society, 1927), 58.

290. "A Map of part of the Inland County to the N^{h} W^{t} of PRINCE of WALE'S Fort H^{s};B^{y}, Humbly Inscribed to the Gov^{nr} Dep^{y}, Gov^{nr} and Committee of the Hon^{ble}, Hud^{ns},B^{y} Comp^{y} By their Hon^{rs}, moste obediant humble servant. Sam,^{l} Hearne; 1772." Manuscript, ink on paper, 76.7 × 82.5 cm, Hudson's Bay Company Archives, Winnipeg (G2/10); for an illustration, see Ruggles, *Country So Interesting,* pl. 9 (note 25).

291. For more on this map see June Helm, "Matonabbee's Map," *Arctic Anthropology* 26, no. 2 (1989): 28–47. A recent study of the positional response of the wood's edge to climatic changes drew on the evidence of dendrochronology and historical records. Reproducing a transcript of figure 4.83, it concluded that "cardinal directions are not represented realistically, however, making the map unreliable for our purposes" (p. 189). In contrast, "the maps of Samuel Hearne" were considered to "have much greater fidelity to cardinal directions and the shapes of rivers and lakes" (pp. 189–90). Although recognizing that "the routes taken by Hearne indicate that he could not actually have seen all the features depicted on his general map [footnote 290] and must have relied upon accounts from his native guides" (p. 190), the authors seem unaware that very little of the wood's edge could have been surveyed or that information about its position must have been obtained from Meatonabee and Idotlyazee. With greater awareness they might not have concluded that "Hearne's map of the woods edge is particularly important" as evidence. Glen M. MacDonald et al., "Response of the Central Canadian Treeline to Recent Climatic Changes," *Annals of the Association of American Geographers* 88 (1998): 183–208.

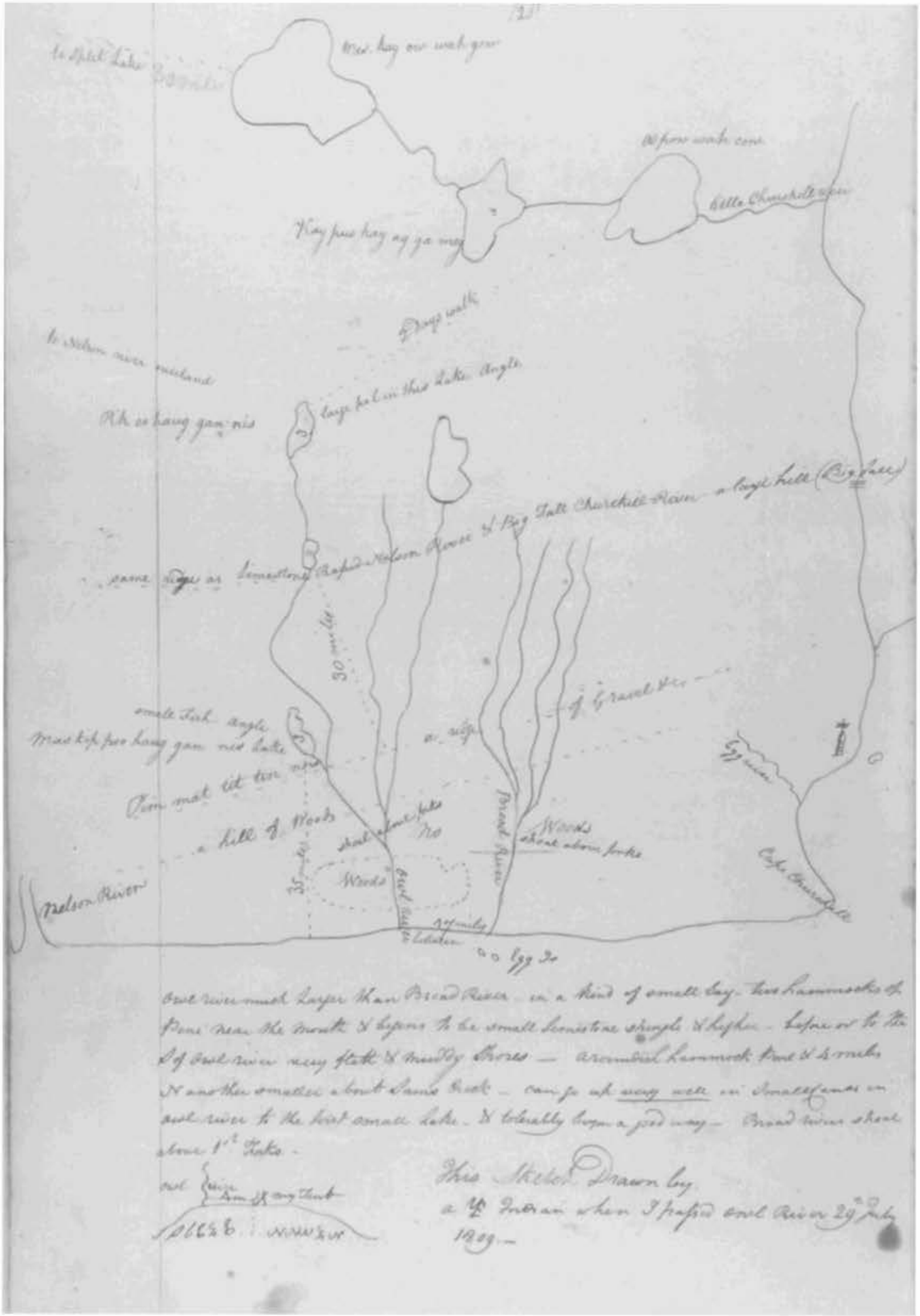


FIG. 4.78. YORK FACTORY INDIAN'S MAP OF THE AREA BETWEEN THE LOWER NELSON AND LOWER CHURCHILL RIVERS. The map, in Peter Fidler's notebook, is titled "This Sketch Drawn by a YF [York Factory and almost certainly Cree] Indian when I passed Owl River 29th July 1809" and shows the Hudson Bay shore in northeastern Manitoba between the mouths of the Nelson and Churchill Rivers and the area inland.
Size of the original: 37.5 × 24 cm. Photograph courtesy of the Hudson's Bay Company Archives, Provincial Archives of Manitoba, Winnipeg (E3/3, fol. 65d).

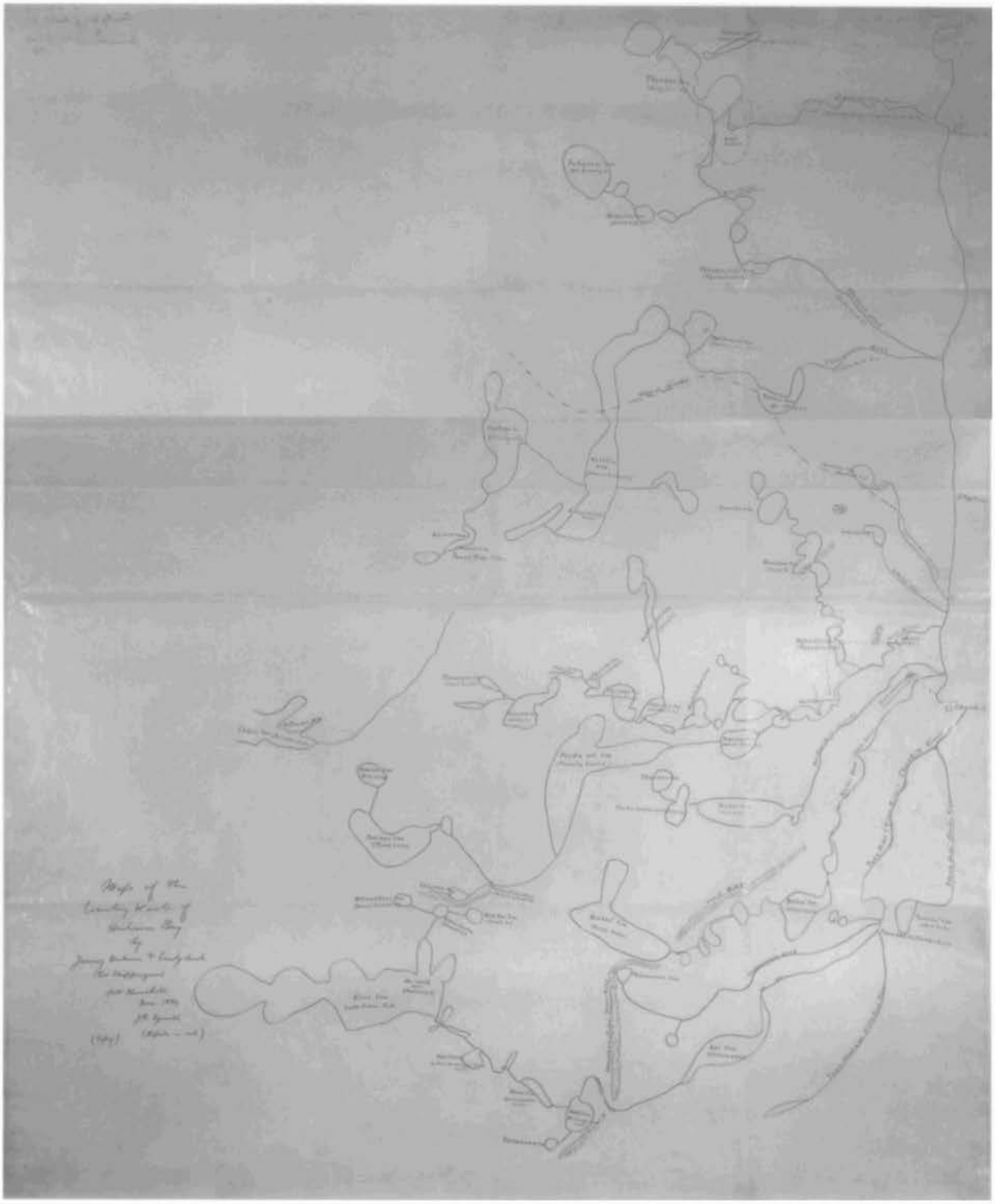


FIG. 4.79. JIMMY ANDERSON AND CURLY HEAD'S MAP OF THE LAKES AND RIVERS WEST OF HUDSON BAY. Manuscript copy in ink on paper, 1894. The inscription reads: "Map of the Country West of Hudson Bay by Jimmy Anderson & Curly head (two Chippewyans) Fort Churchill Nov. 1894, J. B. Tyrrell (Rapids in red) (Copy)." Thematic content includes dashed line, "Edge of Woods"; a fine dashed line, "Large Timber" (exclave of coniferous forest on the tundra); "Sand Ridge"; and English translations of Indian toponyms, some incorporating thematic information, e.g., "Boggy Ground L." and "Gravel Ridge Lake." What may be an earlier version of this map is in the same collection in four sheets, and on it the pencil lines could well be the Chipewyans' originals; it does not, however, reproduce well.

Size of the original: 95 × 76.5 cm. Photograph courtesy of the J. B. Tyrrell Papers, Thomas Fisher Rare Book Library, University of Toronto (1894.016).

all direction. The earlier of the two maps, compiled by James Knight when he was governor of the Hudson's Bay Company's territories, was based in large part on Cree and Chipewyan maps made for him before his death in 1719 or 1720 (fig. 4.83). It represents the coastline from Fort Churchill to the mouth of the Coppermine River as almost a straight line, with a slight change in direction at Repulse Bay, where in reality one does not exist. Knight used two or more Indian maps as sources, and lacking a clear understanding of the coast as a whole, he may have misunderstood their orientation and joined the components in a way that did not represent Indian understanding of the coast.

There is no such explanation for the 1767 map by Meatonabee and Idotlyazee, on which the same coastline is represented as even straighter than on Knight's map. Chipewyans were frequent visitors to Churchill Factory, where the map was copied and supplemented by Moses Norton, and they also knew the interior very well, as shown by Meatonabee's successfully guiding Samuel Hearne's expedition to the Coppermine River. They may not, however, have had knowledge of the coastal region north of Churchill Factory. That was entirely within the Inuit culture region, where languages and way of life were different from those of the Athapaskan-speaking Indians of the interior. As late as 1892, annotations on a contemporary transcript of a canoe-route map made for Tyrrell by a Chipewyan named Andrew, which ended at the middle Great Indian (Thelon) River, noted that the route was "known only to the Eskimos" (fig. 4.84). Yet Meatonabee and Idotlyazee's map, in addition to representing the rivers and lakes of the interior, does indicate their lower courses to the sea with reasonable felicity.

Andrew's map represents a highly complex route, almost one thousand kilometers long, across portages, and through scores of complexly shaped lakes from Lake Athabasca northeast to the Thelon River in what is now the Northwest Territories. It was made to indicate that a passable route existed, was known to the informant, and linked the place at which it was made to a major feature (Hudson Bay) that Tyrrell wished to reach. It is doubtful whether the map would have been of any use to an uninitiated guide. Tortuous river courses are smoothed out, and complex lake shorelines are either symbolized by circles and ovals or caricatured to emphasize critical bays and peninsulas. The spacing of features along the route is certainly not planimetric and probably not even according to travel time. None of the innumerable potentially false routes are represented.

Unlike most canoe-route maps, Andrew's does not represent rapids or falls. Yet such features were common on maps made by Subarctic Indians, always represented by one or more short strokes transverse to the line of the river channel. The enhanced map on animal parchment

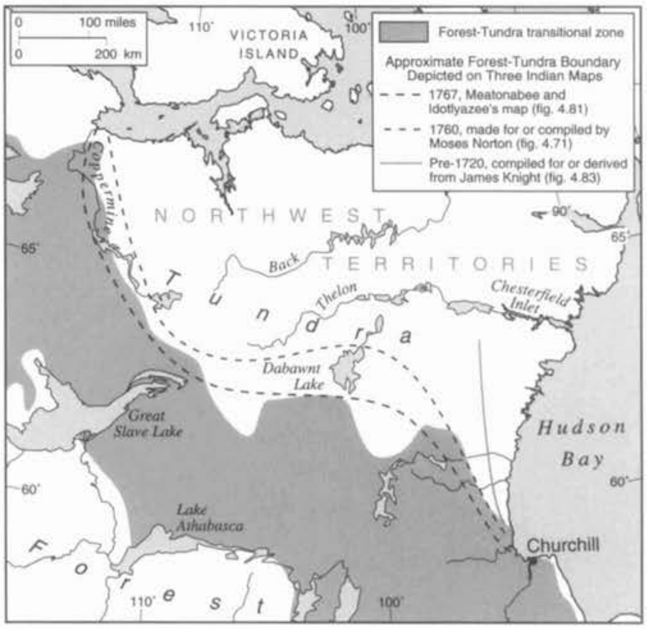


FIG. 4.80. FOREST-TUNDRA BOUNDARIES FROM INDIAN MAPS OF THE NORTHERN INTERIOR. This map shows boundaries from the untitled map of an extensive area west and northwest of Hudson Bay (fig. 4.83); "Moses Nortons Drt" (fig. 4.71); and Meatonabee and Idotlyazee's "Explanation of a Draught" (fig. 4.81). These three maps were the sources of dashed lines pre-1720, 1760, and 1767, respectively, on this figure.

of the area west of Hudson Bay about 1760 is a good example (fig. 4.71).

Although Indian characteristics persisted in maps made for Euro-Americans, the maps were necessarily also influenced by factors introduced by Euro-Americans. The media supplied for making maps influenced their appearance. A map of Lake Nipigon made at Fort William in 1869 by Ojibwas (Indians of the Northeastern region but having much in common with the Northern Ojibwas, their Subarctic neighbors immediately to the north) for the geologist Robert Bell is a good example of media proportions' influencing overall map shape (fig. 4.85). The map was drawn by Windigo, assisted by other Indians from Lake Nipigon, at Bell's request and on a sheet of paper he supplied. If the sheet had been oriented with the long axis vertical the map probably would have been shaped much closer to planimetry (fig. 4.86). Bell's account of the procedure suggests a casual response to his request.

> I gave one of them [Windigo] a sheet of paper, which he spread upon the cook's baking board and went to work with a lead pencil to make a sketch of the lake [Nipigon]; all the rest standing round him in a circle helping him by their suggestions and improvements. While this interesting work and discussions were going on, some one (in an evil moment) knowing their

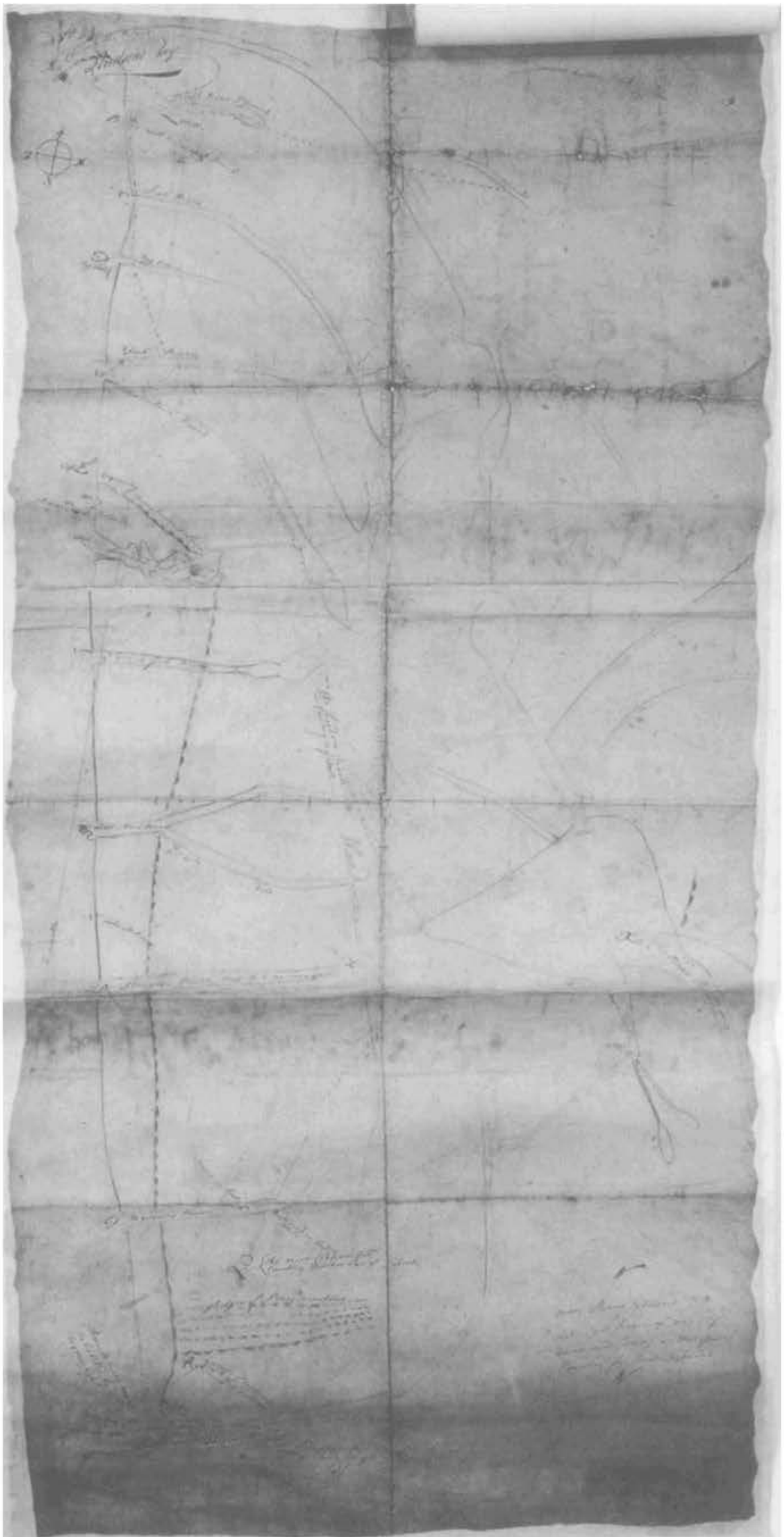


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FIG. 4.81. MEATONABEE AND IDOTLYAZEE'S MAP OF AN EXTENSIVE AREA OF MAINLAND CANADA NORTHWEST OF HUDSON BAY. Chipewyan, 1767. Transcript on paper (probably by Moses Norton) of original on deerskin, pencil enhanced in ink; endorsement: "An Explanation of a Draught brought by two Northern Indian Leaders Call^{d} Meatonabee & Idotlyazee, Of Y^{e} Northward of Churchill River Viz^{t} Hudsons Bay." Geometrically, at least, this seems to be an exact copy of the original skin.
Size of the original: 144.8 × 71.8 cm. Photograph courtesy of the Hudson's Bay Company Archives, Provincial Archives of Manitoba, Winnipeg (G2/27).

> weakness–tossed them a pack of cards. In an instant, baking board, paper and pencil were dropped and games commenced, at which they played with great eagerness all afternoon. . . . I afterwards got the map finished and here is the result of their combined effort, only touched up with a little color. I should mention that the shape is distorted Indian fashion to fit the paper and to make the most of it.[292]

Other shapes on Windigo's map were probably not the consequence of paper size and proportion. Two bays on the left (approximately west) of Lake Nipigon are represented as disproportionally large and indented. Grand Bay and Gull Bay were on the part of the coast on which the Ojibwas had been granted small reserves by the terms of the Robinson-Superior Treaty of 1850. On Windigo's map these two bays and the intervening stretch of coast constitute approximately 30 percent of the lake's total shoreline; in reality, they make up approximately 10 percent. This exaggeration was most probably a consequence of long-standing tradition in showing the Gull Bay area: the bay had long been the most important point of entry into the lake by Indians in their small birchbark canoes, and the Gull River was the route used to and from Fort William on Lake Superior.[293] Significantly, the Gull River is represented wide and bold on Windigo's map.

Scientific surveys also fostered and influenced Indian mapping in the Far North. In 1838 a Cree had suggested to the Hudson's Bay Company's trader, Robert Miles, at Fort Rupert that Charlton Island at the south end of James Bay would make a good beaver preserve. It was unsettled, virtually unknown, and without both beavers and most of their mainland predators (it did have otters, which could destroy the beavers). In the winter of 1838–39 two Crees were ordered to map the island and trap otters. They produced a chart in pencil containing "sixty one Lakes laid down by them, they consider eligible and desirable in every respect for Beaver to inhabit but they say there are many more other smaller Lakes they did not note, but which nevertheless if Beaver were numerous on the Island they would with their customary sagacity render inhabitable by their dams."[294] In the spring of 1839

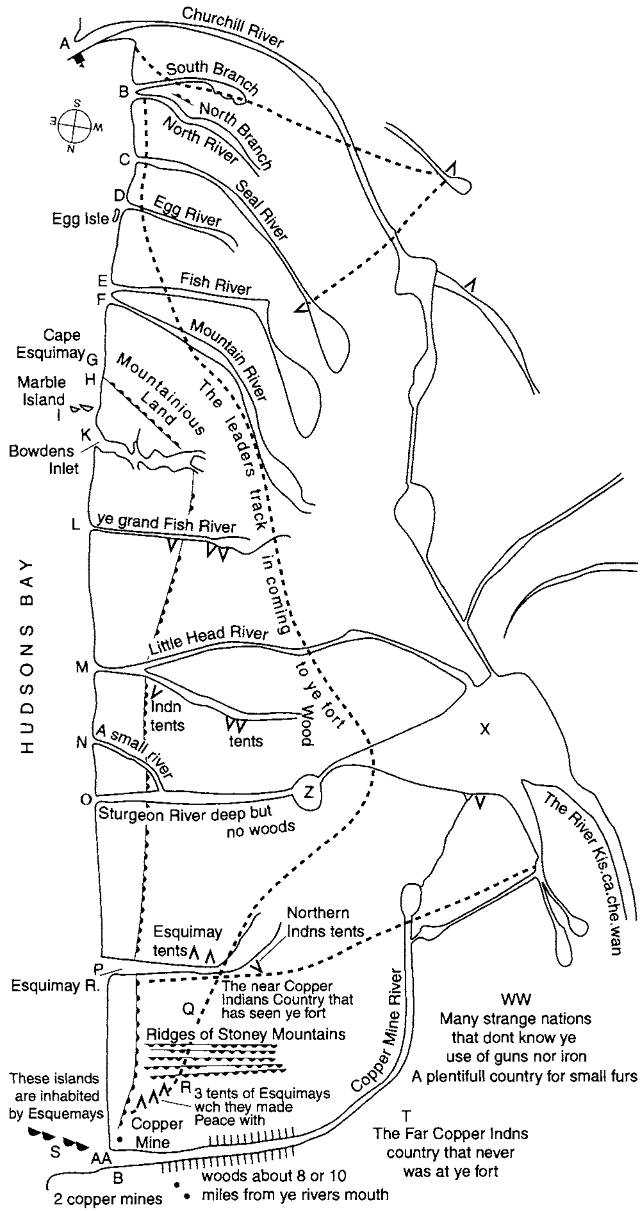


FIG. 4.82. REDRAWING OF MEATONABEE AND IDOTLYAZEE'S MAP (FIG. 4.81).
After John Warkentin and Richard I. Ruggles, eds., *Manitoba Historical Atlas: A Selection of Facsimile Maps, Plans, and Sketches from 1612 to 1969* (Winnipeg: Historical and Scientific Society of Manitoba, 1970), 91.

292. "Lecture on 'Exploration in the Nipigon Country' by R. Bell, Delivered under the Auspices of the Nat. Hist. Socy. of Montreal, Feby. 10th 1870. Being the First of the Sommerville Course," manuscript, Robert Bell Collection, National Archives of Canada, Ottawa (MG 29 B 15, vol. 36).

293. *Historical Atlas of Canada*, vol. 1, pl. 63 ("Transportation in the Petit Nord," by Victor P. Lytwyn) (note 71).

294. "Rupert House Journals, 1838–39," Hudson's Bay Company Archives, Winnipeg, B186/a/58, p. 33, 16 and 20 April 1839. The original chart is lost, but a copy of 1839 is extant: "Copy.–Survey of Charl-

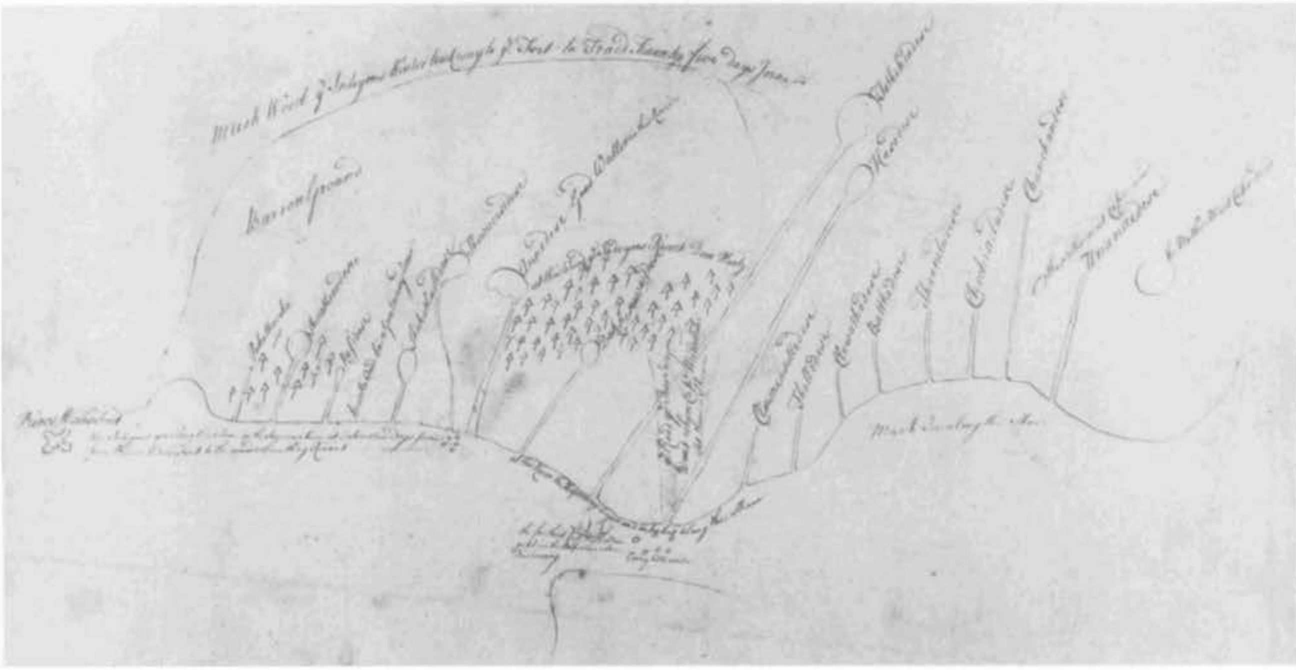


FIG. 4.83. MAP OF AN EXTENSIVE AREA OF MAINLAND CANADA NORTHWEST OF HUDSON BAY. The map incorporates pre-1720 Cree and Chipewyan maps; it was compiled by or derived from James Knight, but with additions to 1742. Not enough is known about this map to tell whether Indians gave it its overall shape, but it was the first of several to present as an approximately straight line the complex coastline of the west side of Hudson Bay, the Gulf of Boothia, and Queen Maud and Coronation Gulfs.
Size of the entire original: 52 × 66.5 cm. Photograph courtesy of the Hudson's Bay Company Archives, Provincial Archives of Manitoba, Winnipeg (G1/19).

several mature beavers were shipped to Charlton Island.[295] The second winter another survey was done, and a chart was made by the Crees with thirty-one additional lakes.[296] During the next four winters Crees were sent to record the proliferation and diffusion of occupied beaver lodges. A total of eight maps were made between 1839 and 1846, and six are extant (fig. 4.87).[297]

The Charlton Island surveys and charts were probably part of the first involvement by native North Americans in a scientific, as distinct from exploratory, survey. Very often the distinction between the two forms of survey was not as sharp. Between 1858 and 1914 officers of the Geological Survey of Canada copied into their field notebooks more than thirty maps made for them by Indians and, less frequently, Inuit in the course of surveys in regions as far apart as southern Quebec, coastal British Columbia, Labrador, and the Yukon. Most were made to help in wayfinding and to show relations between known features separated by unknown hinterlands. Some, however, revealed geological features and mineral resources. For example, on 13 July 1896 in the Cross Lake region, Joseph B. Tyrrell recorded the following: "We went into the house of an Indian named [space] and he showed me some large pieces of black tourmaline and some excellent

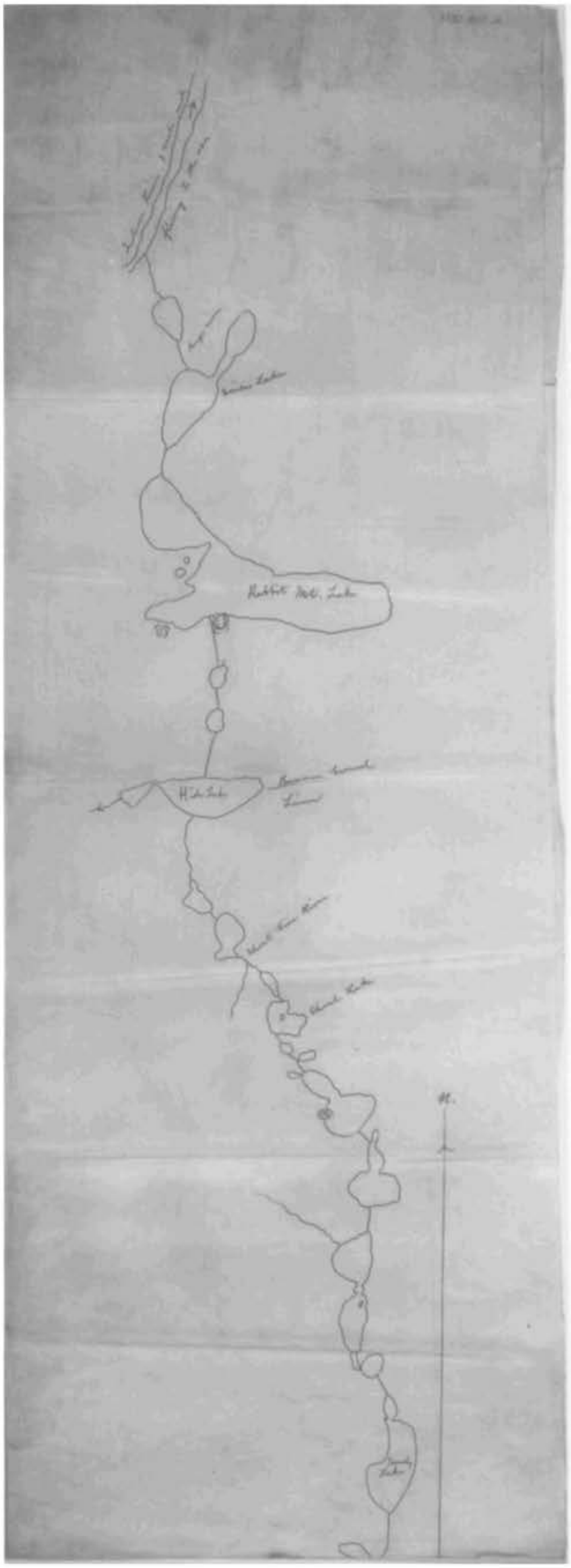
ton as laid down by Kennewap & Cauc-chi-chenis themselves in pencil whilst at Charlton, February and March 1839, In[k]'d over their own marks by C. T. R. Miles at Ruperts House 16 April 1839 . . . signed Robt. Miles. Copied by henry Connolly," 53.4 × 65.5 cm, ink on coarse paper. Hudson's Bay Company Archives, G1/65.

295. "Rupert House Journals, 1838–39," entry for 13 April 1839, p. 32.

296. "Sketch Simpson's Bever-preserve Charlton Island as originally laid down by the Indians 1838/39 Red Ink additions thereto by them 1839/40," 52.8 × 65.3 cm, ink on paper, 1842 (?), Hudson's Bay Company Archives, G1/68. A third chart of 1844–45 recorded by letters and numerals thirty-six lakes that it had not been possible to visit and, on the other lakes, the locations of thirty-five occupied lodges with young, one occupied lodge without young, and one lodge with uncertain occupancy.

297. See Ruggles, *Country So Interesting,* 86 (note 25); the maps are listed on 212–15 (240[A], 251[A], 256[A], 268[A], 275[A], and 276[A]) and 250 (136[C] and 140[C]).

(Facing page)
FIG. 4.84. CONTEMPORARY TRANSCRIPT OF ANDREW'S MAP OF THE SEVEN-DAY CANOE ROUTE FROM LAKE ATHABASCA TO THE THELON RIVER, NORTHWEST TERRITORIES, 1892. Routes across terrain with few resources and limited opportunities were often represented in the simplest of ways, as a single path, with little or no concern for branches or hinterland features. The map is a contemporary transcript, black ink on tracing linen with red portages, dated 30 July 1892, annotated by J. B. Tyrrell. From an original in six sheets by Andrew, a Chipewyan from Fond du Lac.
Size of this transcript: 139 × 25 cm. Photograph courtesy of the J. B. Tyrrell Papers, Thomas Fisher Rare Book Library, University of Toronto (1892.012).


Rabbit Mt. Lake
N.

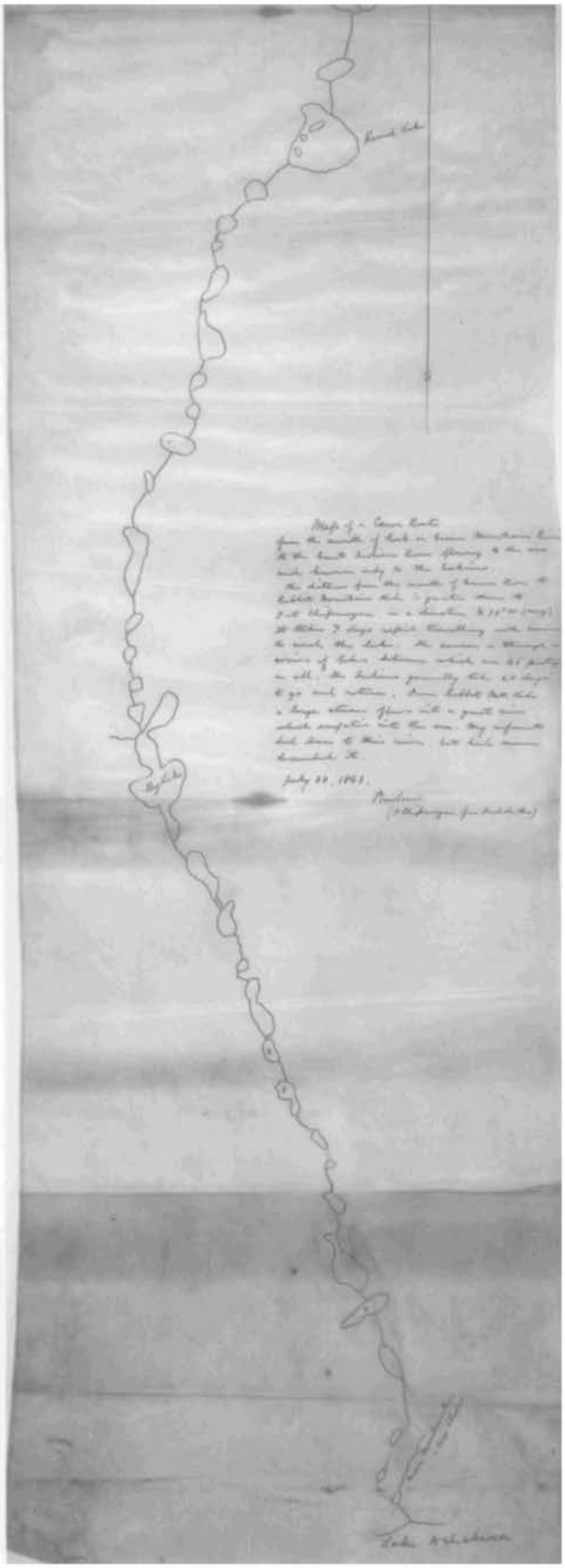

Map of a Canoe Route

FIG. 4.85. CHIEF WINDIGO'S MAP OF LAKE NIPIGON, ONTARIO. Nipigon band of Ojibwas, ca. 1869, probably original Indian pencilwork on paper, enhanced in ink and blue wash, and with the addition of many names. Windigo was being assisted and interactively corrected by other Indians. Size of the original: 53 × 65.5 cm. Photograph courtesy of the Robert Bell Collection, National Archives of Canada, Ottawa (NMC 21734).

pieces of white mica got from the band of coarse white pegmatite in the surrounding vicinity. . . . He also drew a map of the country from John Scotts Lake to Wikusko Lake, including the latter lake."[298]

Arctic

The Inuit of the Arctic have sometimes been singled out as particularly able mapmakers.[299] Such opinions, which

298. Joseph B. Tyrrell's field notebook #1950, entry for 13 July made on Indian Reserve Island, p. 30, National Archives of Canada, Ottawa, RG 45, vol. 174.

299. Robert A. Rundstrom, "A Cultural Interpretation of Inuit Map Accuracy," *Geographical Review* 80 (1990): 155–68, esp. 157. It was certainly not the case that Inuit were "perhaps alone in attempting the delineation of relief features"; Leo Bagrow, *History of Cartography*, rev. and enl. R. A. Skelton, trans. D. L. Paisey (Cambridge: Harvard University Press; London: C. A. Watts, 1964; reprinted and enl., Chicago: Precedent, 1985), 27.

In a more recent article, Rundstrom looks at the exchange of maps and geographic information between Inuit and Europeans and Euro-Americans in the nineteenth and early twentieth centuries and asks why the Inuit were such remarkable mapmakers and eager to provide maps when there was no obvious cultural basis for map production. He concludes that "Inuit maps are best considered as *acts,* not artifacts," with the primacy of the making over the object. "Mimetic performances influenced virtually every aspect of Inuit life, and mapmaking should not be considered as any different in this respect." See Robert A. Rundstrom, "Expectations and Motives in the Exchange of Maps and Geographical Information among Inuit and *Qallunaat* in the Nineteenth and Twentieth Centuries," in *Transferts culturels et métissages Amérique/Europe, XVI*^{e}*–XX*^{e} *siècle,* ed. Laurier Turgeon, Denys Delâge, and Réal Ouellet (Sainte-Foy, Quebec: Presses de l'Université Laval, 1996), 377–95, esp. 387–88.

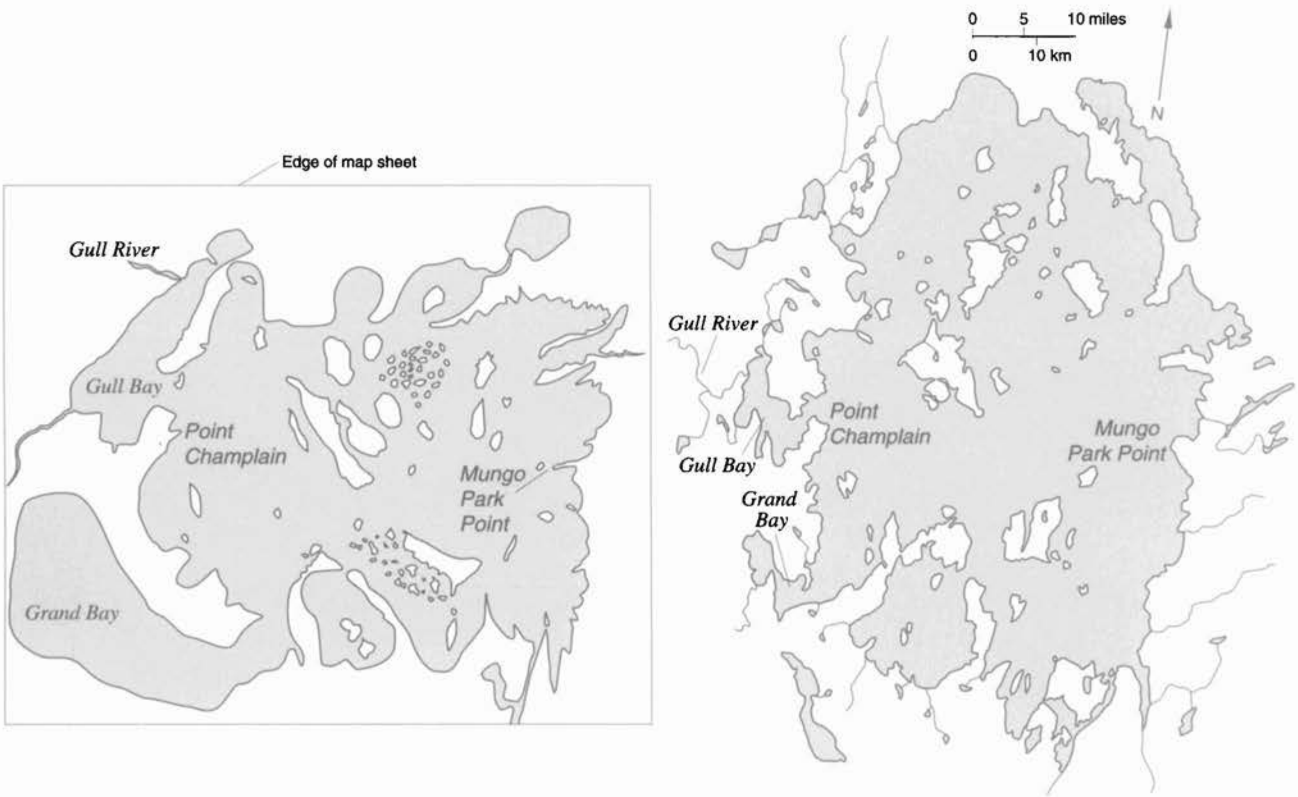


FIG. 4.86. THE LINEWORK ON WINDIGO'S MAP OF LAKE NIPIGON RELATED TO THAT ON A MODERN MAP. Windigo's outline is on the left; on the right is a modern outline. This highlights the influence of paper proportions on the overall shape of Windigo's map.

have been stronger outside than within North America, probably arose from a combination of three general circumstances: the relatively late but well-recorded contact between Inuit and Euro-Americans; the reproduction of redrafted versions of Inuit maps in several widely read nineteenth-century works on Arctic exploration;[300] and the systematic collection of information in map form on later scientific expeditions, many examples of which were featured in subsequent published reports.[301] One recent work selects an Inuit example to illustrate graphically the "ability of indigenous peoples to draw accurate maps." A map of the Belcher Islands given to Robert Flaherty in 1910 by Wetalltok is reproduced adjacent to one earlier and one later printed chart of that part of Hudson Bay.[302] The number, shapes, and pattern of islands on the Inuit's map are quite unlike those on the earlier chart but are remarkably similar to those on the later map. When Inuit planimetry has differed markedly from that on Euro-American maps, the assumption has been that it was a

300. For example, William Edward Parry, *Journal of a Second Voyage for the Discovery of a North-west Passage from the Atlantic to the Pacific* (London: John Murray, 1824), facing 197, 198, and 252; John Ross, *Narrative of a Second Voyage in Search of a North-west Passage,* 2 vols. (London: A. W. Webster, 1835), facing 1:262; and Charles Francis Hall, *Life with the Esquimaux: A Narrative of Arctic Experience in Search of Survivors of Sir John Franklin's Expedition* (London: Sampson Low, Son, and Marston, 1865), 105 and 537.

301. For example, Franz Boas, "The Central Eskimo," in *Sixth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, 1884–'85* (Washington, D.C.: United States Government Printing Office, 1888), 409–669, esp. 643–47 (pl. IV and figs. 543–46); Knud J. V. Rasmussen, *Iglulik and Caribou Eskimo Texts,* Report of the Fifth Thule Expedition 1921–24, vol. 7, no. 3 (Copenhagen: Glydendalske Boghandel, 1930), 89–99 and 146–60 (sketch maps I–XI); idem, *The Netsilik Eskimos: Social Life and Spiritual Culture,* Report of the Fifth Thule Expedition 1921–24, vol. 8, nos. 1 and 2 (Copenhagen: Glydendalske Boghandel, 1931), 91–113 (sketch maps I–VIII) and 477–80 (sketch maps I and II); idem, *Intellectual Culture of the Copper Eskimo,* Report of the Fifth Thule Expedition 1921–24, vol. 9 (Copenhagen: Glydendalske Boghandel, 1932), 86–89 (sketch maps I and II); Therkel Mathiassen, *Material Culture of the Iglulik Eskimos,* Report of the Fifth Thule Expedition 1921–24, vol. 6, no. 1 (Copenhagen: Glydendalske Boghandel, 1928), 98 (fig. 58); idem, *Contributions to the Physiography of Southampton Island,* Report of the Fifth Thule Expedition 1921–24, vol. 1, no. 2 (Copenhagen: Glydendalske Boghandel, 1931), 11–12 (figs. 1 and 2); idem, *Contributions to the Geography of Baffin Land and Melville Peninsula,* Report of the Fifth Thule Expedition 1921–24, vol. 1, no. 3 (Copenhagen: Glydendalske Boghandel, 1933), pl. 2; and George Miksch Sutton, "The Exploration of Southampton Island, Hudson Bay," *Memoirs of the Carnegie Museum* 12, pt. 1 (1932): esp. 45 and 46 (figs. 1 and 2).

302. David Turnbull, *Maps Are Territories, Science Is an Atlas: A Portfolio of Exhibits* (Geelong, Victoria: Deakin University, 1989; reprinted Chicago: University of Chicago Press, 1993), 24–25 (figs. 4.9–4.11).

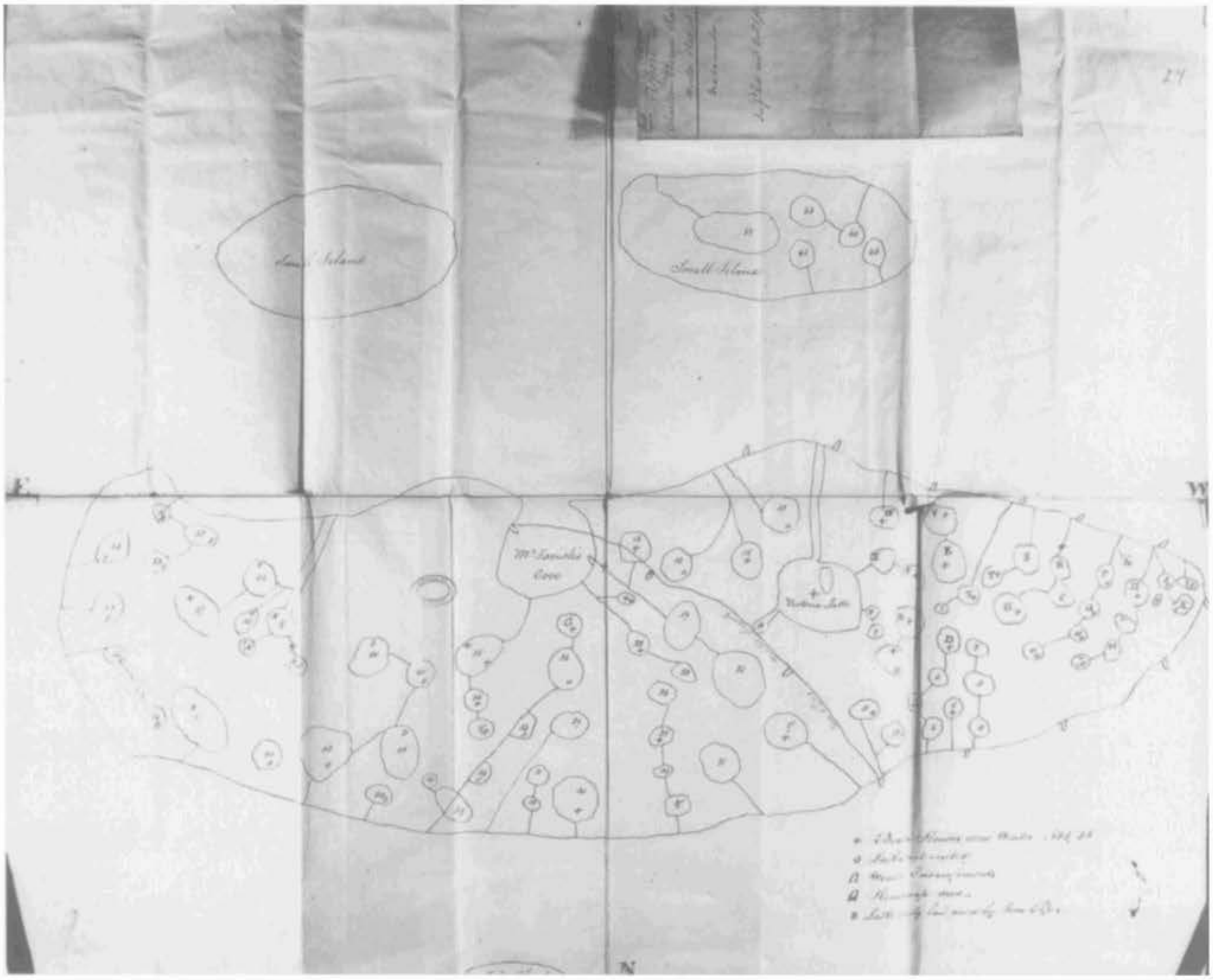


FIG. 4.87. TOM PIPES'S INDEX MAP FOR HIS SURVEY OF CHARLTON ISLAND DURING ITS SIXTH WINTER AS A BEAVER PRESERVE. Probably Cree, 1845, ink on paper. "Sketch map to illustrate reports on Charlton Beaver Preserve by the Indian Tom Pipes." Eight maps related to the beaver preserve were made between 1839 and 1846.

Size of the original: 53.6 × 66.3 cm. Photograph courtesy of the Hudson's Bay Company Archives, Provincial Archives of Manitoba, Winnipeg (B186/b/49, fol. 27).

consequence of poor drawing skills, incomplete spatial knowledge, or both. This may have been true in some cases, but differences also arose from Inuit's blending geographic knowledge with cosmographic tradition. Evaluating the accuracy of Inuit maps according to planimetry must therefore be undertaken with these caveats in mind.

Spink and Moodie, in an early review of Inuit maps and accounts of mapping activities in the Canadian Eastern Arctic, concluded that the

> maps communicate only part of the territorial knowledge of the Inuit. They are simple and unadorned drawings which seek to represent sufficiently memorable features of landscape as to make a route navigable by one who has never journeyed that way before. The maps possess unique characteristics of scale, content, and style, and were executed upon distinctive media prior to the coming of the Europeans. Although deficient as pleasing charts, they serve as practical accompaniments to an extremely colourful and diverting verbal account. The stories implicit in most of the place-names and the appropriate naming of landforms in Arctic territory reveal the maps to be merely part of the process of communicating territorial knowledge.
>
> The maps are generally limited to portraying areas which were visited by the draughtsman, but such a restriction does not impose a severe handicap on the amount of territory which can be represented. . . . The widespread use of mapping among the Eskimo reflects not only their territorial knowledge, but also the frequency of travelling. Their great mobility in part ex-

plains why they are prepared to accept cartography when more sedentary peoples are not prepared for its inherent quick diminishing of distance. Cartography is apparently an indigenous element of Eskimo culture, and perhaps even an essential adjunct to the nomadic way of life.[303]

Spink and Moodie did not, however, account for the variation in proficiency observable in Euro-American accounts.

EURO-AMERICAN PERCEPTIONS

Assertions about the mapmaking skills of Arctic natives were often put forth as unsupported generalizations. For example, in or before 1849 Teben'kov wrote, "The ability of the Aleuts to compile sketches of their habitat is noteworthy. I had many sketches made by them which are very similar to geodesic surveys."[304] Similarly, the French naval officer Joseph René Bellot, on his first day in the Arctic, commented that an Iglulik's sketch of the location of two ships along the coastline of Baffin Island "once more attested [to] their singular geographical aptitude."[305] That he reached such a conclusion so quickly may indicate preconceived ideas about the mapping aptitude of Inuit.

As we might expect, most Inuit maps represent coastlines, the critical zones between land and marine resource worlds. Unlike maps of large areas of terra incognita, coastal maps could be evaluated soon after they were made, when the coastline was explored and provisionally surveyed. In 1851, a group of Kangarjuatjiarmiut men and women drew a coastline map for the crew of the *Investigator,* "the accuracy of which was subsequently fully confirmed by the journey of Mr. Rae along the coast."[306]

On other occasions, however, subsequent Euro-American experience seemed to expose the limitations of Inuit maps. In 1853, on the east coast of Victoria Island, Captain Richard Collinson reported that one of his crew "succeeded in inducing some of them [possibly of the Eqalugtormiut group of Copper Eskimos] to draw a chart of the coast to the eastward, which was several times repeated, agreeing very well with each other, but were totally unlike the coast afterwards travelled over by me."[307] William Edward Parry, commenting on a number of charts of the coast of Melville Peninsula made by Iglulik Eskimos in 1822, observed that "no two charts much resembled each other, and that the greater number of them still less resembled the truth in those parts of the coast with which we were well acquainted."[308]

One direct comparison of an Inuit map with a contemporary Admiralty map of the coast from the nineteenth century exists (fig. 4.88). It is of approximately eight hundred kilometers of the north coast of Alaska, from Point Barrow to perhaps Herschel Island. Of the original by the shaman Erk-sin'-ra, John Simpson, surgeon on HMS *Plover* and author of the first substantive account of the North Alaska coast natives, wrote that it agreed "minutely in many particulars with the narrative and chart of Messrs. Dease and Simpson," except that Erk-sin'-ra denied the existence of the Pelly Mountains to the west of the Colville River. The shaman conceded, "We never saw them, but perhaps you might with your long spy-glasses."[309] Indeed, the Pelly Mountains reported by Thomas Simpson did not exist.[310]

A map made in 1823 by another shaman, Toolemak, was evaluated less favorably. Parry reported that "Toolemak, though a sensible and intelligent man, we soon found to be no draftsman, so that his performance in this way, if taken alone, was not a very intelligible delineation of the coast."[311] Toolemak's verbal explanation of the sketch provided Parry with more useful information.

Accounts of Inuit understanding of European maps also vary substantially. In 1853 Rochfort Maguire noted that it "was remarkable how well" three males in the cabin on board HMS *Plover* "comprehended" official coastal charts "when their ideas were turned to it," but he added that "if I had asked them a question at another time and brought them to a chart when their mind was else where, it would have been difficult to make them un-

303. John Spink and D. Wayne Moodie, *Eskimo Maps from the Canadian Eastern Arctic,* ed. Conrad Heidenreich, Monograph 5, *Cartographica* (1972), esp. 29.

304. Mikhail Dmitrievich Teben'kov, *Atlas of the Northwest Coasts of America: From Bering Strait to Cape Corrientes and the Aleutian Islands, with Several Sheets on the Northeast Coast of Asia,* trans. and ed. Richard A. Pierce (Kingston, Ont.: Limestone Press, 1981), 76.

305. Joseph René Bellot, *Memoirs of Lieutenant Joseph René Bellot,* 2 vols. (London: Hurst and Blackett, 1855), 1:102.

306. Alexander Armstrong, *A Personal Narrative of the Discovery of the North-west Passage* (London: Hurst and Blackett, 1857), 338–39. The event was also reported by two others on the ship: Robert John Le Mesurier McClure, *The Discovery of the North-west Passage by H.M.S. "Investigator," Capt. R. M'Clure, 1850, 1851, 1852, 1853, 1854,* 2d ed., ed. Sherard Osborn (London: Longman, Brown, Green, Longmans, and Roberts, 1857), 190, and Johann August Miertsching, *Frozen Ships: The Arctic Diary of Johann Miertsching, 1850–1854,* trans. and ed. Leslie H. Neatby (New York: St. Martin's Press, 1967), 116–17. The Kangarjuatjiarmiut lived near Minto Inlet.

307. Richard Collinson, *Journal of H.M.S. "Enterprise," on the Expedition in Search of Sir John Franklin's Ships by Behring Strait, 1850–55,* ed. T. B. Collinson (London: S. Low, Marston, Searle, and Rivington, 1889), 286.

308. Parry, *Journal of a Second Voyage,* 197 (note 300).

309. John Bockstoce, ed., *The Journal of Rochfort Maguire, 1852–1854,* 2 vols., Hakluyt Society Publications, ser. 2, nos. 169–70 (London: Hakluyt Society, 1988), 2:501–50 (app. 7: Dr. John Simpson's Essay on the Eskimos of Northwestern Alaska), esp. 541.

310. Thomas Simpson, *Narrative of the Discoveries on the North Coast of America* (London: R. Bentley, 1843), 129, 132, 171.

311. William Edward Parry, *Journals of the First, Second, and Third Voyages for the Discovery of a North-west Passage from the Atlantic to the Pacific,* 6 vols. (London: J. Murray, 1828–29), 4:100–101.

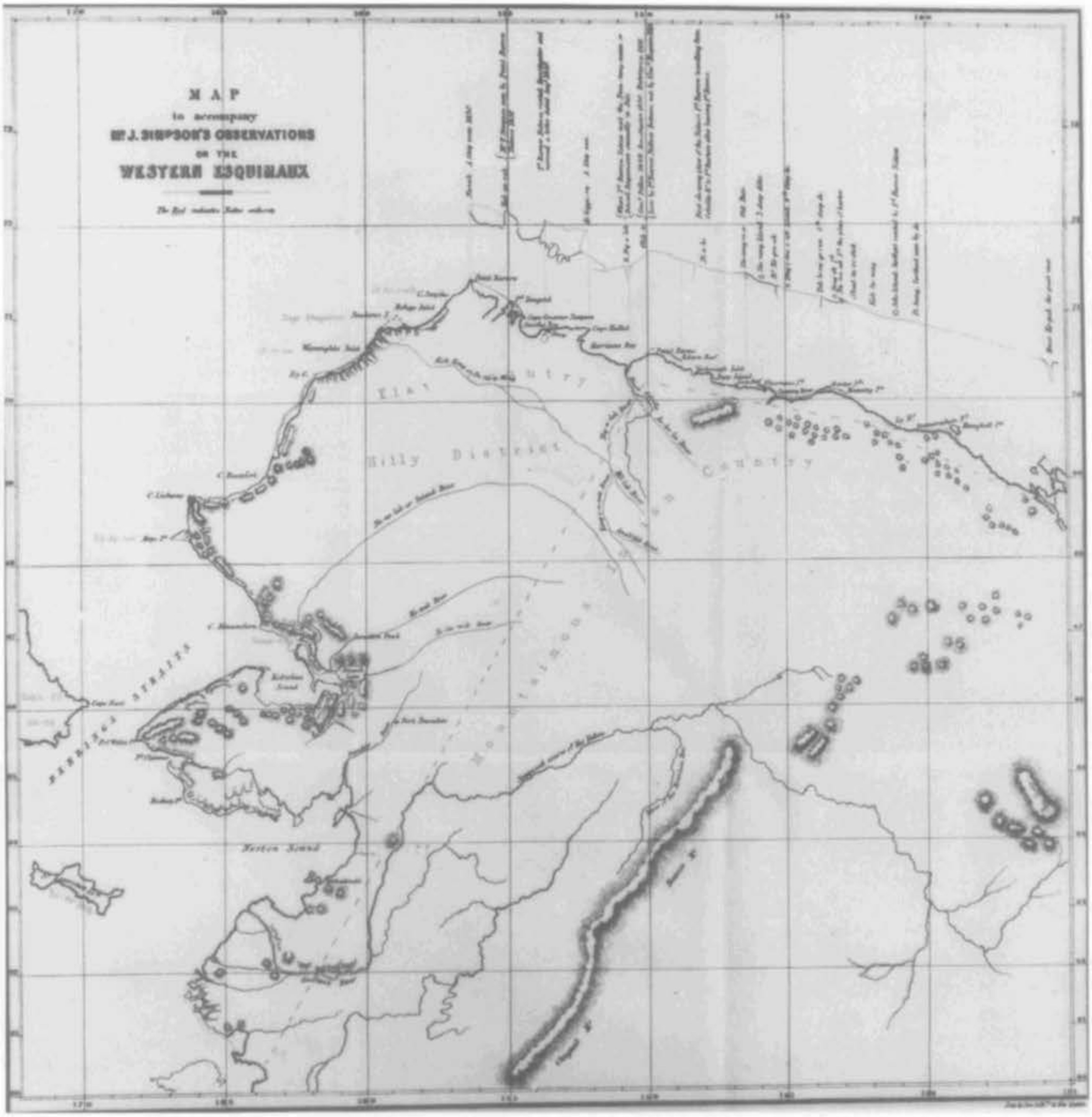


FIG. 4.88. TWO CHARTS OF THE SAME COAST. One coastline is in black based on an Admiralty chart, and the other, more northerly and drawn in red parallel to it, is derived from a chart drawn in May 1853 by Erk-sin'-ra, an Inuit shaman. In ten places the native chart is correlated with the Admiralty chart by a linking dotted line.

Size of the original: 36.6 × 37 cm. From *Further Papers relative to the Recent Arctic Expeditions in Search of Sir John Franklin and the Crews of H.M.S. "Erebus" and "Terror"* (London: G. E. Eyre and W. Spottiswoode, 1855), 916. Photograph courtesy of Special Collections and Rare Books, Wilson Library, University of Minnesota, Minneapolis.

derstand any thing about it."[312] Based on his experience with the Copper Eskimos between 1913 and 1916, Diamond Jenness took a contrary view. He reported that "not a single native was encountered who had the slightest conception of a map, with the sole exception of Uloksak. Even he had only a vague comprehension."[313]

Something of the problem some Inuit faced in interpreting Euro-American maps was recognized in 1846

312. Bockstoce, *Journal of Rochfort Maguire*, 1:235 (note 309).

313. Diamond Jenness, *The Life of the Copper Eskimos*, Report of the Canadian Arctic Expedition, 1913–18, vol. 12, pt. A (Ottawa: F. A. Acland, 1922), 229.

by F. A. Miertsching, a Moravian missionary at Okkak (Okak) village on the Labrador coast. In the course of teaching geography to adult Inuit, he made use of a globe but found that

> much patience and pains is needful to make these . . . people understand these representations of the earth's surface; for some of them think the [Euro-Americans'] maps very imperfect, because on the coast of Greenland, for instance, they observe no figures of houses, tents, kayaks, or seals; so also they are greatly disappointed, to find London marked on the map with a simple "o," though it contains such a number of people, houses, and ships. It is not till after the matter has been long discussed, that we can get into anything like clearness.[314]

For these Inuit, and probably others, interpretation of a map obviously depended at least as much on the context as on the form of the representation.

Contemporary records of observations made by Arctic explorers, though usually precise, lack the environmental contexts and anthropological insights needed to derive conclusions concerning mapmaking skills. Likewise, the corpora of extant maps do not in themselves afford adequate evidence on which to compare the qualities of Inuit maps with those of other traditional peoples. It is clear, however, that Inuit notions of "map accuracy" are very different from those in the West.

EPHEMERAL MAPS

Like other North American natives, Inuit people made ephemeral maps in sand or snow, among themselves and for others.[315] Because most of the early contacts between Euro-Americans and Inuit were on shorelines, many accounts describe ephemeral maps made in sand or with pebbles or beach detritus. For instance, Frederick William Beechey described an incident in 1826 in which a group of Bering Strait Eskimos

> constructed a chart of the coast upon the sand, of which I took very little notice at the time. . . . they renewed their labour, and performed their work upon the sandy beach in a very ingenious and intelligible manner. The coast line was first marked out with a stick, and the distance regulated by the days' journeys. The hills and ranges of mountains were next shown by elevations of sand or stone, and the islands represented by heaps of pebbles, their proportions being duly attended to.[316]

Villages and fishing stations were marked by sticks, and in one case the fact that a channel was so narrow that two boats could not paddle abreast was indicated with paddling motions and pieces of wood representing the boats. At one point, Beechey corrected the location of one of the Diomede Islands. The mapmaker at first objected, but another Inuit pointed out that the islands were lined up ("seen *in one*") from Cape Prince of Wales, supporting Beechey's correction, and the other Inuit concurred.[317] This account is of interest not only for the graphic description of the marking out and three-dimensional modeling. It also contains rare evidence of scaling in days' journeys, attention to the proportional size of features, and the geographical principle of alignment. Less exceptional, but of interest, is the account of the involvement of bystanders in resolving a difference of opinion about the placement of an island.

MAPS ON PAPER

Most surviving nineteenth-century Inuit maps were made on paper at the request of explorers, ethnographers, or collectors working for museums. Some of their content was probably included in response to questions by these Europeans and Euro-Americans, who almost always wrote toponyms and notes on the maps.

One method commonly used by explorers seeking geographic information was to draw a map of the area as far as it was known, or to use an existing chart and ask Arctic natives to continue it. Such a method required that the Inuit have both mapping skills and an understanding of European maps. In 1830, Netsiliks showed both when they extended John Ross's map of the land between Repulse Bay and Prince Regent Inlet (plate 8).[318] In another case, the representation of the seaward limit of land ice on the east coast of Melville Peninsula in the spring, when coastal travel was easier across the ice than on the land, was probably included by the Iglulik woman Illigliak at Parry's request (fig. 4.89). Parry drew a stretch of coastline on the lower part of the paper, and Illigliak added the shaded portion, apparently providing the information for the written notations of "musk oxen," "fresh water fish & Deer," and "Seals but no Walrus's or Whales." Illigliak was referred to by G. F. Lyon as one of "our [two] hydrographers."[319] Parry was explicit in his opinion that better-quality maps could be obtained from the Inuit by providing a chart of land already known and asking for it to be extended, "if information and not mere curiosity be the object."[320]

314. F. A. Miertsching, "From Okkak," *Periodical Accounts of the Work of the Moravian Missions,* 1846, 338.

315. See Spink and Moodie, *Eskimo Maps,* 4–5, for example (note 303).

316. Frederick William Beechey, *Narrative of a Voyage to the Pacific and Beering's Strait* (London: H. Colburn and R. Bentley, 1831), 290.

317. Beechey, *Narrative of a Voyage,* 291.

318. Ross, *Narrative of a Second Voyage,* 1:259–60 (note 300).

319. G. F. Lyon, *The Private Journal of Captain G. F. Lyon, of H.M.S. "Hecla,"* new ed. (London: J. Murray, 1825), 160.

320. Parry, *Journal of a Second Voyage,* 196 (note 300). Facing p. 198

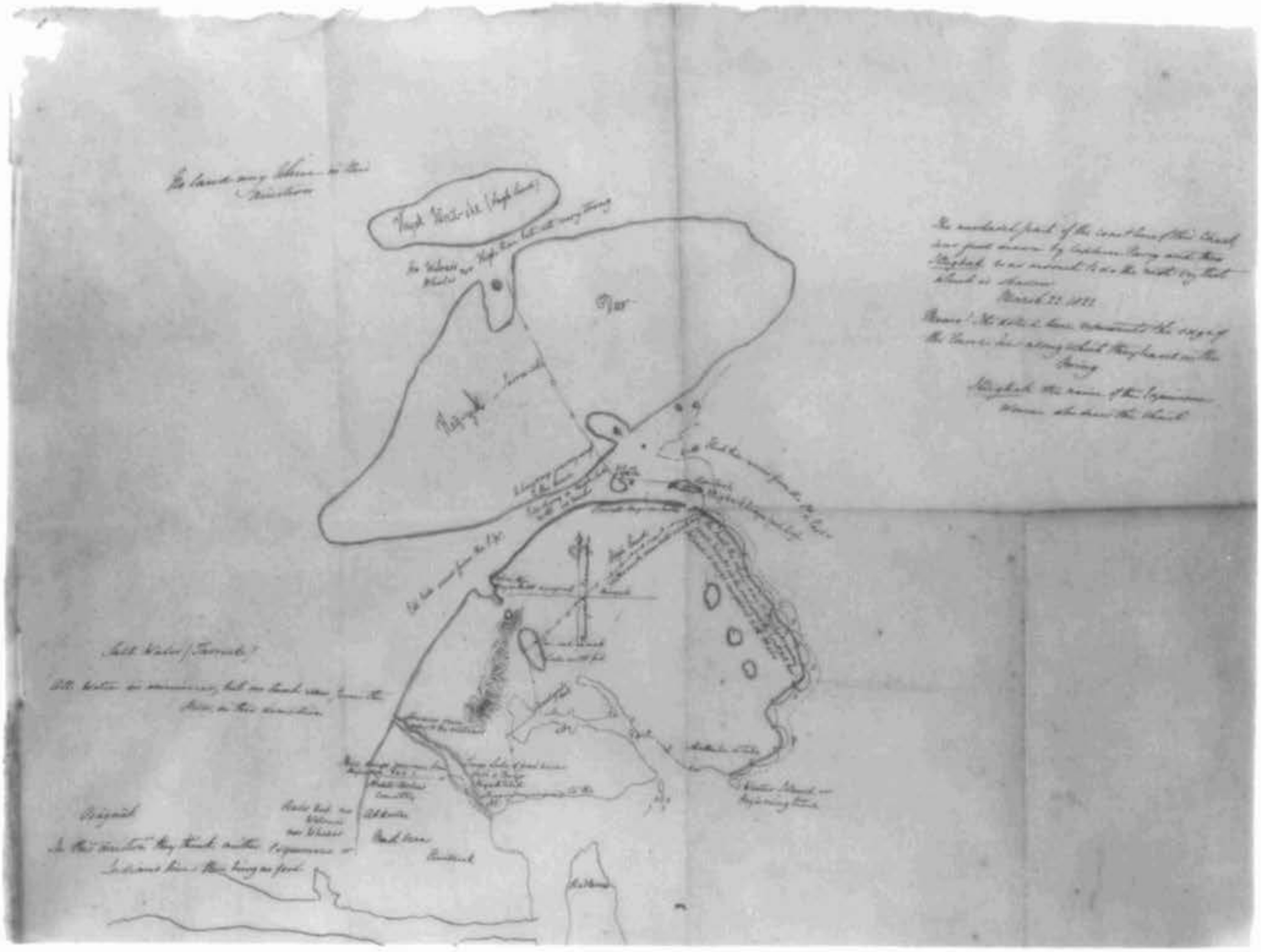


FIG. 4.89. ILLIGLIAK'S MAP OF THE MELVILLE PENINSULA AND BAFFIN ISLAND, NORTHWEST TERRITORIES. Iglulik, March 1822; manuscript, ink on tracing paper with the coastline drawn by Illigliak and enhanced with blue wash. The inscription on the right reads: "The unshaded part of the coastline of this Chart was first drawn by Captain Parry and then *Illigliak* was desired to do the rest: viz that which is shaden March 22.1822 Memo/The dotted line represents the edge of the land ice along which they travel in the Spring. *Illigliak* the name of the Esquimaua Woman who drew the chart."
Size of the original: 44.5 × 59.5 cm. Photograph courtesy of the Board of Trustees of the National Museums and Galleries on Merseyside, Liverpool (Liverpool Museum, 1957.1).

In the winter of 1897–98, Meliki, a member of the Aivilingmiut group of Igluliks, drew in pencil on paper a good example of a small-area map (fig. 4.90). It was of Cape Fullerton harbor on the northwest coast of Hudson Bay, the winter quarters that year of the New England whaling captain George Comer, who later worked as a collector of Inuit artifacts for Franz Boas of the American Museum of Natural History in New York.[321] During winter the coastal waters were frozen, and on the map it is not easy to distinguish the coast. Two components dominate: profiles of Comer's two sailing ships and a series of circular snow houses represented in plan. There are a number of erasures that seem to show Meliki was striving to achieve a careful representation. The snow houses are shown according to their internal plans. A rough

is an engraved version of Illigliak's map: "Eskimaux Chart No. 2. The shaded parts drawn by Iligliuk at Winter Island, 1822. The Original in the Possession of Cap.ⁿ Perry," it includes the "Line of Ice along which the Eskimaux travel in the Spring" but excludes other thematic content concerning the direction of flood tides and ebb tides and the locations of "Deer" and "Musk Oxen." For a thorough and insightful analysis of Parry's use of Inuit maps, see Bravo, *Accuracy of Ethnoscience* (note 31). Bravo's monograph arises from his dissertation, "Science and Discovery in the British Search for a North-west Passage, 1815–1825" (Ph.D. diss., Cambridge University, 1992).

321. Comer was one of a trio collecting Inuit artifacts for Boas. The other two were the Scottish whaling captain James Mutch and a missionary, Rev. Edmund J. Peck, who was at Cumberland Sound from 1894 to 1905. All three collected Inuit maps. Those collected by Comer and Mutch are in the American Museum of Natural History. Five collected by Peck are in the Anglican Church of Canada Archives, Toronto, file XXXIII.

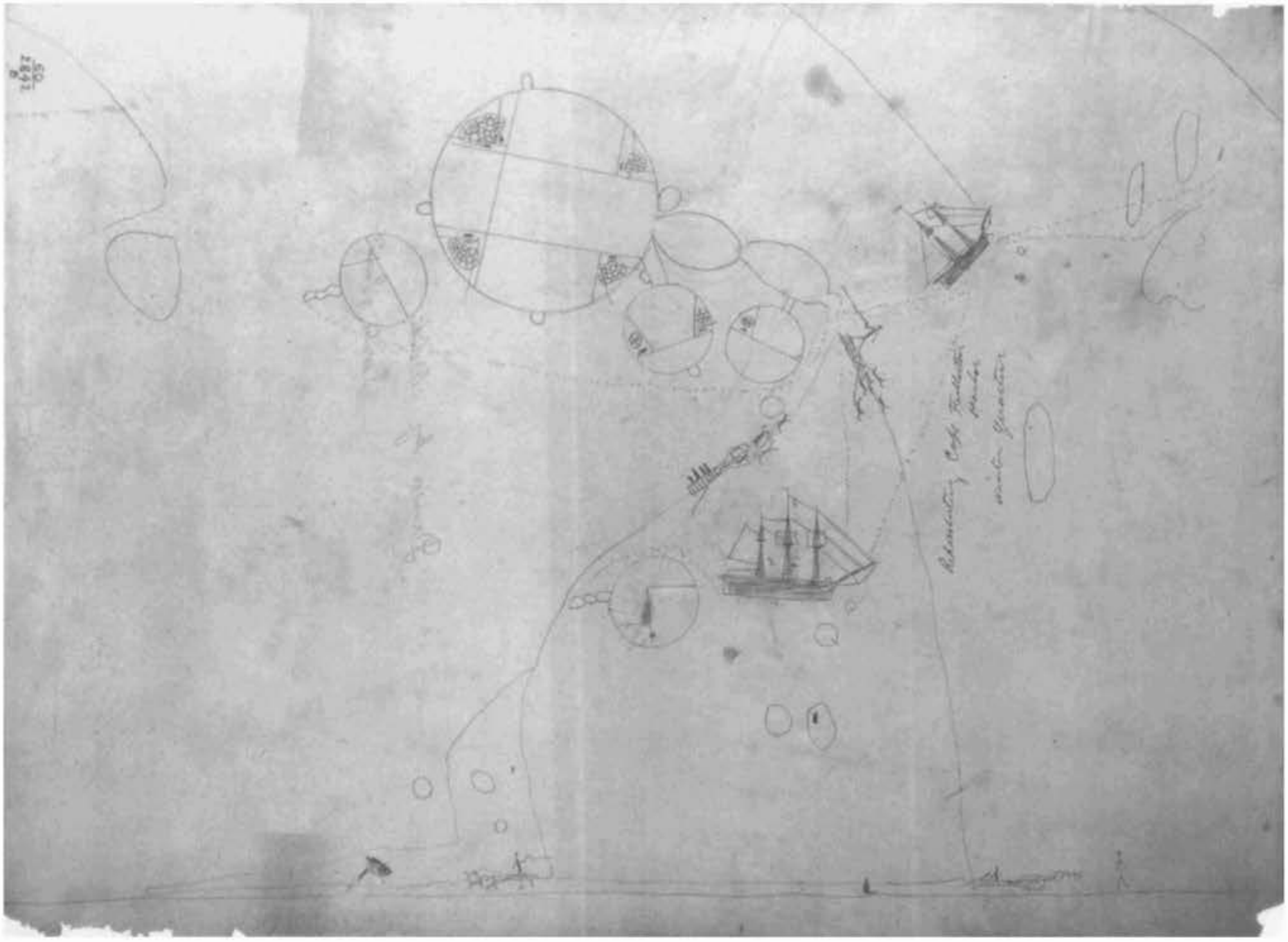


FIG. 4.90. PLAN OF ACTIVITIES AT CAPE FULLERTON HARBOR, BY MELIKI, AN IGLULIK, CA. 1898. Endorsement on back: "Drawn by Meliki, Iwilic Inuit"; on front: "Representing Cape Fullerton Harbor winter quarters," in ink, presumably in George Comer's hand. The map apparently shows the winter quarters of the Connecticut whaler Captain George Comer. Comer presented it to Franz Boas, anthropologist at the American Museum of Natural History in New York, for which he was later to become an official collector of Inuit artifacts.
Size of the original: 41.5 × 57 cm. Photograph courtesy of the Department of Library Services, American Museum of Natural History, New York (cat. no. 60/2842-B).

sketch that accompanied the map identifies the occupants of some of the sleeping benches.[322] Notwithstanding the disproportional size of the elements of the drawing, the whole has the connectivity characteristic of a map: dogsled routes to and from places beyond its limits; footpaths between snow houses and ships; and what appear to be coasts.

Within a year or two of making the map of Cape Fullerton harbor, Meliki made a map for Comer showing one journey to hunt musk oxen in the winter of 1893–94 and apparently two other journeys taken in 1895–96 and in 1897–98 (fig. 4.91). The area depicted was west of Roes Welcome Sound in what is now Keewatin District. Evidently the distances traveled were considerable. Dots placed along the routes to "indicate where Igloes were built" suggest journeys inland of perhaps one month. Although an igloo may have been occupied for more than one night, the interval between adjacent igloos presumably represented one day's journey, since overnight sleeps in winter would have been impossible without them. Interestingly, the spacing of dots on the protected and presumably smoother ice of Wager Bay is much wider than the average spacing either on land or on the presumably rougher coastal ice of Roes Welcome Sound. Even on land the space between adjacent dots varies considerably, much as it does on the map of the area between the Red Deer and upper Missouri Rivers made in 1802 by the Blackfoot chief Ki oo cus (fig. 4.62 above), on which each circle represents a night's sleep. On Meliki's map, clusters

322. The sketch in pencil, "place of Igloos as drawn by Meliki, January 25, 1898," is on the back of a print titled "Iris," 24.5 × 16 cm, Department of Anthropology, American Museum of Natural History, New York (cat. no. 60/2842 I).

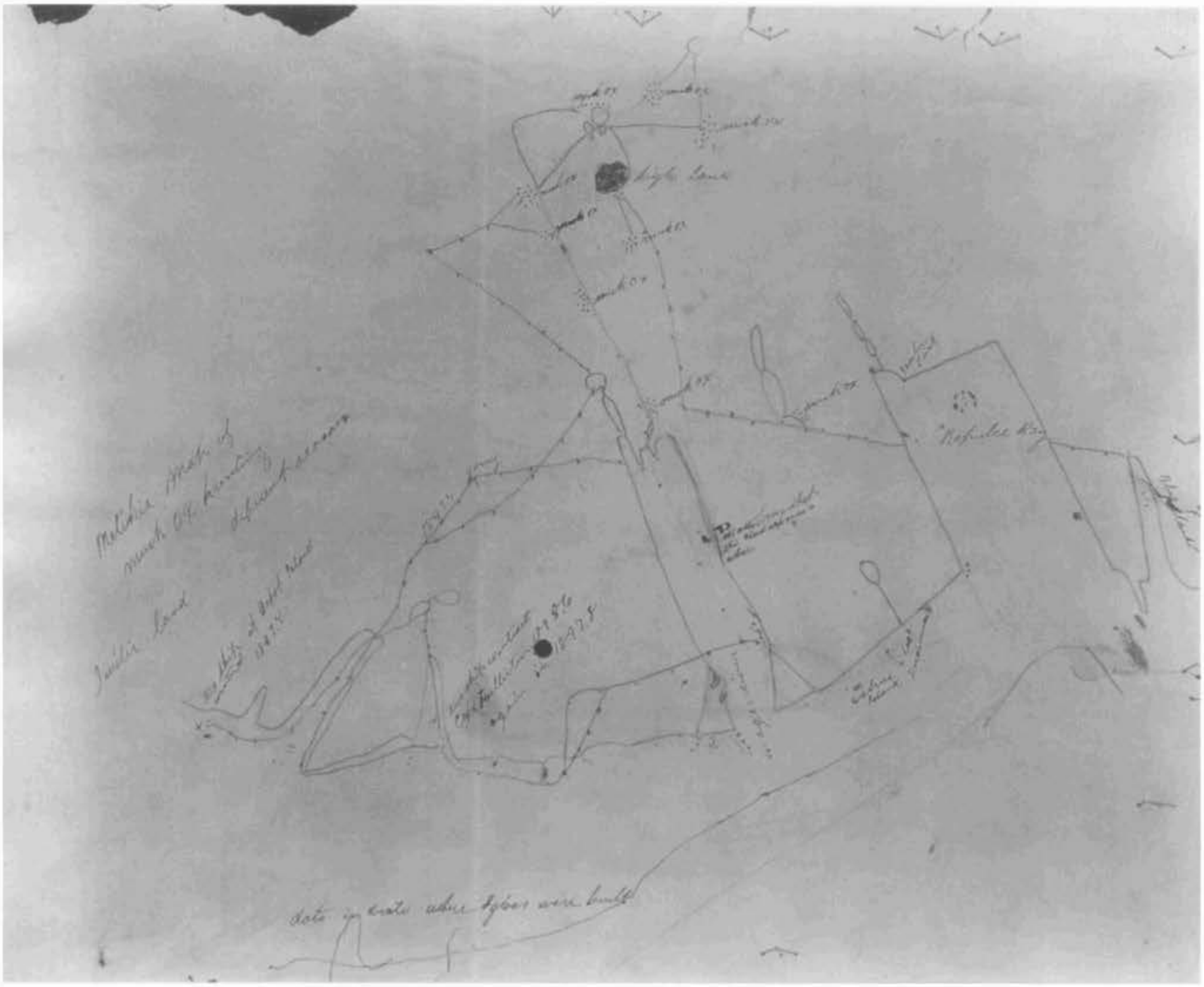


FIG. 4.91. MELIKI'S MAP OF MUSK OX HUNTING BETWEEN CHESTERFIELD INLET AND REPULSE BAY, CA. 1898. Untitled Aivilingmiut manuscript map of the west coast of Southampton Island, Roes Welcome Sound, and the mainland between Depot Island and Repulse Sound. Linework in pencil with names and legends in ink. Although George Comer's inscription indicates "musk ox hunting diferent seasons," only the first part of the "1893.4 going" route is represented unambiguously.
Size of the original: 41.5 × 56.5 cm. Photograph courtesy of the Department of Library Services, American Museum of Natural History, New York (60/2842/E).

of eight to fifteen dots indicate the locations and, presumably, relative sizes of ten herds of musk oxen. No other animals are represented. A legend in Wager Bay indicates that "the natives say that this island was once a whale."

A detailed map that included the same region as well as more of the coastline south of Cape Fullerton was made for Comer at about the same date by Teseuke, another Aivilingmiut (fig. 4.92). Teseuke used small dots to show the location of the herds in detail. In addition, near the center of the map (lower left on detail shown in fig. 4.92) on the fast ice south of Cape Fullerton is a pictographic scene of Inuit with spears, sleds, dogs, and dog whips. One Inuit is engaged in killing an animal, and the

(*Facing page*)
FIG. 4.92. DETAIL FROM TESEUKE'S MAP OF ANIMAL RESOURCES AND HUNTING ACTIVITIES ON BOTH SIDES OF ROES WELCOME SOUND, 1898. "Drawn by Teseuke Harry 1898 Iwilic [probably Aivilingmiut] Inuit"; the map is manuscript, ink and crayon on paper. This remarkably detailed map contains such locational details as "salmon," on the river northwest of Cape Fullerton, and "Bear said to be plentifull," on what appears to be White Island off the north coast of Southampton Island.
Size of the original: 97.5 × 64.8 cm.; this detail: ca. 52 × 37 cm. Photograph courtesy of the Department of Library Services, American Museum of Natural History, New York (60/2842/A).

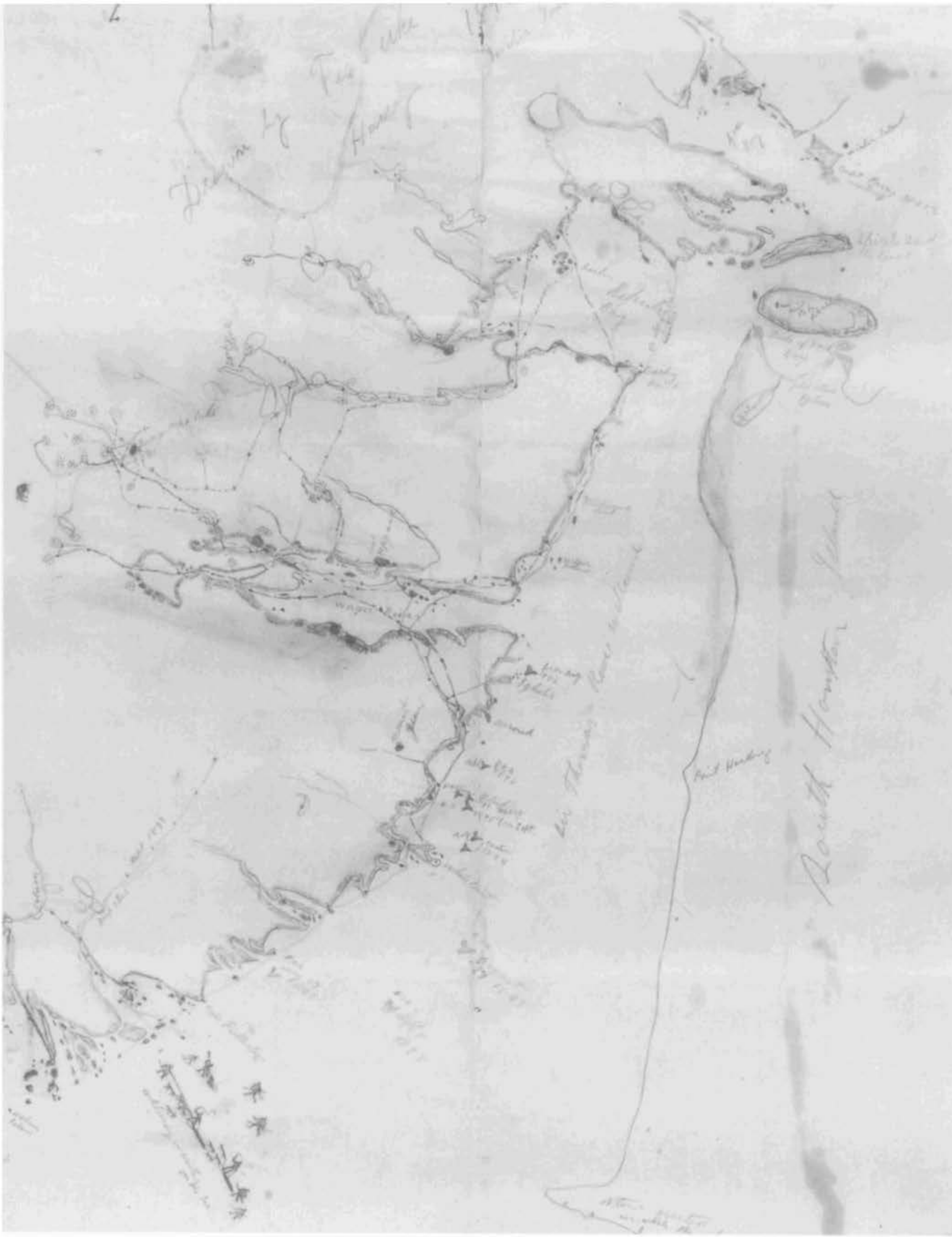


FIG. 4.93. WETALLTOK'S MAP OF HIS FORMER HOME, THE BELCHER ISLANDS IN HUDSON BAY. Inuit, probably Quebec, untitled manuscript in pencil of the Belcher Islands drawn on the back of a missionary print by the Inuit Wetalltok sometime before December 1910. Flaherty's chance look at this map led to the discovery of iron ore resources on the long-forgotten islands.
Size of the original: 35.5 × 31.5 cm. Photograph courtesy of the American Geographical Society Collection, University of Wisconsin–Milwaukee Library (Rare 772.3-c/.B44 A-19--).

scene has the inscription "walrusing in winter on the ice." As with Meliki's map for hunting musk oxen, however, native lore is acknowledged by an inscription on what appears to be Vansittart Island just across Frozen Strait (upper right): "Spirits said to live on this Island." Meliki's and Teseuke's maps were of the region south of and con-

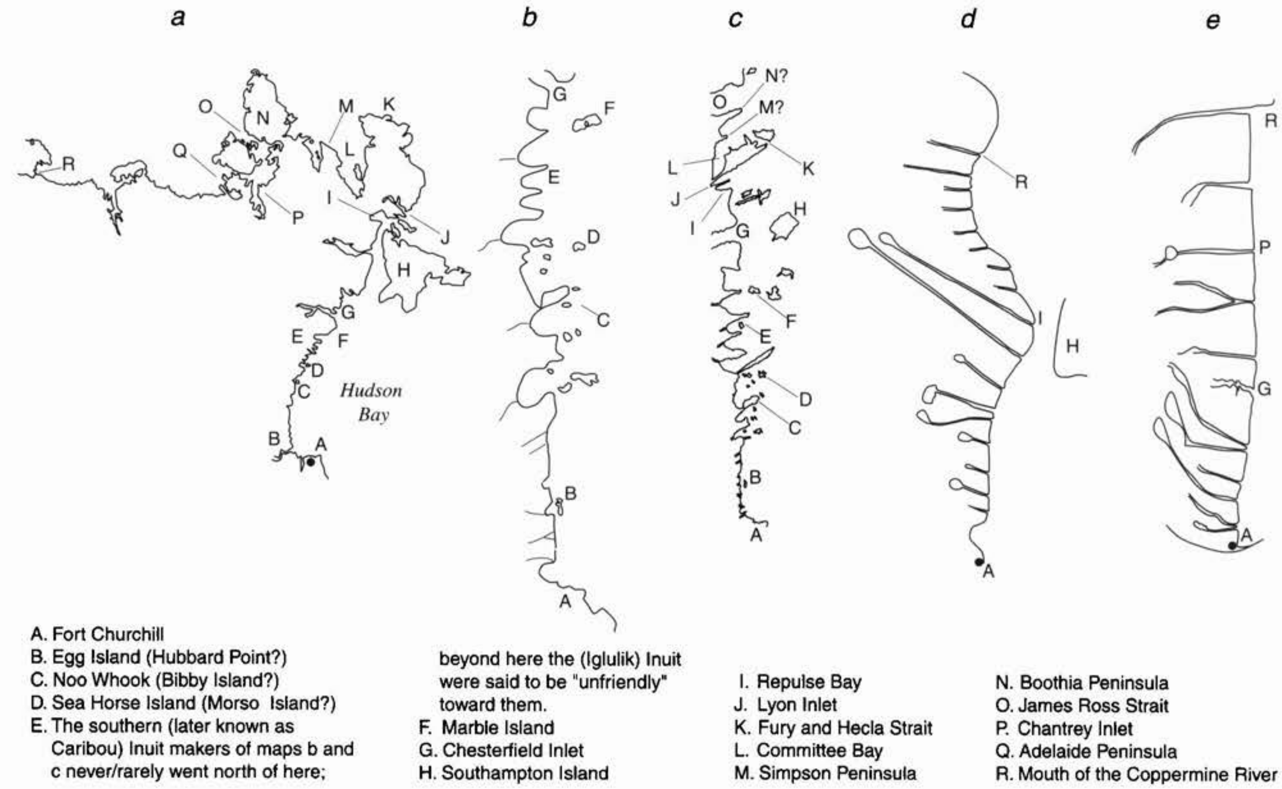


FIG. 4.94. MODERN, INUIT, AND INDIAN REPRESENTATIONS OF THE HUDSON BAY COASTLINE. Shown are one modern, two nineteenth-century Inuit, and two eighteenth-century Indian representations of four thousand kilometers of the coastline of the Northwest Territories. The coastline from a modern map is shown in *a; b* is based on the 1809 map of Nay hik til lok; and *c* is based on the Inuit map communicated by William Auld, 1820 (fig. 4.95). The Indian representation in *d* is based on a post-1742 draft of a map incorporating pre-1720 Indian maps (fig. 4.83), and *e* is based on Meatonabee and Idotlyazee's map, ca. 1767 (fig. 4.81).

tiguous to that mapped by Illigliak, the Iglulik woman, almost eighty years before (fig. 4.89 above).

At least one well-known Inuit map appears to have been made not at the behest of scientific explorers or ethnographers, but perhaps to satisfy nostalgia for a distant homeland (fig. 4.93). In 1910 Robert Flaherty, on Charlton Island in James Bay en route to prospect for iron ore on the Nastapoka Islands off the eastern coast of Hudson Bay, met an Inuit, Wetalltok, who from a "litter [of] odds and ends . . . drew out an old coloured lithograph, tattered and torn. On the back of it, in pencil and crudely drawn, was a map, obviously handiwork of his own."[323] It was a map of Wetalltok's former home, the Belcher Islands, drawn on the back of a missionary print. The Belcher Islands, which were far to the north of Charlton Island, much farther out in Hudson Bay than the Nastapoka Islands, had been almost forgotten by Euro-Americans. Flaherty's own maps showed the Belcher Islands as very small, and he doubted that a land mass so big–from Wetalltok's description of travel times the main island was about 160 kilometers long–could have gone unnoted for so long. Wetalltok gave Flaherty the map, saying he had others, and in subsequent expeditions it was found that the map had quite accurately depicted the extensive and intricately shaped islands.[324]

Within a few years Wetalltok's map received wide publicity. In 1918 a facsimile was reproduced in a much respected, widely read journal.[325] The remarkable detail in which Wetalltok had mapped an extremely complex series of islands, however, was not fully appreciated until the 1960s, when accurate 1:500,000 topographic maps were published.

Two maps by Inuit and two by Subarctic Indians (figs. 4.81 and 4.83 above) of the coastline north of Churchill on Hudson Bay provide an opportunity to compare maps of a single area. All four maps show the long

323. Robert Joseph Flaherty, *My Eskimo Friends: "Nanook of the North"* (London: Heinemann, 1924), 18.

324. Flaherty, *My Eskimo Friends,* 18–47, esp. 41.

325. Robert Joseph Flaherty, "The Belcher Islands of Hudson Bay: Their Discovery and Exploration," *Geographical Review* 5 (1918): 433–58, esp. fig. 4. Subsequently Flaherty published *My Eskimo Friends* and made the famous documentary film, *Nanook of the North* (1922).

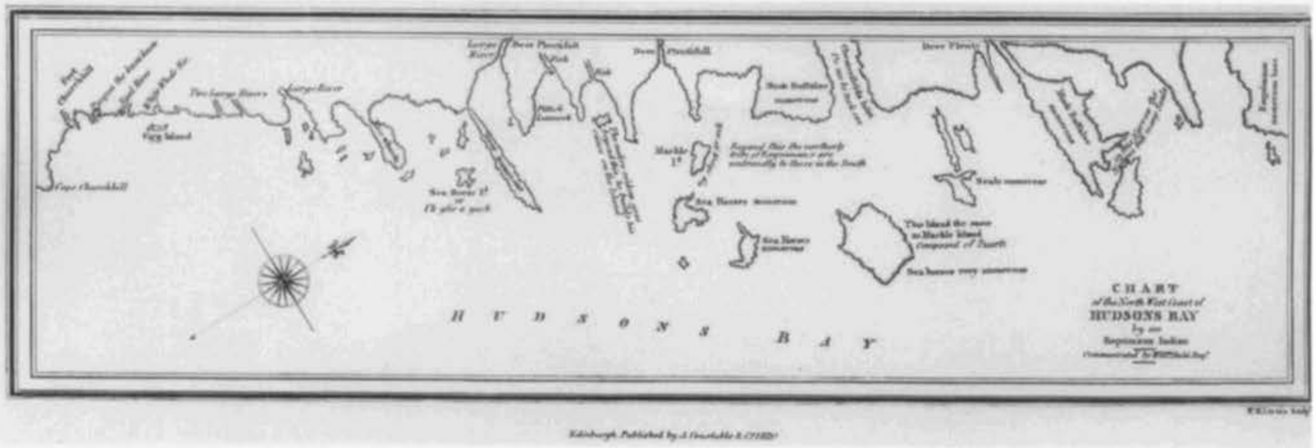


FIG. 4.95. UNKNOWN INUIT'S (PROBABLY CARIBOU ESKIMO) CHART OF THE NORTHWEST COAST OF HUDSON BAY, PRE-1821. Engraved and published version of a chart "by an Esquimaux Indian." In contrast to the Subarctic Indian maps of this coast (see figs. 4.81, 4.83, and 4.94), this chart exaggerates the headlands, islands, bays, and inlets, doubtless reflecting the Inuit's greater familiarity with and economic dependence on the seacoast.
Size of the original: 7.2 × 27.4 cm. From *Edinburgh Philosophical Journal* 4 (1821), lower part of pl. V at end of volume.

and complex coast as essentially straight (fig. 4.94). The earlier of the two Inuit maps, a transcript by Peter Fidler of an 1809 sketch by Nay hik til lok, begins just south of Fort Churchill and terminates to the north immediately beyond named Chesterfield Inlet (a section of the coast that is indeed essentially straight).[326] The second, by an unnamed Inuit, was communicated to the Wernerian Society in 1820 by William Auld and is known only in an engraving published with the society's proceedings (fig. 4.95).[327] Beginning at the same point as Nay hik til lok's map, it depicts the coastline far beyond Chesterfield Inlet. The long, distinctively shaped, narrow-based peninsula where "Musk Buffaloe [Oxen are] numerous" and where, at its distal point, is a "Narrow [where] the Natives kill many Seals" are very probably Melville Peninsula and Fury and Hecla Strait. The narrow base of the peninsula was later named Rae Isthmus, and the short but needlelike peninsula immediately to its left was almost certainly a representation of elongate Vansittart Island, between Repulse Bay and Lyon Inlet, which is connected to the mainland by fast ice for much of the year and separated from it by only a few kilometers at other times. Interpreting the coast beyond is more speculative, but there is no overall change in its direction at the fulcrum of Fury and Hecla Strait. This custom of representing long coastlines as essentially straight was common among Inuit and Subarctic Indians.

MAPS ON IVORY AND WOOD

The Inuit and Eskimos have a long tradition of engraving walrus tusk ivory. In Alaska, archaeological evidence indicates that pictorial engraving, generally of single subjects, began in late prehistoric times. By the early nineteenth century, objects made from carved ivory were being decorated with representations of humans, man-made objects, and animals, almost always in profile. No maps are known to have been made in this traditional style. Maps were engraved on ivory by Alaskan natives beginning in the late nineteenth century, when a commercial trade in ivory objects was established, centered at Saint Michael. The Alaska Commercial Company fostered the market by supplying walrus ivory to increasingly specialized engravers, whose work was characterized by the engraving of whole walrus tusks, larger figures, more detail, and the frequent use of the Western pictorial style seen by the Inuit in printed graphics.[328]

326. The Inuit-drawn coastline in figure 4.94*b* is based on a transcript by Peter Fidler of an "Is ke mo Sketch" of the west coast of Hudson Bay beginning at Churchill and continuing north to a point immediately beyond Chesterfield Inlet, in two sections: "Drawn by Nay hik til lok an Iskemo 40 years of age 8th July 1809," ink on paper, 19 × 24.7 cm, Hudson's Bay Company Archives, Winnipeg (E3/4, fol. 16r, lower part of page; not illustrated here). Figure 4.94*c* is based on a map transcribed by William Auld (see fig. 4.95).

327. On 2 December 1820, Professor Robert Jameson had exhibited at a meeting of the Wernerian Society in Edinburgh "a chart of the north-west side of Hudson's Bay, drawn by an Esquimaux," "Proceedings of the Wernerian Natural History Society," *Edinburgh Philosophical Journal* 4 (1821): 194–96. It was almost certainly the manuscript in the possession of William Auld. William Auld Sr. had served the Hudson's Bay Company between 1790 and 1815, much of the time at Churchill. He retired to Leith, near Edinburgh. His son William Auld Jr. also served the Company in Canada, returning to London with his brother on 26 October 1820. Hence either father or son could have supplied the manuscript from which the engraving was made.

328. Saint Michael had been a United States Signal Service Station since 1874 and was the center from which E. W. Nelson collected arti-

Maps were produced as souvenirs for this market in relatively large numbers, and many have survived. They were apparently made by a few specialist engravers, of whom several members of the Kakarook family working at Saint Michael were particularly important. Almost all the known extant examples contain toponyms and are of the coastline and offshore islands in the region of Norton Sound, Seward Peninsula, and Kotzebue Sound. In almost every case the source seems to have been a published map, suggesting heavy influence by Western markets. Because the medium was elongate and gently curved, the engraver almost always had to straighten the coastline. Some of the examples were merely cartographically decorated tusks, whereas others had legs or supports and were designed to function as cribbage boards (fig. 4.96). Although such maps are noteworthy, they are exceptional, characteristic of a small area at a late date, and derived from printed sources rather than traditional knowledge or individual experience.

As with North American Indians, there does not appear to have been a widespread tradition among the Inuit of carving, painting, or drawing mobiliary maps on wood. One group, however, the Ammassalik Eskimos on the east coast of Greenland, appear to have made wooden maps, examples of which were collected in the late nineteenth century.[329] Members of the Amdrup expedition of 1898–1900 collected an example of one type, a bas-relief coastal map on a wooden board (fig. 4.97). Thalbitzer, who led a later expedition to the area, believed that this map and apparently others were products of "later

facts for the Smithsonian Institution between 1877 and 1881. See Dorothy Jean Ray, *Eskimo Art: Tradition and Innovation in North Alaska* (Seattle: University of Washington Press, 1977), 22–28.

329. The maps are discussed and illustrated in Gustav Frederik Holm, "Ethnological Sketch of the Angmagsalik Eskimo," and William Carl Thalbitzer, "Ethnographical Collections from East Greenland (Angmagsalik and Nualik) Made by G. Holm, G. Amdrup and J. Petersen," both in *The Ammassalik Eskimo: Contributions to the Ethnology of the East Greenland Natives,* 2 vols., ed. William Carl Thalbitzer, Meddelelser om Grønland, 39–40 (Copenhagen, 1914), 1:1–148, esp. 107, and 1:319–754, esp. 665–66. Holm's Danish original: *Den Østgrønlandske Expedition, udført i Aarene, 1883–85,* Meddelelser om Grønland, 10 (Copenhagen, 1888), esp. pl. XXXXI.

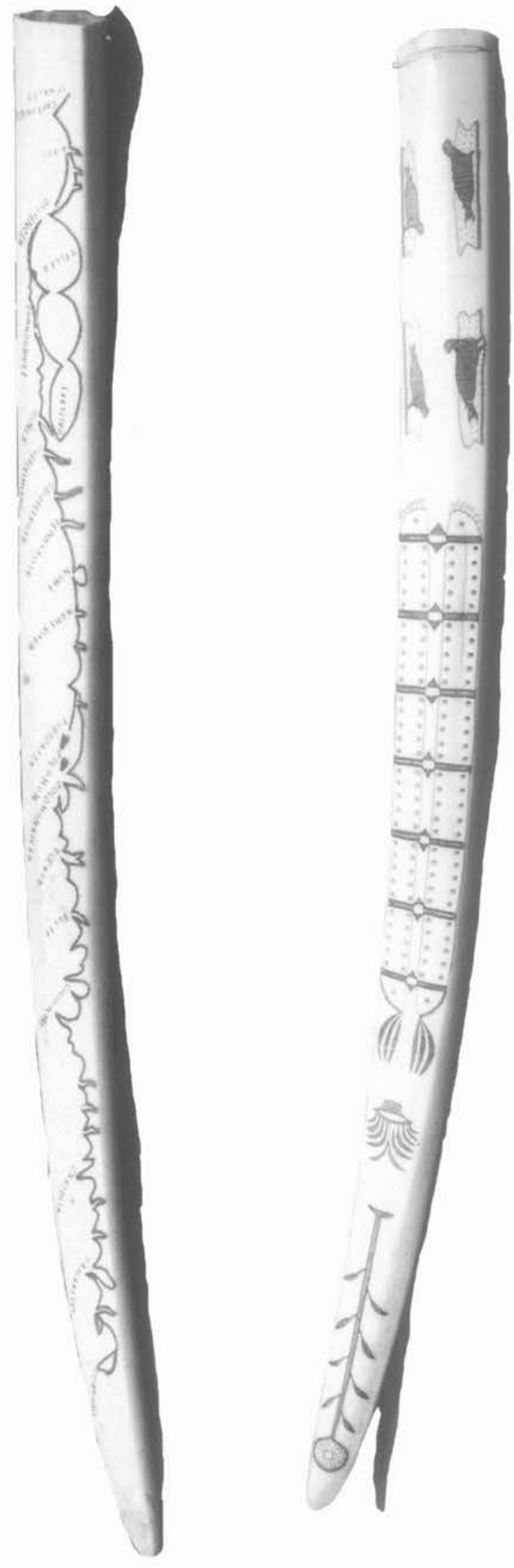


FIG. 4.96. MAP OF PART OF THE WEST COAST OF ALASKA ENGRAVED ON A WALRUS TUSK CRIBBAGE BOARD. Bering Strait Inuit, late nineteenth century. The coast represented, from Cape Prince of Wales to Saint Michael, bounds most of deeply indented Norton Sound but is straightened here to accord with the shape of the tusk. On the side opposite the map is a cribbage board. The hollow of the tusk was used to store the pegs.
Length of the original: 65 cm. Photograph courtesy of the Board of Trustees of the National Museums and Galleries on Merseyside, Liverpool (Liverpool Museum, 36.135.14).

FIG. 4.97. AMMASSALIK BAS-RELIEF CARVING ON WOODEN BOARD OF AN OUTLINE OF PART OF THE EAST GREENLAND COAST, 1884–85. This type of map may have been particular to east Greenland, perhaps a post-contact development. The map shows Kap Dan, the east side of the Ammassalik (Angmagssalik) fjord. The water has been cut out and drawn with pencil.
Size of the original: 20 × 8.5 cm. Photograph courtesy of the National Museum of Denmark, Department of Ethnography, Copenhagen (L. 6654).

times." He gave no evidence for their lateness and offered no explanation for it.[330] The bas-reliefs were intricately carved and required smooth, flat surfaces, such as European boardwood. Though the closest to Europe of all North American cultures (at their closest, approximately four hundred kilometers from Iceland), the Ammassaliks' coastal territory was not on the routes of the tenth- and eleventh-century Norse or any of the several searchers for a Northwest Passage from the late fifteenth century onward. Contacts with Europeans therefore appear to have been late.

More unusual than the bas-relief tradition are three-dimensional maps that the Ammassaliks carved from blocks of wood (figs. 4.98 and 4.99). Although they could have been made out of driftwood, they probably were not, and their production must have required very sharp cutting tools. The two long edges of figure 4.98 are intricately carved; long, irregular, but carefully crafted indentations separating equally irregular but purposefully shaped protuberances. These were carved to represent actual fjords and headlands. Their sequence as represented on the right-side edge is continued on the left-side edge. The face of the wood was grooved and beveled to represent "not only the contours of the country, but also its appearance and the reliefs of the mountains." Describing such maps, Holm drew attention to their less obvious information content: "All the places where there are old ruins of houses (which form excellent places for beaching the boat) are marked on the wood map; the map likewise indicates where a kaiak can be carried over [the inter-valley ridge] between the bottom of two fjords, when the way round the naze [headland] between the fjords is blocked by the sea-ice."[331]

The map in figure 4.99 is much thinner and more nodular, each nodule representing one of a sequence of offshore islands. The coastal map in figure 4.98 and this island map were complementary, and by "*manipulating* the [nodular] stick so that the islands appear in their right position to the mainland, the traveller is enabled by means of this map to inform others of the route he has taken."[332] Figures 4.98 and 4.99, as well as another map collected by Holm, were apparently made by "Kunit fra Umivik."[333] The only other known example was probably carved by the same man.[334] There is therefore a very real possibility that Kunit was an innovator.

330. Thalbitzer, "Ethnographical Collections," 666.
331. Holm, "Ethnological Sketch," 107 (note 329).
332. Holm, "Ethnological Sketch," 107.
333. Holm, *Den Østgrønlandske Expedition,* pl. XXXXI (note 329).
334. Model of the east coast of Greenland from north of Kangerdlugsuatsiak to Ammassalik measuring 16.4 × 5.9 cm and carved in wood perhaps by (or as a copy of one by) Kunit; Museum, Michigan State University, East Lansing, Michigan (item 896.17, 62154).

FIG. 4.98. THREE-DIMENSIONAL AMMASSALIK ESKIMO COASTAL MAP OF PARTS OF THE FJORD COAST OF EAST GREENLAND, CARVED IN WOOD. It is not certain how such maps were used, though it seems they had to be rotated. Some specimens may have been made for collectors. Length of the original: 14 cm. Photograph courtesy of the Greenland National Museum and Archives, Nuuk.

FIG. 4.99. THREE-DIMENSIONAL AMMASSALIK ESKIMO MAP OF ISLANDS OFF THE FJORD COAST OF EAST GREENLAND, CARVED IN WOOD. This island map complements the coastal map (fig. 4.98) when the two are positioned and moved correctly in relation to each other. Length of the original: ca. 24 cm. Photograph courtesy of the Greenland National Museum and Archives, Nuuk.

MAPS IN LATE TWENTIETH-CENTURY INUIT ART AND SOCIAL POLICY

As has occurred among Australian aborigines and many other indigenous groups, traditional map elements have become important components of Inuit commercial art. McGrath has described seven examples of Inuit art containing cartographic elements made between 1964 and 1986. All show coasts and rivers very approximately in plan, and all except the earliest show a mix of humans, animals, dwellings, or Euro-American goods (e.g., guns and ships) in profile. On the earliest example, Map of the Arctic Bay, by Toongalook (Cape Dorset, ca. 1964), the syllabics state that the artist had never made a map before and did not consider himself good at it (fig. 4.100).[335]

335. Robin McGrath, "Maps as Metaphors: One Hundred Years of Inuit Cartography," *Inuit Art Quarterly* 3, no. 2 (1988): 6–10, esp. 8, and see idem, "Inuit Maps and Inuit Art," *Inuit Art Enthusiasts Newsletter* 45 (1991): 1–20.

FIG. 4.100. MAP OF THE ARCTIC BAY AREA (CAPE DORSET, 1964). By Toongalook (1912–67). Graphite on paper.
Size of the original: 65.5 × 50.6 cm. Photograph from Jean Blodgett, *North Baffin Drawings* ([Toronto]: Art Gallery of Ontario, 1986), 77 (fig. 37); copyright Art Gallery of Ontario. By permission of the West Baffin Eskimo Cooperative, Cape Dorset.

Yet it is maplike: a coastline with islands and with hachuring very similar to that on many of the maps made for Franz Boas some eighty years earlier by members of an earlier generation of the same Baffin Island Inuit living several hundred kilometers to the east.[336] Later examples are more stylized and less obviously cartographic.

Analysis of commercial art may well reveal changes in the spatial perceptions of Inuit artists,[337] undoubtedly influenced by changing lifestyles in the twentieth century, including exposure to topographic maps. Good topographic maps now exist for vast areas for which until the mid-twentieth century there were, if any, only crude reconnaissance maps. The nucleating of the Inuit population into fewer and often larger centers has increased awareness of these. During 1973 and 1974, approximately 1,600 Inuit in thirty-three northern settlements throughout Arctic Canada participated in the Inuit Land Use and Occupancy Project. An important component was the creation of map biographies, in which each man plotted on topographic maps the areas where he had hunted, trapped, fished, and camped during his adult life.[338] Although several operational hurdles had to be overcome, the ability of Inuit to plot on printed base maps was not one of them. "If cross-checking and overall consistency are tests of truth, then it can safely be said that accuracy and honesty were in virtually every case beyond doubt."[339] The accuracy and standardization of Euro-American maps had increased dramatically during the previous century and a half. The Inuit's ability to use them with confidence and precision had more than kept up with that change. What is not clear is the extent to which the Inuit have lost their earlier concept of map. It is interesting that, although they easily used topographical maps as a base, the Inuit mapmakers found it difficult to comprehend the categorization of phenomena suggested by Euro-Americans. Asked to indicate a hunting range, Inuit hunters used lines and loops rather than enclosing the area in a circle. When urged to use circles, they tended to mark only "inner hunting areas–the favourite spots, where kills had been made, the core areas–rather than outer perimeters."[340]

Cartographic Affinities between the Eurasian and American Arctic and Subarctic Regions

Based on material assembled in this chapter and chapter 8 below, there is some evidence of stylistic, media, and contextual parallels between the Arctic and Subarctic regions of North America and Asia. Since the work of Franz Boas, it has become increasingly clear not only that "stylistic parallels around the Pacific rim are more abundant and more convincing than those around the Atlantic," but that "the number of parallels increases and becomes more specific as one proceeds north from the mouth of the Columbia River to Bering Strait."[341] These

336. Franz Boas elicited from Inuit more than forty maps on paper in the course of anthropological fieldwork in southern Baffin Island in 1883 and 1884. Most of these are in the National Anthropological Archives, Natural History Museum, Smithsonian Institution, Washington, D.C. ("129, 270 Eskimo," Gift of Franz Boas, c/o Bureau of American Anthropology, through O. I. Mason, February 25, 1895, U.S.N.M. acc. 29,060). At least three others have survived in the Museum für Völkerkunde, Berlin. Of several published examples of the Boas Inuit maps, the one most similar to Toongalook's was of Cumberland Sound, drawn by Itu, a Nugumiut; see Boas, "Central Eskimo," fig. 545 (note 301).

337. See Peter Osmers, "Inuit Perspective in Drawings," unpublished paper, Carleton University, 1992.

338. With the exception of the Mackenzie delta, plotting was on National Topographic System 1:500,000 topographic sheets.

339. Milton M. R. Freeman, ed., *Inuit Land Use and Occupancy Project*, 3 vols. (Ottawa: Minister of Supply and Services Canada, 1976), 2:56.

340. Freeman, *Inuit Land Use*, 2:55.

341. William W. Fitzhugh, "Crossroads of Continents: Review and

parallels include several similarities in graphics and design. For example, graphic and sculptural art was important and "was conspicuously displayed on garments and everyday artifacts and in similar types of petroglyphic art" for both the Tlingits of southeast Alaska and the Amur River peoples along the frontier of northeastern China. Interior Siberians and Athapaskans "shared certain clothing concepts and embroidery techniques and designs." On opposite sides of the Chukchi and Bering Seas, the Maritime Chukchi/Asian Eskimos shared many cultural attributes with the Alaskan Eskimos, among which were religious life, festivals, and fur embroidery.[342]

Most of the American Arctic peoples Europeans met at first contact were Neo-Eskimos. Beginning in north Alaska about A.D. 1000, their ancestors had migrated rapidly eastward through the maritime Arctic, colonizing much of it by 1200 and virtually all by 1550.[343] Known by archaeologists as Thule people, their language, much of their mythology, and most of their material culture derived from northern Alaska.[344] Fine linework, pictography, and representation were characteristics of a tradition of engraving ivory and bone from northeast Asia, throughout the American maritime Arctic to east Greenland.

Among the Na-Dene-speaking northern Athapaskans of interior Alaska and the northwest Canadian Subarctic language, shamanistic beliefs and practices, as well as much folklore, have strong affinities with northeast Asia; for material culture, including art forms, this is somewhat less so.[345] Later in prehistory, some of these peoples were drawn toward regions beyond: the Northwest Coast, with its fishing economy; the caribou-rich tundra; the boreal forests to the east of the Cordilleras; and the bison-rich northern edge of the Plains. In each they mixed with peoples already there. Ultimately, some reached the southern Plains, where, as ancestors of the Navajos and Apaches, they became involved in trading with the Pueblo societies of the Southwest.[346] Obsidian for cutting tools and siliceous stone for flaking into tools were traded over considerable distances throughout these regions.[347]

These parallels and origins remain to be explored in the context of traditional cartography of Arctic and Subarctic peoples. Doing so will require assembling more artifactual evidence, particularly cosmographical material, which will need to be interpreted with reference to folklore and traditional worldviews.

With the reopening to the West of museum collections in the former USSR and the initiation of joint research projects between North American and Russian specialists, the time is now propitious.[348] Cosmographical maps painted on drumheads and used by shamans in the Eurasian Subarctic probably had North American equivalents, such as the drums used by dreamers in North Athapaskan groups. Artifacts in North American collections must be reexamined, particularly the celestial maps incorporated on the ceremonial coats of northeast Asian shamans. The Lakota sky maps and the Koryak dancing coat (plate 14) share an interesting characteristic: neither depicts celestial patterns as seen from the earth; they portray them as mirror images reflected from it. Divination practices need to be reexamined on a circumpolar basis. Not all were concerned with predictions of conditions and events in space, but some certainly were.

Vernacular kinds of mapmaking on the bark of paper birch and on blazed trees should be reexamined for similarities in their styles and distributions. It would not be surprising if there was also an indigenous North American equivalent to the decorative ceremonial maps found on a range of northeast Asian artifacts that included the handles of ritual vessels, canoe benches, and paddle blades (see below, pp. 344–48).

Parallels between traditional cartography in northwestern North America and that in northeast Asia are sufficient to suggest a common prehistoric origin rather than independent but convergent development in similar environments. Further evidence will doubtless emerge in rock art and prehistoric artifacts, especially if specialists interested in these forms develop a heightened awareness that maps might be among them. More evidence remains to be recognized in ethnographic artifacts collected during early postcontact times. Early contact written records must also be scrutinized for supporting evidence. But assessing the nature of links and dating them await a fuller understanding of the migrations of peoples and diffusion

Prospect," in *Anthropology of the North Pacific Rim,* ed. William W. Fitzhugh and Valérie Chaussonnet (Washington, D.C.: Smithsonian Institution Press, 1994), 27–51, esp. 29. On Boas: Franz Boas, "America and the Old World," in *Congrès International des Américanistes: Compte-Rendu de la XXI^e Session, deuxième partie tenue a Göteborg en 1924* (Göteborg: Göteborg Museum, 1925), 21–28, and idem, "Relationships between North-west America and North-east Asia," in *The American Aborigines: Their Origin and Antiquity,* ed. Diamond Jenness (1933; reprinted New York: Russell and Russell, 1972), 357–70.

342. Fitzhugh, "Crossroads of Continents," 34–35.

343. *Historical Atlas of Canada,* vol. 1, pl. 11 ("Peopling the Arctic," by Robert McGhee) (note 71).

344. Robert McGhee, "Thule Prehistory of Canada," in *Handbook of North American Indians,* ed. William C. Sturtevant (Washington, D.C.: Smithsonian Institution Press, 1984), 5:372–73.

345. Galina I. Dzeniskevich, "American-Asian Ties as Reflected in Athapaskan Material Culture," in *Anthropology of the North Pacific Rim,* ed. William W. Fitzhugh and Valérie Chaussonnet (Washington, D.C.: Smithsonian Institution Press, 1994), 53–62. Notwithstanding the title, no conclusive evidence is presented for material cultural ties. The strongest evidence is the ornamentation of buckskin clothing (56).

346. John W. Ives, *A Theory of Northern Athapaskan Prehistory* (Boulder, Colo.: Westview Press, 1987), 351–53.

347. *Historical Atlas of Canada,* vol. 1, pl. 14 ("Prehistoric Trade," by J. V. Wright and Roy L. Carlson) (note 71).

348. For example, since the late 1980s the Smithsonian Institution has organized cooperative archaeological, anthropological, and ethnographic programs.

of cultural traits during approximately the past ten thousand years.

Concluding Themes

In this chapter I have presented the evidence for indigenous mapmaking among native North Americans. The task now is to draw several concluding themes from this largely regional treatment. These include the methodological problems of explaining the degree of acculturation in various examples of Native American maps, their physical attributes (media), structure, information content, and social purpose.

Stages of Acculturation

Throughout the regional accounts, the context of native encounters with Euro-Americans has been constantly in evidence. The concept of "first contact" with Europeans not only separates prehistory from history, it is associated with a change in the nature of evidence available to posterity. And this contact also foreshadowed accelerating acculturation of maps and of the contexts in which they were made and used.

As a working concept, however, the idea of first contact presents serious operational problems. First, regional variations in the date of supposed first contact were almost four hundred years apart. Hernándo de Alarcón's account of how a Halchidhoma Indian made a map of the lower Colorado River for him in 1540 could certainly qualify. Similarly, first contact has been claimed in the case of figure 4.52, the 1914 map of the territory of the then extinct Yahis in northern California made by Ishi, the last Yahi survivor.

The Halchidhoma and Yahi examples illustrate a second operational problem in applying the concept of contact: exactly how unacculturated were they? Alvar Núñez Cabeza de Vaca and three other survivors of the Narvaez expedition had probably passed some five hundred kilometers to the southeast of Alarcón's encounter only a few years before, but members of Alarcón's expedition were nevertheless the first Europeans ever to enter the lower Colorado Valley. One might assume, therefore, that the Halchidhoma's map would have been unacculturated. On the other hand, in the case of Ishi in northern California, although he has been called "the last wild Indian in North America," Euro-American traders and trappers had first entered northern California ninety years before his capture in 1911. Indeed, by that year there had been permanent Euro-American settlement very close to Yahi territory for several decades.[349] Whereas historically early first contacts preceded (or marked the beginning of) acculturation, historically late first contacts cannot be assumed to have done so.

A third operational problem arises when we attempt to define when the period of first contact ended. The possibility of indirect acculturation arising from occasional Spanish activities in the region during the sixteenth century cannot be discounted in the Halchidhoma example.[350] On the other hand, even if one accepts that Ishi was "wild" when captured in 1911, was his map of 1914 an example of first contact cartography? By then he had lived for most of three years in the Museum of Anthropology, San Francisco, and had associated with eminent anthropologists.[351] We do not know whether the map was produced spontaneously or interactively with researchers, and the original is not extant. What might Ishi have inscribed or modeled on the ground before abandoning himself to Euro-American settlers only three years before, and how would it have differed from the published map?

Even allowing for the considerable differences in dates of first contact between the several parts of North America, however, there are remarkably few truly indigenous artifacts; the mid-eighteenth-century Quapaw painted hide (plate 6) may well be the oldest. Contemporary accounts of early contact map artifacts are just as rare—the earliest was probably the painted bison hide found in 1540 by Vásquez de Coronado at the Zuni pueblo Hawikuh. But there are some very useful early contact accounts of mapmaking in what appear to have been traditional ways—for example, Jacques Cartier's account of St. Lawrence Iroquoian men modeling a map of the Lachine Rapids and upper St. Lawrence River in 1541. Indeed, accounts afford the best evidence of early contact maps, outnumbering extant maps almost two to one. It is through such accounts that we know, for example, of the widespread use of birchbark as a map medium in the Northeast, the near ubiquity of modeling on the ground, and the indigenous use of maps in teaching and planning.

A recent global analysis of current mapmaking by indigenous peoples in the context of conservation projects recognizes three levels of basic mapping activity that may help clarify the distinction between contact and post-contact cartography in history. The first level consists of maps intended as communication tools for use while the environmental appraisal is in progress. These tend to be ephemeral, from outlines in the sand to arranging colored materials on the ground to make maps. Their simplicity and flexibility make them ideal for communicating within and between local groups. At the second level, sketch mapping commences with interaction between technicians and practitioners in medicine, agriculture, hunting,

349. Goetzmann and Williams, *Atlas of North American Exploration,* 148–49 (note 184), and Helen Hornbeck Tanner, ed., *The Settling of North America: The Atlas of the Great Migrations into North America from the Ice Age to the Present* (New York: Macmillan, 1995), 128–29.

350. Goetzmann and Williams, *Atlas of North American Exploration,* 32–33 and 36–39.

351. According to a later source, which reproduces another redrafted version of the map, it "was Ishi's first attempt at map making drawn at the Museum of Anthropology, about 1914" (Kroeber, *Ishi,* 215 [note 216]).

and fishing and sometimes involves training local residents as surveyors to gather and map the data. The third level involves combining the sketch maps with existing topographic maps to produce documents acceptable for transactions with external agencies. Such maps are recognized as evidence that the land is being used, and this enhances claims to ownership by local communities.[352]

In the context of maps discussed in this chapter, the third level is manifestly "Westernized" and hence a postcontact mapmaking activity because it utilizes existing topographic maps. At the second level, the distinction between "technicians and practitioners" and the reference to native peoples being "trained as surveyors" suggest likewise. In contrast, the "outlines in the sand" and "maps on the ground" of the first level are redolent of traditional modes of production in the contact stage. As with modern maps intended as informal sketches, their historical equivalents are also the most difficult to document.

The extant maps of Charlton Island made by Crees between 1839 and 1846 (e.g., fig. 4.87), made in a context similar to the modern indigenous conservation maps, are good examples of the contact tradition. In contrast, the map of part of the Missouri River in North Dakota made by Sitting Rabbit in 1907 (fig. 4.58) is clearly an example of a postcontact document. Based on a published Missouri River Commission map, its content was in part determined by Orin G. Libby, who commissioned it on behalf of the State Historical Society of North Dakota.[353]

Most of the surviving maps made by Indians and Inuit were made at the request of Euro-Americans. Because most were solicited for specific purposes, usually to satisfy the need for geographical information, a large number have survived, though virtually all with enhancements. Almost all are on paper. Some have survived in archives since soon after they were made. Of these, those made for official presentation to royalty and their colonial representatives may–for reasons of aesthetics, intelligibility, or propriety–also be some of the most modified from the Indian originals. For example, the well-known extant versions of the Chickasaw map of the Southeast presented in 1723 to Francis Nicholson, governor of Carolina, contains two pictographic drawings: one small pointing hand and an armed Indian warrior leading a horse (fig. 4.38). Yet there are many empty spaces on the transcript, and one wonders if the original may have contained additional pictographs; perhaps omitted by the draftsman because that information was either incomprehensible or irrelevant to the English conception of the map as a statement of the strategic relations between themselves, allied Indians, the French colonists, and Indians allied with the French.

During the nineteenth century, Arctic exploration, the opening up of the interior and western parts of the continent, and the increasing scientific attention given to these regions and their traditional peoples resulted in many official reports, semiofficial publications, and travel narratives. As the century progressed, publications were increasingly illustrated with line engravings (often woodcuts), including many examples of Indian and Inuit maps. These engravings tended to be small and simplified versions of the originals. The changes that could take place between originals and published versions can be seen by comparing the maps preserved in the National Anthropological Archives, Washington, D.C., with those published in the *Annual Reports of the Bureau of American Ethnology* in the late nineteenth century. The original maps include a set of three inscribed birchbarks given to Garrick Mallery about 1887 by Sapiel Selmo, a Passamaquoddy chief of the Pleasant River region in Maine. They are *wikhegan,* maps incorporating recent events and immediate intentions left as messages for persons expected to follow.[354] The pencil markings on the originals, together with the circumstances of their presentation and collection, suggest they were specimens made on request. The published engravings lack some of the subtle detail found on the originals–including enhancements, modifications, and numbering of features.

An interesting insight into the acculturation process is provided by a Kiowa monthly calendar for the period August 1889 to July 1892. Drawn in colored inks on buckskin, it was copied from an earlier pencil version in a notebook (fig. 4.101). Each month was represented by a pictograph associated with an event. The pictograph for June 1891 is of a Euro-American and an Indian speaking to each other across a frame, on and above which are a number of small circles (fig. 4.102). It was the month in which a commission reached an agreement with the Caddos and Wichitas, near neighbors of the Kiowas to the southeast, for the sale of their reservation lands. The small circles symbolized the purchase money, and the frame divided into sections represents the allotments of land in the form of a gridded map.[355]

Based on the various levels of acculturation of the maps discussed in this chapter, it is possible to summarize three broad and inevitably overlapping stages in the develop-

352. Peter Poole, *Indigenous Peoples, Mapping and Biodiversity Conservation: An Analysis of Current Activities and Opportunities for Applying Geomatics Technologies* (Landover, Md.: Biodiversity Support Group, 1995), 6.

353. Thiessen, Wood, and Jones, "Sitting Rabbit 1907 Map," 146–49 (note 230).

354. The three birchbark *wikhegan* in the National Anthropological Archives, Washington, D.C. (cat. 393, 431–33), were reproduced as line engravings in Mallery, "Picture-Writing," 347–50 (figs. 456–58) (note 4).

355. James Mooney, "Calendar History of the Kiowa Indians," in *Seventh Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1895–'96* (Washington, D.C.: United States Government Printing Office, 1898), 129–445, esp. 145, 373–79, and pl. LXXX.

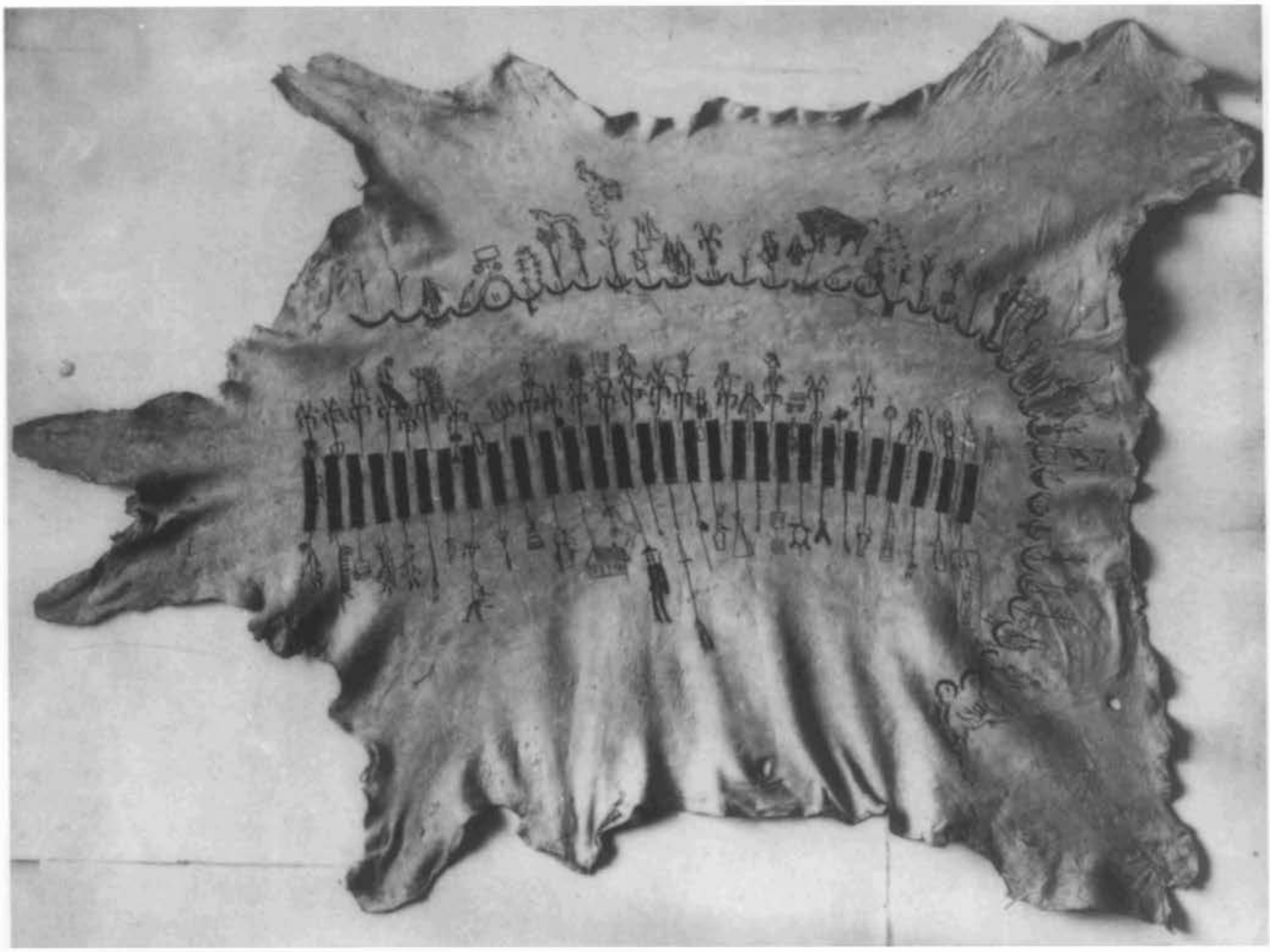


FIG. 4.101. KIOWA MONTHLY CALENDAR. This calendar was redrawn by Anko for James Mooney in 1892 in colored ink on buckskin from the original in pencil in a notebook. Only the photograph is extant.
Photograph courtesy of the National Anthropological Archives, Smithsonian Institution, Washington, D.C. (neg. no. 46.856).

FIG. 4.102. PICTOGRAPH FOR JUNE 1891 FROM KIOWA MONTHLY CALENDAR ON BUCKSKIN. In this detail from the upper right of figure 4.101, the frame symbolizes the sectional map used in negotiating a land sale. Although the calendar was drawn by Anko, a Kiowa, it was the sale of reservation lands by the neighboring Caddos and Wichitas that symbolized the month.
Photograph courtesy of the National Anthropological Archives, Smithsonian Institution, Washington, D.C. (neg. no. 46.856).

ment of Amerindian cartography. The stages are described in table 4.1.

PHYSICAL ATTRIBUTES (MEDIA)

Although there are reports of native North American maps made throughout the continent, the media and techniques varied considerably. Some materials and meth-

TABLE 4.1 Summary of Stages in the Development of Native North American Cartography

PRECONTACT STAGE	CONTACT STAGE	POSTCONTACT STAGE
Period: Predating even indirect European influence and beginning several thousand years earlier. *Evidence:* Rock art and manmade structures, but both are problematic. *Types of maps:* Celestial, many ultimately verifiable; terrestrial, more difficult to verify; cosmographical, most difficult to verify. *Location:* In the field, particularly in the subarid West but including structures in the Mississippi and Ohio Valleys. *Quantity:* Incalculable but probably numerous. *Characteristics:* Truly indigenous in structure, style, and information content. Presumably changed through time as a consequence of migrations and cultural diffusions. *Problems:* Discovering in the field; dating; verifying map function.	*Period:* Mid-sixteenth and mid-seventeenth centuries along the northeastern and eastern littoral, in the St. Lawrence and lower Mississippi Valleys, and in the Southwest. Mid-seventeenth to mid-eighteenth century in the eastern interior. Mid-eighteenth to early nineteenth century in the northern and western interiors. Early to mid-nineteenth century in the Far West. Early to late nineteenth century in the Arctic fringe. *Evidence:* Artifacts and accounts by explorers, traders, soldiers, missionaries, and early settlers. *Types of maps:* Very few celestial and cosmographical, rather more terrestrial. Many on birchbark, some on skin, less frequently on hard animal tissue and in wampum. Ephemeral and modeled maps not extant. *Locations:* Museums for artifacts. Early literature on discovery and exploration for accounts. *Quantity:* Very few artifacts; numerous accounts. *Characteristics:* Indigenous in structure and style but with an increasing tendency for content to be influenced by contact. *Problems:* Paucity of artifacts and ambiguity of many accounts, especially earlier ones.	*Period:* From the establishment of the first permanent Euro-American settlements, the development of regular trade and communications networks, and the beginnings of resource exploitation. *Evidence:* Maps made to aid communication with Euro-Americans and to satisfy their requests for information about routes, strategic relationships, and resource locations. *Types of maps:* Mainly terrestrial maps on paper in states ranging from entirely native drawn, via annotated originals, to Euro-American transcripts and printed versions. *Locations:* Mainly in archives. Printed versions mainly in official publications. *Quantity:* Numerous and from every part of North America. *Characteristics:* Unquestionably maps but lacking many to most indigenous attributes. *Problems:* Assessing the degree of acculturation and deciding how far each map's production, characteristics, and role afford evidence of native cartographic traditions.

ods were virtually ubiquitous, whereas others were characteristic of particular regions.

Inscribing and modeling ephemeral maps on the ground–whether terrestrial or celestial–was a spontaneous and widespread enterprise; perhaps because of its novelty and utility in the eyes of European observers, it may have been overreported at the time of contact. Though the practice was regionally less widespread, some groups modeled maps in the course of shamanic performances. Restricted as to when and where they were performed, the cartographic components were usually only parts of more complex designs. Repeated over many generations, they tended to become stereotyped and often combined terrestrial, celestial, and cosmographic elements. Until the twentieth century, Euro-Americans rarely witnessed these ceremonial performances. When they did, as with John Smith's observations of Virginia Algonquian "conjurations" in 1607, the accounts tended to stress forms and behavior rather than patterns, purpose, and meaning. The best-known examples of this kind of map modeling are in some of the dry sandpainting ceremonies in the Southwest, in which various colored sands depicted various celestial elements. In these rituals, the commonly cited examples of which relate to the Navajos, the sands were carefully sprinkled to create designs on a prepared background of natural colored sand and then destroyed.

Bark was perhaps the most distinctive of the map media, primarily but not exclusively that of the paper birch, *Betula papyrifera.* The tree grows in a broad belt extending from the East Coast between Maryland and Labrador to the Rocky Mountains in Montana and the lower Mackenzie River in the western Canadian Subarctic. The use of its bark as a map medium was most common in the eastern part of the belt, among the northeastern Indians and the easternmost bands of the Subarctic in the Upper Great Lakes region. Among most of these peoples, its use was reported from the early contact stage. For short-term use, it was ideally suited to inscribe or to mark with mixtures of grease and natural pigments (and later on with pencil). This made it a near perfect medium for instant pictographic messages.

Maps drawn on animal skin were almost certainly less common than ephemeral maps inscribed on the ground or relatively short-lived maps made on birchbark. They tended to be large and to be made for special purposes and occasions. Other media were more localized or atypical. Throughout much of northeastern North America, mnemonic devices known as wampum belts were made from colored shells shaped into beads and woven into patterns symbolizing both geopolitical and spatial relationships. It is perhaps in the Subarctic and Arctic that the most specialized forms of materials are reported. In the eastern Subarctic, the scapulae of mammals have been used in a form of divination known as scapulimancy, which was often cartographic. Among the Ammassalik Eskimos on the east coast of Greenland, maps in bas-relief or in three dimensions were carved on driftwood to represent not only the complex fjord coastline but also the shape of the mountains along the coast. The Inuit also have a tradition of engraving walrus tusk ivory with graphics, although no premodern examples appear to have been maps. Elsewhere, although maps were occasionally painted on the trunks of blazed trees, wooden boards were rarely employed, even after Europeans introduced sawn boards. Perhaps making maps on paper was the most convenient equivalent of doing so on the ground or on birchbark. Furthermore, perhaps the relative permanence afforded by painting or engraving maps on wood was not considered necessary.

STRUCTURE

The geometric structure of Indian and Inuit maps has received very little attention. Without knowing a culture's underlying concepts of how space is ordered and represented, it is impossible for another culture using different spatial structures to interpret indigenous maps. There is no evidence that the formalized geometries of the West had any counterpart in native North America before the late postcontact stage, and there is always the danger of imposing Western geometric concepts on indigenous representations. Such Western concepts include metric scale, standard units of measure, standard orientation, and systematic projection.

In North America there was little need for such regularization of distance and direction. Land and water distances were experiential itinerary measures; days' journeys, overnight stops, distances between pauses, the distance over which a gunshot could be heard. Without exception, these were relative. Factors influencing them included season of the year, environmental conditions, mode and purpose of travel, physique and skills of the weakest member or horse, and previous experience of the route.

Nevertheless, geometric regularities are certainly recognized in cosmographical concepts such as the fundamental axes of the universe, the cardinal directions, and the underlying importance of the circle. The Pawnee and Lakota Sioux notions of the heavens' mirroring the earth are related: Grieder's third and final cultural wave in his genetic explanation of precontact art was characterized by a fundamental belief that events on earth took on meaning only by reflection from the heavens.[356]

Working with modern Navajos (descendants of third wave peoples), Rik Pinxten recognized that their spatial representations are rooted in three basic notions: volume/plane, movement, and dimension. These are implicit in many secondary spatial notions: near/separate/contiguous, part/whole, boundary, in/out, center/periphery, open/closed, overlapping, convergence/divergence, order and succession, front/back, up/down, left/right, and next to.[357] All the secondary notions are dimensionless, involving neither a linear metric nor a system of angular measure, and include many topological properties that are retained even when the structure undergoes deformation.

Virtually all Indian and Inuit maps are structured topologically in the informal sense. Exceptions occurred after Euro-American acculturation or when cosmographical locations took precedence over geography. The Black Hills component of the map made by Amos Bad Heart Bull sometime between 1891 and 1913 (fig. 4.57) is a good example. The placing of Devils Tower within the Black Hills may have been topologically incorrect, but it was entirely consistent with Lakota belief that the terrestrial world was a mere mirror of the celestial. Because their theology overrode topography, conceptual relocations of fixed terrestrial features were sometimes necessary.

Networks of rivers and trails, topologically structured, were included because they functioned as routes and, occasionally, as boundaries. But in the absence of graticules and grids, they also served as the structural base on which it was possible to mentally situate small areal and nodal features. For example, without its rivers and paths, not only would the Chickasaw map of 1723 (fig. 4.38) have had significantly less information content, but it would have been virtually uninterpretable by outsiders, especially as originally drawn, before names were added.

356. Grieder, *Origins of Pre-Columbian Art,* 101 (note 49).

357. Rik Pinxten, *Towards a Navajo Indian Geometry* (Ghent, Belgium: Communication and Cognition, 1987), 16–23.

The ground areas represented on terrestrial maps ranged from a few hectares to well over a million square kilometers.[358] Most small-area maps were based on the direct once-only or lifetime experience of one individual or small group. In contrast, making large-area maps must have involved integrating information provided by many, perhaps over several generations, and almost certainly mediated by tradition.[359] Terrestrial maps have many kinds of networks, but it is useful to recognize a hierarchy from very simple to highly complex: single-path networks, single-branch networks, multibranch networks, and circuit networks (fig. 4.103).

Single-path maps may be the most common of the four types (fig. 4.103*a*). They usually represent routes but vary enormously in style, complexity, and information content. The simpler ones were almost all made in the course of indicating specific routes, especially in the postcontact stage, when Indians frequently served Euro-Americans as geographical informants and field guides. The canoe-route map made in 1892 by the Chipewyan Andrew for the geologist J. B. Tyrrell is a good example (fig. 4.84). The information content of single-path maps is essentially that of oral itineraries.

Not all single-path maps were of simple routes. Though beltlike rather than linear in overall form, the Southern Ojibwa Mide migration charts (e.g., fig. 4.23) were in essence maps of single-path, one-way migration (or diffusion) routes. Yet their pictographic complexity and mythical information content is in marked contrast to the simple birchbark message map found in 1841 on the Ottawa River–Lake Huron watershed (fig. 4.24).

Single-branch networks add one or more branches to a single path (fig. 4.103*b*). The branches were included either to show alternative routes or to position other information on the map more clearly. An example is a map of the lower Colorado River traced on the ground by a Yuman (Quechan) Indian for Lieutenant Amiel Weeks Whipple in February 1854. It was made so that the Yuman could give the positions as well as names of various Indian groups.[360] Because this stretch of the river flows through semiarid scrub, tributaries are few, widely spaced, and hence effective for positively locating other features. Presumably this map was very similar to the map of the same stretch of the river reported to have been made for Alarcón by a Halchidhoma (near neighbors of the Yumans) more than three hundred years before.

Multibranch networks include two or more single-branch networks as discrete but adjacent components (fig. 4.103*c*). Most large-area maps of large river systems (e.g., figs. 4.38, 4.59, 4.66, 4.67, 4.71, 4.78, 4.81, and 4.83) represent networks of this type.

Circuit networks form the most complex category (fig. 4.103*d*); in them it is possible to pass between any two points in the circuit by several alternative routes. They are found in Indian route systems composed entirely of land paths, or canoeable rivers with transwatershed portages, or combinations of the two. Of such networks represented on maps, only a small proportion were composed entirely of land paths; for example, the Alabama headman's map of the locations of ten Chickasaw villages, one Natchez village, and the paths between them (fig. 4.40). Much more common are circuit networks consisting of a combination of land paths, navigable rivers, and transwatershed portages. Of this type, the Indian map of part of New Mexico transcribed in 1602 (fig. 4.59), with its combination of intersecting *rios* and *caminos,* is a good example.

There are a few indications of attempts to "scale" simple representations–such as single-path and single-branch networks–according to travel time. The case has already been made that this was so for the Cayuga-Susquehannock single-branch network map of 1683 of the Susquehanna River (figs. 4.18 and 4.19). Examples may have been more common among single-path maps, but the difficulty of establishing sufficient reliable referents along most of these, coupled with lack of knowledge about travel times (actual, average, upstream, downstream, by season, and so forth) virtually excludes the possibility of proof.

The structure of Indian and Inuit maps was also influenced by the shape of the available media, as in the case of the map of Lake Nipigon made on paper by Ojibwa Indians about 1859 (figs. 4.85 and 4.86). Though less immediately apparent, the representation of a complex single-branch network on the Iowa map of 1837 (fig. 4.67) is distorted to a remarkable extent by the constraints of the paper it was drawn on. Here the east bank tributaries of the upper Mississippi River (mainly in what are now Wisconsin and northwestern Illinois) occupy almost as much space as those on the west bank (draining

358. Of the examples of terrestrial maps reproduced in this chapter, figures 4.59, 4.66, 4.67, 4.71, 4.79, 4.81, 4.83, and especially 4.38 are the large-area maps.

359. Although made over a period of more than 150 years, figures 4.79, 4.81, and 4.83 may be part of such a tradition. If so, it was a post-contact tradition much influenced by the fur trade, which involved Indians in longer and more frequent journeys, gave rise to new contacts between Indians (and hence information flows), opened up new riverine routes, and created a demand for geographical information almost as great as for furs themselves.

360. Whipple made a copy of the ground map in a notebook; Lieutenant W. Whipple, untitled map in pencil on paper, February 1854, Notebook 20, Pacific Railroad Survey on 35 Parallel, Mississippi River to Pacific Ocean, 15 April 1853 to 22 March 1854, Oklahoma Historical Society, Oklahoma City. The most accessible published version is a line drawing: "Yuma map of Rio Colorado, with the names and location of tribes within its valley," in *Explorations and Surveys,* 16 (note 183).

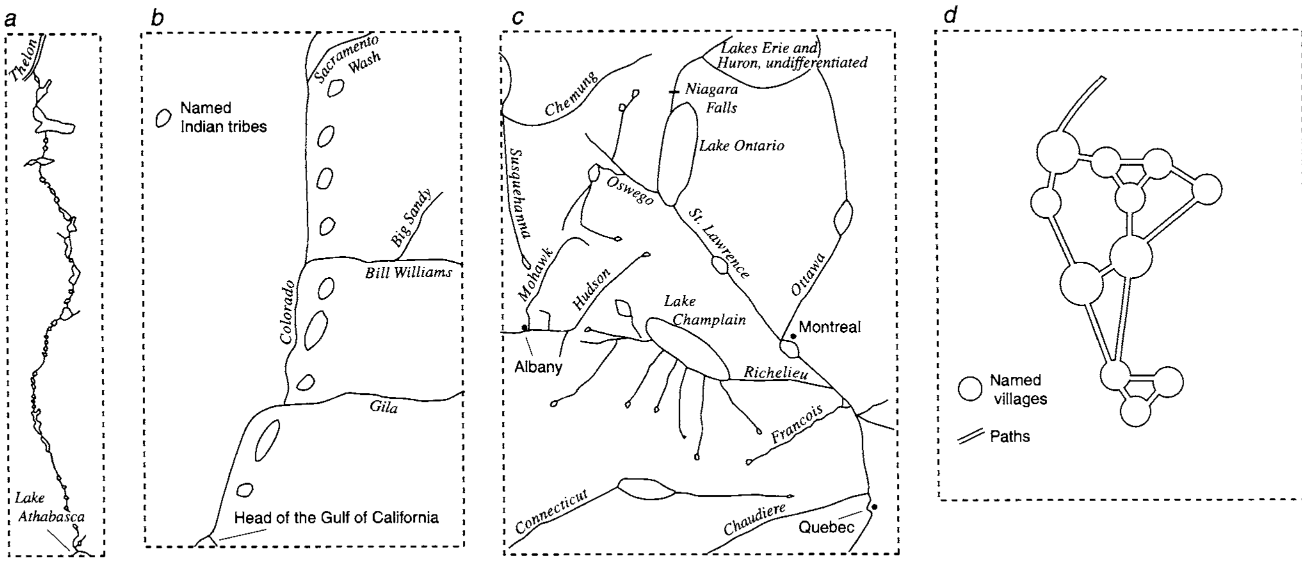


FIG. 4.103. FOUR TYPES OF NETWORKS ILLUSTRATED BY INDIAN MAPS. The single-path network (*a*) is illustrated by the 1892 Chipewyan map of the canoe route from Lake Athabasca to the Thelon River–more than seven days' travel involving forty-five portages (fig. 4.84). The single-branch network (*b*) is depicted by the Yuman map (1854) of the lower Colorado River and tributaries showing named Indian groups (see notes 183 and 360). In *c*, the multibranch network is based on a map of parts of the St. Lawrence, Susquehanna, Hudson, and Connecticut drainage systems, anonymous (Indian?), 1696 or 1697 (fig. 4.20). The circuit network shown in *d* is derived from the map by the Captain of Pakana (Alabama headman) showing the paths between their villages in what is now northeastern Mississippi (1737) (fig. 4.40).

most of Minnesota, Iowa, South Dakota, Nebraska, and northern Kansas, as well as part of Missouri) (fig. 4.68).

In the eighteenth and nineteenth centuries, Inuit and Subarctic Indians tended to represent the long and geometrically complex coastlines north from Fort Churchill and east around the Fury and Hecla Strait as essentially straight, though often exaggerating bays, estuaries, headlands, and offshore islands–significant features for travel, hunting, fishing, and other vital tasks. Inuit did represent parts of this coastline at a larger scale and in remarkable detail (e.g., fig. 4.92). However, the traditional way of indicating the crucial boundary between land and sea was an essentially straight line with minimal ornamentation. They may have been making a traditional cartographic generalization very similar to that of Blackfeet who, soon after contact at least, placed a smooth boundary on maps to indicate the transition zone between their two worlds; forest and grassland (figs. 4.62 and 4.80). Likewise, the boundary between forest and tundra was commonly placed on maps by Subarctic Indians soon after contact in the eighteenth century.

No one factor determined the geometry and structure of Indian and Inuit maps. Although they differed from modern European maps in deriving nothing from absolute linear metrics and having no equivalents of either grid or graticule, pattern and shape were not random. The geometry of a specific map is likely to have been influenced by several interrelating factors, for the most part hidden.

INFORMATION CONTENT

In their information content, native North American maps were unlike either topographic or thematic maps made in the Euro-American tradition.[361] Within the area mapped, no attempt was made to represent consistently every occurrence of a range of different phenomena. Even though most native North Americans were well informed about their own territories and the wider geography of their part of the continent, their terrestrial maps were not intended to be compendiums of that information. Each contained sufficient information to achieve its purpose, and the purpose was always circumscribed. The underlying principle was parsimony in selecting. It was assumed that those a particular map was intended for needed it to supplement what they already knew or to remind them of what they might forget. Supplementing was the dominant role of terrestrial maps, whereas cosmographic and celestial maps served to remind. A map was not a spatially organized cornucopia of information from which sundry groups or individuals could draw according to their needs. The selection of information could be based on form, function, magnitude, cultural significance, mythical and religious attributes, or some combination of these.

Awareness of differences between indigenous and Euro-American mapping practices emerged slowly. Dur-

361. Several of the concepts in this section were introduced and developed in more detail in Lewis, "Metrics, Geometries, Signs, and Language" (note 2).

ing the sixteenth century and well into the seventeenth, the consequences of these differences for explorers, traders, and early settlers were not great. Later, especially during the Enlightenment, the mores and standards of accuracy of European cartography were tacitly assumed to hold for native maps as well. For more than three hundred years, and persisting until recently, Euro-Americans "read" native maps for their information content with little or no appreciation of these fundamental differences.

The selection and emphasis of natural physical features–hydrological networks, coastlines, key sites, and watersheds–were directly related to their significance within the context of the map's communication role. Rarely were they a function of physical magnitude. Rivers used regularly as routeways were often represented to the exclusion of rivers that were their equivalents in other respects. The map of the Susquehanna River obtained by Robert Livingston in 1683 (figs. 4.18 and 4.19) omits all east bank tributaries, one major west bank tributary (the Juniata), and the south shore of Lake Ontario. Because the circumstances in which the map was made are fairly well documented, these omissions are explainable as consequences of political and strategic factors.

Conversely, small but significant features were often exaggerated on maps. For example, the locally bold eastern edge of the Coteau des Prairies in northeastern South Dakota was more than a locally prominent physiographic feature. It marked the boundary between different environments, resource bases, and native groupings. It is represented as a large mountain range on the engraved version of the Indian "stag skin" map, the original of which was given to Lahontan in 1688–89 (fig. 4.60). This alpine image may in part have been a consequence of the transcribing and engraving processes. Similarly, although the amount of modification in its transcribing and mosaicking is unknown, La Vérendrye's composite map of 1729 (figs. 4.76 and 4.77) shows a solitary "Rivière au Vermillon" in a region of many rivers and the "montagne de pierre brillanté" in an otherwise relatively empty portion of the map. Both features were exceptional and culturally endowed but neither large or spectacular.

The range of phenomena found in all known examples of Indian and Inuit maps is remarkably diverse. Environmental information was normally included for strategic reasons, to demonstrate spatial relations, or because it was associated with natural resources. The "woods edge" on Chipewyan maps was not an abstract biogeographical statement but a signal that it had strategic significance for travel, subsistence, and even survival (see figs. 4.79–4.83). Amos Bad Heart Bull's distinction between valley bottoms, benchlands, escarpments, and buttes brought out the essential space relations of the western Great Plains (fig. 4.56), which half a century or more later were to be classified by ecologists as ecosystems and by rural sociologists as sutlands and yonlands. Critical resource locations were indicated on many maps. The earliest were the widely spaced *salinas* on Miguel's map of 1602 (fig. 4.59). Salt was a vital resource on the central and southern Great Plains. Exactly two hundred years later, Ki oo cus's map of the northwestern Great Plains (fig. 4.62) marked a similarly vital resource: berries. Berry sites, however, were shown only on marked trails, with no indication of their presence or absence in the vast intervening spaces.

Mammals were a somewhat more localized food resource than edible plants. Hence favorable locations were represented on maps with even greater frequency. John Tinker's 1662 transcript of an Indian map of what had formerly been Pequot territory (fig. 4.15) has an associated text indicating a neck of country into which the Indians had driven deer. Examples of animal resources on maps include the series of Cree maps made between 1839 and 1846 to show the dispersion of beavers after their introduction to Charlton Island (fig. 4.87); several nineteenth-century Plains Indian pictorial maps representing bison moving along trails (figs. 4.54 and 4.58); and the Aivilingmiut map of musk ox hunting journeys to the west of Roes Welcome Sound on which clusters of dots indicate the locations and relative sizes of the herds (fig. 4.91).

Cultural information almost certainly exceeds that relating to the natural world on Indian and Inuit maps: individuals and groups of people; dwellings and settlements; routes and journeys; hunting, trapping, and fishing activities; clearings and fields; domesticated animals; battles, powwows, and councils; and very occasionally, boundaries.

The representation of boundaries merits consideration in view of the widespread opinion that native North Americans had no concept of landownership or finite territorial limits. On the relatively rare occasions when Indians did represent ownership boundaries, they were usually being proposed or negotiated and were not de facto. An early example is the 1666 or 1668 map delimiting a rectangular area of land that was available for sale to the Plymouth Colony (fig. 4.16). Less well known were the bark and stone maps produced on consecutive days in 1805 by a Mississauga spokesman. Both of these showed boundaries of lands they were willing to cede but, very unusually, did so in the context of the Indians' understanding of the boundaries of land sold a generation earlier. Mississauga leaders, at least, had thus inherited an acculturated but orally transmitted tradition of boundaries of landownership that they were able to record when needed.

THE INDIGENOUS ROLES OF MAPS

Maps were made, used, and in some cases preserved for a variety of secular and spiritual purposes, though the distinction between them was never sharp. Most of the secular roles fall into one of three functional categories: leaving messages; instructing, collating, and planning; and commemorating events.

Message maps were almost exclusively characteristic of the Northeast and adjacent parts of the eastern Subarctic. Most were made on birchbark and left at strategic locations to inform groups expected to arrive soon (e.g., figs. 4.24 and 4.25). Others were made on the blazed trunks of trees and seem usually to have been associated with war (e.g., figs. 4.27 and 4.28). Although the Indians of these regions are reported to have made maps on birchbark from early contact, accounts of their use as messages came later.[362] The rivalry between English and French interests, mainly in connection with the fur trade, stimulated Indian travel and migration, particularly among the maize-cultivating, hitherto relatively sedentary Indians around the eastern Great Lakes. New alignments, new tensions, new economies, new territorial ranges, and new routes emerged. In this new Indian world there would have been greater need for messages, and it could well be that the somewhat formal maps on birchbark as reported in the late seventeenth and early eighteenth centuries were adapted for more immediate utilitarian use.[363] Whether message maps were made spontaneously by Indians in the course of traditional hunting trips, seasonal migrations, and occasional crises before contact with Europeans is one of the most important and intriguing questions facing future historians of North American traditional cartography.

The use of maps in planning, gathering information, and instruction was usually connected with war or travel beyond normal territorial limits. Although much of the evidence is from early contact stages, the direct and indirect consequences of contact may almost immediately have increased their use. Samuel de Champlain's generalized account of St. Lawrence Valley Indians using plans made with sticks in preparing battle orders incorporated both planning and instruction. The chiefs placed sticks in a predetermined pattern to indicate battle positions; the warriors then took note and repeatedly practiced keeping their intended ranks. Far more impressive was the modeling on a beach by a Nootka of a village some 150 kilometers away that was about to be attacked. In that incident, mapping, planning, and learning involved considerable interaction between the participants. Much more pedagogic was the way Comanche elders in western Texas are reported to have used ephemeral maps in briefing young braves about routes to be taken on long-distance raids far beyond the limits of their own territory.

The facility with which Indians and Inuit extended Europeans' maps of rivers and coastlines beyond the limits of the latter's explorations is well documented.[364] It may have been one of the procedures whereby Indians gathered geographical information to make maps of vast areas extending far beyond the limits of their own experience (e.g., fig. 4.38). For example, in 1861, on the lower Moisie River, eastern Quebec, a map was made on birchbark to help exchange information about the route to the source of the river and beyond (fig. 4.69). It was used by a new pair of Indian guides to instruct an existing pair who had reached the limits of their area of competence.

Recording former events with maps seems to have been common, particularly but not exclusively among Plains Indians. The oldest extant example is probably the route of a Quapaw war party to a successful battle against enemy Indians as incorporated in a painted bison hide dating from the mid-eighteenth century (plate 6). Its artistic quality and the durability of the medium chosen suggest that it was made as a symbolic record of this important event (or perhaps a sequence of similar events) and intended for posterity. An example from the nineteenth century, Oto Gero-Schunu-Wy-Ha's map of 1825, embraces a huge area and traces, among other events, the route of a war party in the upper Arkansas Valley (figs. 4.64, 4.65, and 4.66). Examples of maps made by non-Plains Indians to record events include many of the birchbark message maps from the Northeast (fig. 4.26), one-time return-journey maps of the kind made by the Chilkat chief Kohklux seventeen years after the event (figs. 4.50 and 4.51), and maps depicting sequences of annual hunting trips, exemplified by that made about 1898 by the Aivilingmiut Meliki (fig. 4.91). A remarkable attempt to present spatial change through time was the sequence of eight Cree maps of Charlton Island, made between 1839 and 1846 to plot the dispersion of newly introduced beavers (fig. 4.87).

Maps made largely for spiritual and metaphysical purposes were almost certainly present long before contact with Europeans and were least affected by Western thought. The role of these representations, which articulated views of the creation of the world and cosmos, was primarily to record traditions and assist in rituals. Many were ephemeral, made in the course of shamanic ceremonies and deliberately destroyed thereafter.[365] Artifac-

362. Among the earliest reported examples is that found in 1775 in northern Maine in the course of Benedict Arnold's Revolutionary War expedition against the British garrison at Quebec (Henry, "Campaign against Quebec" [note 107]).

363. For a generalized account of these, see pp. 84–86.

364. For example, the extension southward by Pawtuckets or Massachusetts in 1605 of the newly explored coast of what was to become Maine and New Hampshire as drawn for them by Samuel de Champlain (p. 68); likewise, the Netsiliks' extension in 1830 of John Ross's map of the land between Repulse Bay and Prince Regent Inlet (plate 8).

365. For example, though not all Southwest sandpainting (dry painting) incorporated maps, virtually all were systematically destroyed at the end of the ceremony in which they were made. Blessing gives another example, departure from which had importance for the ultimate recog-

tual examples were closely guarded and concealed by their keepers.[366] On the rare occasions when they were seen by Europeans, the only surviving evidence is that mediated by these observers.[367]

During the period of acculturation, problems of interpretation compounded. When Euro-Americans began to witness ceremonies and collect artifacts toward the end of the nineteenth century, it was possible only because the native belief systems they were associated with were in terminal decline. By then native informants were not as well informed as the initiates of previous generations. Moreover, traditional artifacts were sometimes replicated commercially for Euro-Americans, who valued them as works of art but lacked the ethnographic knowledge to understand them. The incorporation in Navajo commercial art of celestial patterns from sandpainting is a good example (fig. 4.47). In addition, Native American oral cosmographies were sometimes represented by Western maps. One example is a line map by the California anthropologist T. T. Waterman showing "the Yurok idea of the world." It shows northern California at the center, surrounded by an ocean, bounded in turn by "sky its edge." Beyond that is an "ocean of pitch" within which is "salmon's home," and beyond that is "boundary of universe."[368] However, there is no evidence that this map was derived from a Yurok artifact or, indeed, that the Yuroks would have either understood or agreed with it in its published form.

Despite difficulties in its interpretation, rock art provides important evidence of indigenous cosmographical representation, much of it in far western North America. These were for the most part the creations of shamans and their initiates in ritual cults, depicting the culturally conditioned visions or hallucinations they experienced during altered states of consciousness.[369] Using ethnographic evidence of early contact cultures, Grieder concluded that in the third wave cultures characteristic of much of North America at contact the circle symbolized the celestial world in plan, and likewise the square represented the terrestrial world (both known and unknown). The concentric design of circle and square (mandala) symbolized the whole cosmos in plan.[370] If so, these were microcosmic analogues or "psychocosmograms" akin to those recognized, for example, in South Asian cartography.[371] It would be wrong, however, to conclude that all or even most simple geometrical shapes in rock art were abstract symbols for terrestrial, celestial, or cosmographic worlds. Some may have symbolized nothing remotely cartographic. Some may have been plans of circular structures such as camps or lodges, which themselves often symbolized worlds by their shape and orientation. For example, the circular sun dance lodge of the historic Plains Indians, the Oglala Sioux tipi, and the hogan of the Navajos were thought to be replicas of the universe.[372] Furthermore, symbols were mutable. Before third wave peoples used the circle to symbolize the sky, it had for millennia symbolized the earth.[373] Other simple geometric shapes also symbolized worlds. For example, in much of North America at the time of contact, the cross was identified with the whole universe.[374] When such symbols appear in rock art there is very little basis for assuming that they were made to represent worlds in plan and even less for distinguishing between the symbolization of the terrestrial, celestial, and cosmographic worlds, particularly when the panels have not been dated or linked conclusively with cultures whose worldviews have been independently reconstructed.

Further progress in interpreting the purpose and meaning of these forms may lead to new insights, and there may well be far more representations of celestial events and star patterns in rock art than hitherto suspected. The now respected and dynamic field of archaeoastronomy, involving astronomers, archaeologists, and cultural anthropologists (as well as many enthusiastic amateur fieldworkers), is likely to make theoretical strides in this direction, although some of the early speculative claims will

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nition and interpretation of Mide migration charts. A Mide priest who died in 1946 left an "amazing accumulation" of birchbarks and pictographic materials transcribed on paper and cardboard. They were saved by intervention as they "were about to be burned as is the custom if no trustworthy successor was available into whose hands the material would ordinarily pass." Fred K. Blessing, "Birchbark Mide Scrolls from Minnesota," *Minnesota Archaeologist* 25 (1963): 90–142, esp. 100.

366. For example, the Southern Ojibwa Mide migration charts. As early as 1850 George Copway described the way birchbark scrolls were preserved and from time to time replaced by replication. Examples of the charts were, however, essentially unknown to non-natives until the early twentieth century. The earliest ones referred to by Selwyn Dewdney were collected in 1903 (Dewdney, *Sacred Scrolls* [note 99]). The first serious description was not published until 1963 (Blessing, "Birchbark Mide Scrolls"). It was not until 1975 that Dewdney, piecing together scraps of ethnohistory and ethnography, convincingly interpreted them as maps.

367. An example is the circular cosmography performed at a ceremony in 1607 in which Virginia Algonquians expressed their worldview behaviorally and showed where they imagined the home of their English captives to be, as witnessed and described by John Smith (figs. 4.11, 4.12, and 4.14).

368. T. T. Waterman, *Yurok Geography,* University of California Publications in American Archaeology and Ethnology, vol. 16, no. 5 (Berkeley: University of California Press, 1920), 192 (fig. 1).

369. Whitley, "Shamanism and Rock Art," 89 (note 47).

370. Grieder, *Origins of Pre-Columbian Art,* 111 and 129 (note 49).

371. Joseph E. Schwartzberg, "Cosmographical Mapping," in *The History of Cartography,* ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), vol. 2.1 (1992), 332–87, esp. 379–82.

372. See note 12 and Åke Hultkrantz, *The Religions of the American Indians,* trans. Monica Setterwall (Berkeley: University of California Press, 1979), 28.

373. Grieder, *Origins of Pre-Columbian Art,* 100 (note 49).

374. Hultkrantz, *Religions,* 28 (note 372).

be found to be spurious.[375] Conversely, conclusive evidence for cosmographic maps will remain elusive, except perhaps for late precontact cultures for which pertinent ethnographic evidence is available from the contact period.

Like Europeans, native North Americans made and used maps to make sense of the world beyond that of direct experience: the conjectural and imagined cosmographical worlds of shamans. They had done so for generations, centuries, probably even millennia before contact. Like Europeans, they also made and used maps to communicate spatially arranged information about parts and aspects of the terrestrial world. Those who knew by experience–travelers, hunters, war chiefs, and guides–communicated with those who needed to know.

In contrast, native North Americans differed from Europeans in not having used maps to divide their terrestrial worlds into finite areas comparable to the Europeans' states, territories, townships, and properties. In this respect, at least, maps made by native North Americans had never been expressions of secular power and were not to be so until well after contact.

375. Within the Americas, since the mid-1970s the astronomer Anthony F. Aveni of Colgate University has been largely responsible for furthering this field.

5 • Mesoamerican Cartography

Barbara E. Mundy

Introduction

The Spanish conquistadores who first traveled into continental America between 1517 and 1521 were amazed at the large cities and complex societies this "New World" held. Many of the high civilizations of pre-Columbian America, the Mayas and Aztecs among them, were concentrated in the region that coincides with modern-day Mexico, Belize, and Guatemala (fig. 5.1). Recent scholars have coined the term "Mesoamerica" to describe this area of historic culture. They have singled out this particular region–assigning it the rough geographical limits of 14° north to 21° north–not only for its distinctive civilizations but also because the people who lived there shared certain cultural characteristics; particular to Mesoamerica were the practice of human sacrifice, a diet of beans and maize, the use of a 260-day ritual calendar, and a "century" of fifty-two years.[1]

At the moment of first contact with Europeans, much of Mesoamerica was loosely under the control of the Culhua-Mexicas, a powerful ethnic group that led the Aztec empire. The Culhua-Mexica capital city, Tenochtitlan, now lies beneath modern Mexico City. Although this Aztec "empire" was roughly contiguous with the region of Mesoamerica, we still cannot speak of a Mesoamerican state or nation.[2] The Aztecs did introduce their language, Nahuatl, as the common tongue of Mesoamerica, but they did little else to integrate the multifold ethnic groups of the region into one nation or to instill a national culture in the areas they controlled. Thus the achievements of Mesoamericans are really the achievements of a host of ethnically diverse peoples: the Aztecs, the Mayas, the Mixtecs, and the Zapotecs, to name but a few.

Among their many accomplishments, these cultures of Mesoamerica took the production and use of maps to a level unparalleled elsewhere in the New World. Mesoamerican cartography was a wholly American feat, evolving independently of European, Asian, and African traditions. We can see its uniqueness and its sophistication through surviving artifacts (see appendix 5.1). These maps–those graphic images representing space that involved symbolic transformation–show us the singular perceptions and presentations of space that Mesoamericans created and developed. At the time of the Spanish conquest, cartography was particularly vibrant in northern Mesoamerica above the Isthmus of Tehuantepec. Here peoples made records using "hieroglyphics, pictorial images and abstract signs."[3] With this writing, Mesoamericans expressed concepts and events without depending on an alphabetic or exclusively phonetic script, and instead of strictly ordered blocks of words, this "picture writing" could be arranged more loosely across the surface of the medium. Such writing, given its pictorial character, nimbly lent itself to mapmaking.

The most numerous examples of Mesoamerican cartography survive from the fifteenth and sixteenth centuries, from both before and after indigenous Americans came under European political and cultural domination.[4] As early as the Olmecs (1200–300 B.C.), Mesoamericans

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I am indebted to Elizabeth Hill Boone, Edward Douglas, Dana Leibsohn, and Mary Ellen Miller, who read the manuscript and offered valuable suggestions and criticisms. The lively roundtables organized by Elizabeth Boone at Dumbarton Oaks broadened my understanding of Mesoamerican maps, and I thank the participating scholars. I am most grateful to Mary Elizabeth Smith; not only did she scrutinize the manuscript, but her exemplary work and unfailing generosity sets an example for all in the field.

1. Paul Kirchhoff, "Mesoamerica," *Acta Americana* 1 (1943): 92–107.

2. R. H. Barlow, *The Extent of the Empire of the Culhua Mexica,* Ibero-Americana 28 (Berkeley: University of California Press, 1949). In most cases the spellings of place-names in this chapter reflect the sixteenth-century forms and are derived from the index to Peter Gerhard, *A Guide to the Historical Geography of New Spain,* rev. ed. (Norman: University of Oklahoma Press, 1993).

3. Elizabeth Hill Boone, "Introduction: Writing and Recording Knowledge," in *Writing without Words: Alternative Literacies in Mesoamerica and the Andes,* ed. Elizabeth Hill Boone and Walter Mignolo (Durham: Duke University Press, 1994), 3–26, esp. 17.

4. "Mesoamerican" and "indigenous" are used to describe artifacts that are predominantly native in style, that is, that "display traits of pictorial content, style, composition, or formal symbolic conventions derived from indigenous traditions"; John B. Glass, "A Survey of Native Middle American Pictorial Manuscripts," in *Handbook of Middle American Indians,* vol. 14, ed. Howard Francis Cline (Austin: University of Texas Press, 1975), 3–80, esp. 4. These artifacts may date to before or after the Spanish conquest. "Pre-Columbian" and "pre-Hispanic" refer strictly to those made before the conquest.

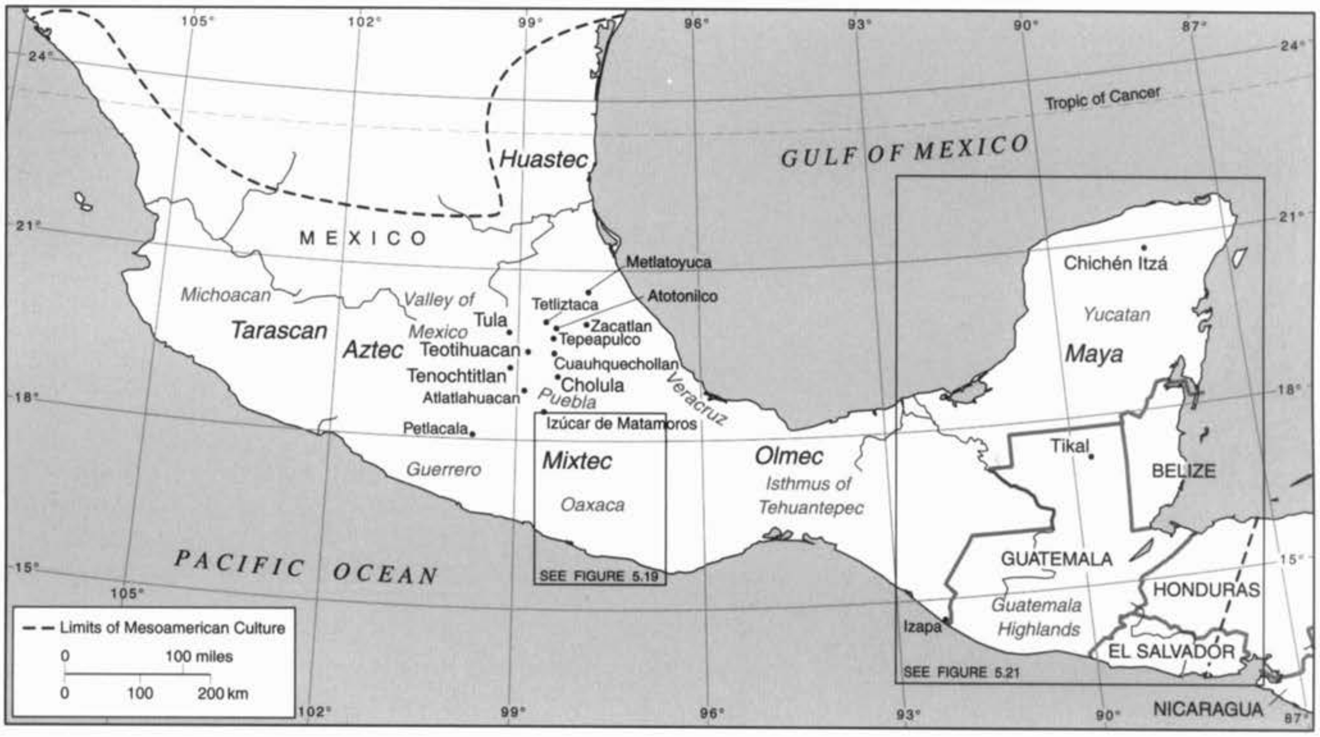


FIG. 5.1. REFERENCE MAP OF MESOAMERICA.

made schematic representations of their cosmos; by the beginning of the first millennium A.D., carved stone tablets called stelae show the cosmic layout, standard and widespread (fig. 5.2). A few extant murals painted between A.D. 200 and 1200 attest to a Mesoamerican tradition of landscape painting (see appendix 5.2). However, idealized sculpted cosmic models and landscapes are not the same as maps, and since examples of maps are usually of a late date, it is difficult to hypothesize about the influence, or relation, between the forms.[5] Although its great florescence was over by 1600, Mesoamerican cartography survives today in the indigenous community maps called *lienzos,* which combine representations of territory with accounts of history and whose precursors date back to the pre-Hispanic period.

What Is a Mesoamerican Map?

Since the moment of first contact with Europeans, the maps made by Mesoamericans have been used and commented on by outside observers. The corpus of Mesoamerican cartographic works has been of interest to scholars for its diversity: an early article on the subject cast light on the variety of maps when it discussed the Plano en papel de maguey (fig. 5.3), the Mapa de Metlatoyuca (fig. 5.4), and the Codex Kingsborough fol. 204r (fig. 5.5). The Plano is a cadastral map of agricultural and house lots, probably drawn to scale, and the Kingsborough is a community map that has absorbed European conventions of landscape. Most typical is the Metlatoyuca, which combines cartography with genealogy in a schematic depiction of space defined by hieroglyphic toponyms.[6]

5. George Kubler, *The Art and Architecture of Ancient America: The Mexican, Maya and Andean Peoples,* 3d ed. (New York: Penguin Books, 1984), 316, has pointed out how "the landscapes in the Temple of the Warriors bring to mind the strip-like arrangements and the cartographic designs of south Mexican [Mixtec] manuscripts." And Thompson notes that mountains on a colonial map of Tabasco "are very like those on a fresco of the Temple of the Jaguars at Chichen Itza" (John Eric Sidney Thompson, *A Commentary on the Dresden Codex: A Maya Hieroglyphic Book* [Philadelphia: American Philosophical Society, 1972], 10). However, the aims of the artists of landscapes would have been quite separate from those of mapmakers: landscape painters would have been attempting to create a pictorial illusion of deep space using largely pictorial images, while mapmakers would not; on the flat, nonillusory surface of their medium, they would have been representing a given landscape, primarily with symbols and hieroglyphs.

6. The maps were discussed by Eulalia Guzmán, "The Art of Map-Making among the Ancient Mexicans," *Imago Mundi* 3 (1939): 1–6. Guzmán accepted the Metlatoyuca map's provenance, since it was reportedly found at that site in northern Puebla. Recently Berger, who also accepts the map as being from Metlatoyuca, has tried to match the hieroglyphic toponyms on the map to place-names in the Metlatoyuca (Metlaltoyuca) area: Uta Berger, "The 'Map of Metlatoyuca'–A Mexican Manuscript in the Collection of the British Museum," *Cartographic Journal* 33 (1996): 39–49. But rather than fixing the map more securely in the Metlatoyuca region, her correlations, to my mind, cast doubt on such a provenance. The question of the map's origin has been taken up by Harold B. Haley, Thoric N. Cederström, Eduardo Merlo J., and Nancy P. Troike, who argue, based on topographic likeness, style, and hieroglyphic correlations, that it belongs among the Coixtlahuaca

Since Mesoamerican cartography was born and matured without contact with cartographic traditions outside the New World, the problem of its relation to other traditions and to our own looms large. Did Mesoamericans make maps? Yes–they certainly created a host of artifacts that we can call maps, using the definition adopted in these volumes. But this answer overlooks the Mesoamerican viewpoint. We are bound to ask, Did Mesoamericans themselves explicitly think of maps as objects in their own right? Or did they recognize maps only implicitly through their use and functions?

Vocabulary sheds some light on the Mesoamerican view of maps. In many cases native speakers identified maps as a subset of writing–which, as I noted above, comprised hieroglyphs, pictures, and symbols. When Mesoamerican writers described maps in native-language documents, they most often would begin with a general term that could be used to describe anything painted or written, then hone its meaning through modifiers and context. For example, one sixteenth-century text in Nahuatl, the Aztec language, calls a map a *tlapallacuilolpan* (colored painting or writing), telling us that "the ruler determined by means of a colored painting or writing how the city was placed."[7] A Yucatec Maya-language document of 1600 describes maps as *pepet dz'ibil* (circular paintings or writings).[8] In using such malleable terms, sixteenth-century Mesoamericans could be more specific than coeval Spaniards, who regularly called maps *pinturas* or *descripciones*.

Perhaps the best indication that Mesoamericans identified maps as a distinct body of objects comes from the three sixteenth-century dictionaries that translated principal Mesoamerican languages.[9] All three include native-language entries for *mappamundi*.[10] In defining the term,

FIG. 5.2. COSMOGRAPHIC STELA AT IZAPA. This stone stela was set up on a large open plaza in Izapa, in Mexico near the Guatemalan border ca. 300 B.C.–A.D. 1. Little is known about the Izapan civilization, but in this stela we find a very early version of the cosmographical schema that prevailed in Mesoamerica until the sixteenth century. At the stela's center is the *axis mundi*, or world tree. Its eight branches give forth fruit and leaves, and its roots stream out from the base of the trunk. These roots are shown as they penetrate a horizontal panel that seems to be the surface of the earth, for on it sit several human figures. Below this platform are a series of triangles, their apexes supporting the earth layer; these may be a stylized rendition of an earth deity, perhaps the teeth or skin of the giant crocodile that many Mesoamerican peoples took to be the surface of the earth. The baseline is dominated by a pattern of waves, undoubtedly the primordial sea. The tree's branches reach up to support a stylized sky band, which crowns the entire scene. This general understanding of the cosmos, mapped here on stela 5, remained constant for over a thousand years.
Size of the original: 2.55 × 1.60 m. From Gareth W. Lowe, "The Izapa Sculpture Horizon," in *Izapa: An Introduction to the Ruins and Monuments*, by Gareth W. Lowe, Thomas A. Lee, and Eduardo Martínez Espinosa, Papers of the New World Archaeological Foundation 31 (Provo: New World Archaeological Foundation, 1976), 17–41, fig. 2.10 (stela 5). By permission of V. Garth Norman, American Fork, Utah.

(Oaxaca) group (appendix 5.1). See Harold B. Haley et al., "Los lienzos de Metlatoyuca e Itzquintepec: Su procedencia e interrelaciones," in *Códices y documentos sobre México: Primer simposio*, ed. Constanza Vega Sosa (Mexico City: Instituto Nacional de Antropología e Historia, 1994), 145–59.

7. "Oquinemili in tlatoani, tlapallacuilolpan omotlali in altepetl" (my translation). Bernardino de Sahagún, *Florentine Codex: General History of the Things of New Spain*, 2d rev. ed., 13 vols., trans. Arthur J. O. Anderson and Charles E. Dibble (Santa Fe, N.Mex.: School of American Research, 1970–82), 9:51 (bk. 8, chap. 17). Aggregate words (like *tlapallacuilolpan*) are typical of agglutinative languages such as Nahuatl.

8. Ralph Loveland Roys, *The Indian Background of Colonial Yucatan* (Washington, D.C.: Carnegie Institution, 1943), 184.

9. Alonso de Molina, *Vocabulario en lengua castellana y mexicana y mexicana y castellana*, 2d ed. (Mexico City: Editorial Porrua, 1977), fol. 82r; Francisco de Alvarado, *Vocabulario en lengua mixteca*, facsimile of 1593 ed. (Mexico City: Instituto Nacional Indigenista and Instituto Nacional de Antropología e Historia, 1962), fol. 146r; and Juan de Córdoba, *Vocabulario castellano-zapoteco*, ed. Wigberto Jiménez Moreno, facsimile of 1578 ed. (Mexico City: Instituto Nacional de Antropología e Historia, 1942). A fourth native language dictionary exists: *Diccionario de motul*, a Maya-Spanish dictionary, believed to have been written by Antonio de Ciudad Real in the late sixteenth or early seventeenth century. It has few entries that are explicitly cartographic like *mappamundi* (manuscript in the John Carter Brown Library, Providence, Rhode Island; photostat in the New York Public Library, 6 vols.).

10. The Spanish friars cited above began with Spanish word lists, probably drawn from Antonio de Nebrija's *Vocabulario de romance en latín* of 1516 (Frances E. Karttunen, *An Analytical Dictionary of Nahuatl* [Austin: University of Texas Press, 1983], xxx). *Mappamundi* was the only explicitly cartographic vocabulary term these friars translated.

(*Facing page*)
FIG. 5.3. PLANO EN PAPEL DE MAGUEY. The Plano en papel de maguey (plan on maguey-fiber paper) is a very rare early sixteenth-century manuscript map of a part of the Valley of Mexico. Despite its name, it is painted on a large sheet of *amatl* paper, whose edges have frayed. This postconquest indigenous map is a mosaic of about three hundred square house lots, each containing a house and seven raised-bed plots separated by irrigation ditches. The name of the householder appears above each house, written both in the Latin alphabet and with native hieroglyphs. Separating each vertical row of house lots from the next are roads alternating with canals. These lots were likely created out of the shallow swampy lakes of the Valley of Mexico; a stone dike seen as a darker line runs along the entire left side of this cultivated zone to protect it during times of flood. See also p. 224 below.
Size of the original: 238 × 168 cm. Photograph courtesy of the Instituto Nacional de Antropología e Historia, Museo Nacional de Antropología, Mexico City (35-3).

Mesoamericans showed that they understood a certain class of cartographic artifacts–*mappaemundi*–to exist in their own sphere. In the Nahuatl dictionary of 1571 compiled by the Franciscan Alonso de Molina (d. ca. 1579), informants provided a richly inflected description of *mapamundi o bola de cosmografía.* It was *cemanauactli ymachiyo, tlalticpactli ycemittoca,* the first term meaning "the world, its model" and the second "that through which the surface of the earth is studied, gazed at, absorbed."[11] The translation of *mappamundi* into Mixtec provided by another Spanish friar, Francisco de Alvarado (d. 1603), in the late sixteenth century was *taniño nee cutu ñuu ñuyevui,* a phrase meaning a "representation of the entire world," derived from the Mixtec terms "example/model," "all," and "world."[12] The Zapotec rendition of *mappamundi* was *tòanacàaxilohuàaquitobilayòo,* derived from Zapotec words meaning "painting" and "all the earth."[13] It is always possible that native speakers, prodded by the insistent questions of Spanish friars, invented these terms on the spot. However, it seems more likely that they understood *mappaemundi* to be akin to their own cosmographical maps and had the words to name them.

Mesoamericans also implicitly identified maps by using painted documents for wayfinding and for property management–functions any modern user assigns to maps. European writers of the sixteenth century who witnessed Mesoamerican maps being used in indigenous contexts described their being put to these familiar uses. Both the sixteenth-century conqueror Hernán Cortés (1485–1547) and his cohort Bernal Díaz del Castillo (1492–1581) told of Mesoamerican itinerary maps used for wayfinding, complete with topographical detail. Cortés received a Culhua-Mexica map that he wrote of as "a cloth with all the coast painted on it" (*figurada en un paño toda la costa*), wherein he could see coastal rivers and ranges. Díaz del Castillo seconded Cortés's description of wayfinding maps of cloth, writing of "a henequen cloth . . . on which all the pueblos we should pass on the way were marked as far as Gueacalá."[14] Another astute observer, Alonso de Zorita (ca. 1512–85), described the Aztecs' use of maps of large districts to keep track of property ownership.[15]

We can accept that sixteenth-century Mesoamericans identified maps explicitly (in verbal definitions) and implicitly (through use). However, we lack a full account of sets and subsets they would have used to create categories among their own cartographic products. Mindful of this deficit, scholars have found that the most satisfying way to classify maps is by subject matter. Mesoamerican maps fall into four general categories:

1. Terrestrial maps that include accounts of history; also called cartographic histories
2. Terrestrial maps without a historical narrative; these include property plans and city plans, and possibly itinerary maps
3. Cosmographical maps that show either the horizontal cosmos, divided into five quadrants (the cardinal directions and the center), or the vertical cosmos, divided into layers along an *axis mundi,* the world tree
4. Celestial maps of stars and constellations in the night sky.

The material evidence from which we derive these categories is heavily weighted with maps made after the con-

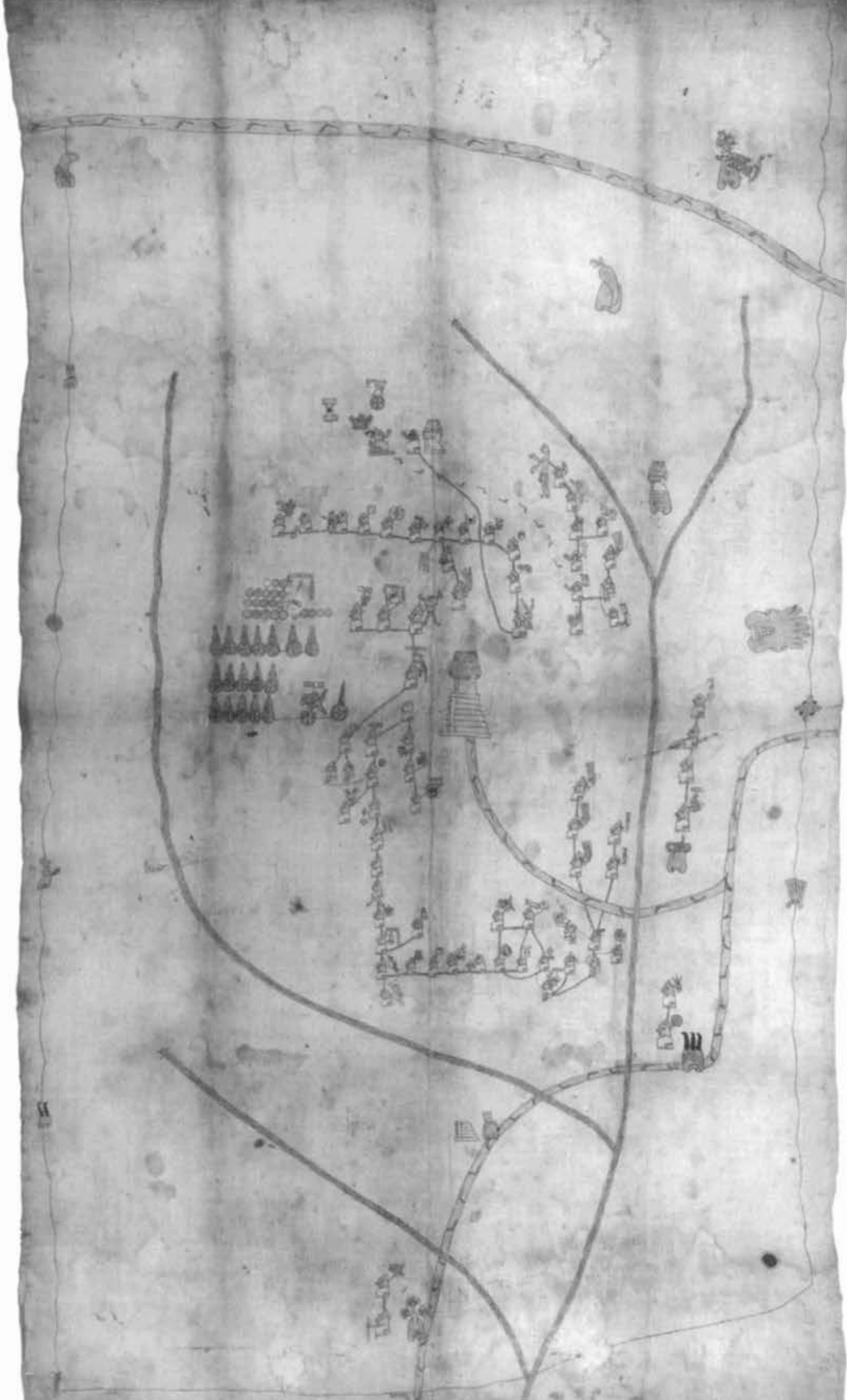
11. Molina, *Vocabulario,* fol. 82r (note 9). For more recent dictionaries by linguists based on Molina, see R. Joe Campbell, *A Morphological Dictionary of Classical Nahuatl* (Madison: Hispanic Seminary of Medieval Studies, 1985), and Karttunen, *Dictionary.* The word some scholars apply to map, *quaxochamatl,* literally "the paper of the boundaries," is not attested in Molina.

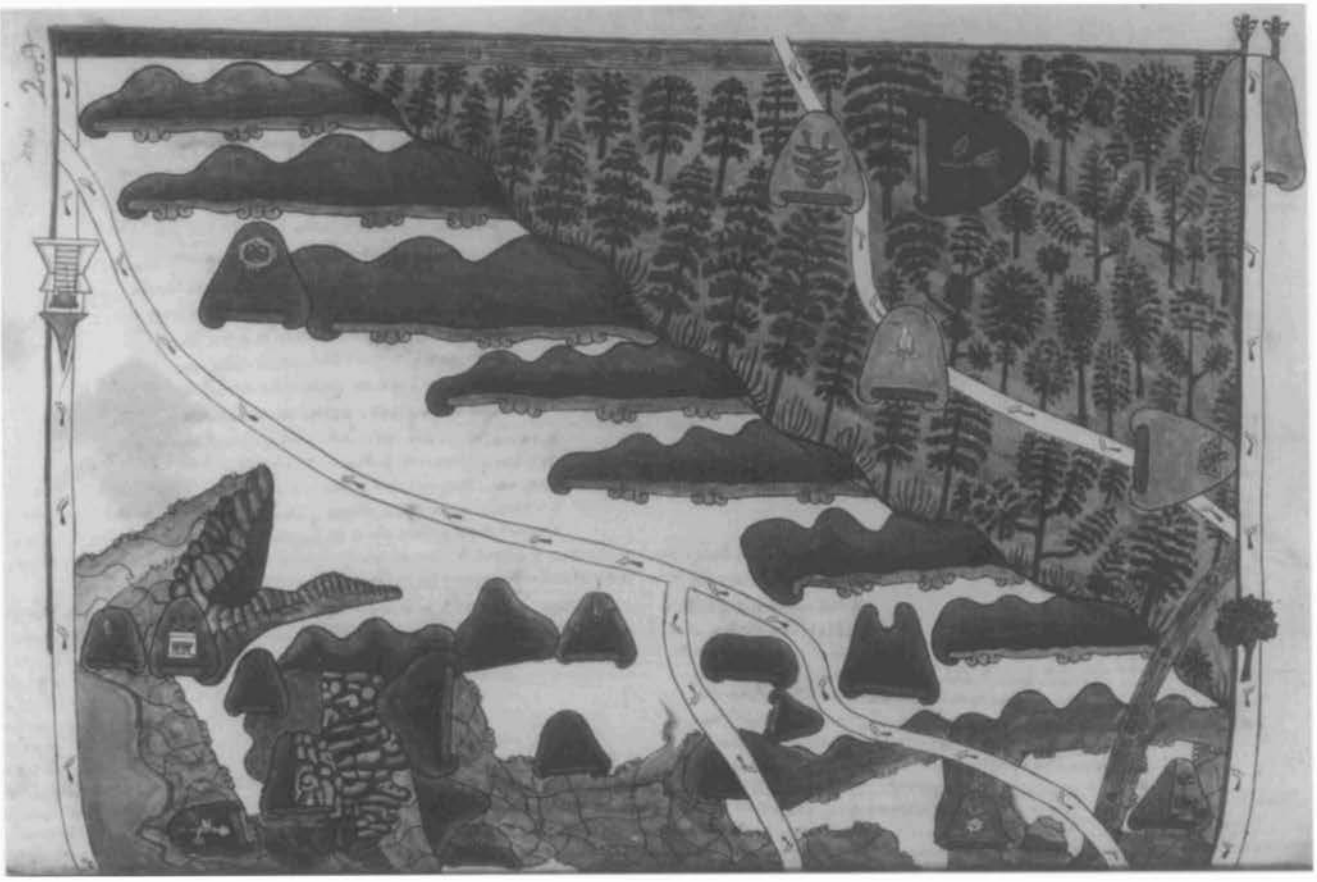
12. Alvarado, *Vocabulario,* fol. 146. Mary Elizabeth Smith (personal communication, 1993) supplied the meaning of the phrase. From her reversal of Alvarado's Spanish-Mixtec word list into Mixtec-Spanish, she has found *taniño* = *figura, señal, muestra, dechado, materia, molde, pisada; nee cutu* = *todo, de cosa continua; ñuu ñuyevui* = *mundo.* See also the complementary modern work by Evangelina Arana and Mauricio Swadesh, *Los elementos del mixteco antiguo* (Mexico City: Instituto Nacional Indigenista and Instituto Nacional de Antropología e Historia, 1965).

13. Juan de Córdoba, *Vocabulario,* fol. 258v (note 9). Component parts are *lohuàa,* meaning *lo pintado; quitobi,* meaning *todo;* and *layòo,* meaning *tierra.*

14. Hernán Cortés, *Letters from Mexico,* rev. ed., trans. and ed. Anthony Pagden (New Haven: Yale University Press, 1986), 94, 340, 344, 349 (quotation on 94), and Bernal Díaz del Castillo, *The True History of the Conquest of New Spain,* 5 vols., ed. Genaro García, trans. Alfred Percival Maudslay, Hakluyt Society Publications, ser. 2, nos. 23, 24, 25, 30, and 40 (London: Hakluyt Society, 1908–16), 5:12, 14, 24–25 (quotation on 12).

15. Alonso de Zorita, *Life and Labor in Ancient Mexico: The Brief and Summary Relation of the Lords of New Spain,* trans. Benjamin Keen (New Brunswick: Rutgers University Press, 1963), 110.





quest in the sixteenth century. However, it is by default our best view of Mesoamerican cartographic traditions. Spatial models of the cosmos abound in sculpture and architecture, some examples dating back to the Olmecs, who founded urban centers as early as 1200 B.C. We do not know if other kinds of maps were made so early, owing to the fragmentary nature of the evidence.[16]

(Facing page)
FIG. 5.4. MAPA DE METLATOYUCA. This large sixteenth-century map, painted on a cloth sheet, is a typical Mesoamerican nexus of history, genealogy, and territory. The territory shown on the map is the area around a town represented by a stepped pyramid temple at center; the dark branching lines on the sheet represent rivers. The roads that cross the top of the map and cut across the lower right quadrant are marked with footprints. A thin black line runs along the edge of the map, punctuated with hieroglyphic place-names that name regional boundaries. Other hieroglyphic place-names, representing the network of villages around the central town, lie along the roads. Clustered in the center of the map are human figures, many connected by a ropelike cord that indicates a family tie; these genealogies probably depict the ruling lineages of the region. This map was purportedly found in the nineteenth century in a stone box in the ruins of Metlatoyuca, in the modern state of Puebla, but its hieroglyphs have never been reliably decoded.
Size of the original: 175 × 102 cm. Copyright the British Museum, London (Add. MS. 30,088).

FIG. 5.5. MAP IN THE CODEX KINGSBOROUGH. This manuscript map of ca. 1555 in a bound book covers the region around the town of Tepetlaoztoc, "Hilly Place of the Cave," situated in the eastern part of the Valley of Mexico. In the upper left side of the map is the hieroglyphic place-name of Tepetlaoztoc, a hill symbol (*tepetl*) marked with an annular shape that is the wide open mouth of the earth monster, symbolizing a cave (*oztoc*). Other toponymic hieroglyphs name settlements and geographical features. Whereas a more conservative Mesoamerican mapmaker would have used only these place-names on this map, this artist stretches the symbolic vocabulary of rocks and hills to create a landscape, probably following the example set by imported European prints. The artist links hill symbols to show hilly ridges, rippling like waves along the diagonal axis of the map. The upper right triangle of the map is filled with drawings of trees, their forms probably derived from European examples, to show us the verdant and forested valley floor, while the lower left triangle contains hill and rock symbols to characterize this craggy area. The roads that crisscross the Tepetlaoztoc region are marked with footprints, and the two rivers, one at the top edge and the other along the bottom right corner, are punctuated with swirling eddies.
Size of the original: 21.5 × 29.8 cm. Copyright the British Museum, London (Add. MS. 13,964, fol. 204r [previously 209r]).

16. There is an abundant literature on cosmological models in Mesoamerican architecture. See, for example, Davíd Carrasco, *Quetzalcoatl and the Irony of Empire: Myths and Prophecies in the Aztec Tradition* (Chicago: University of Chicago Press, 1982); idem, *Religions*

Historiography

To the casual viewer, the most distinctive and definitive element of Mesoamerican maps is the hieroglyphs used for toponyms. To a more practiced eye, many Mesoamerican maps distinguish themselves by including history. So it is hardly surprising that these two elements–hieroglyphs and history–first attracted scholarly attention. By the end of the nineteenth century, maps were firmly in the embrace of historians, who looked at the history they contained, and epigraphers, who looked at writing systems. Both these paths of inquiry, while doing much to advance understanding of history and written language, did little to explore a third and crucial area: the distinctive spatial quality of Mesoamerican maps, including questions of how maps represent space, which spaces get represented, and why. This has proved a fecund subject in recent years.

The study of the historical component of maps has had a long and illustrious record, as chroniclers from the sixteenth century onward have used cartographic histories–along with other pictorial manuscripts–as the sources for their prose histories. Fernando de Alva Ixtlilxochitl (ca. 1578–1648) gives us one of the clearest examples of a dependence on cartographic history. This mestizo descendant of pre-Hispanic nobility based his two main works, the *Relaciones* and the *Historia chichimeca,* at least in part upon the Codex Xolotl, a cartographic history.[17] Ixtlilxochitl's esteem for native pictorial sources was common to his predecessors and his contemporaries, such as Fray Diego Durán and Diego Muñoz Camargo. The value cartographic histories like the Codex Xolotl had to historians meant that they were avidly collected and have been carefully preserved since the sixteenth century.

Writing history based on cartographic histories continues to the present; perhaps this century's most breathtaking achievement in this arena was Alfonso Caso's 1949 article. Caso correlated the two genealogies that appear on the 1580 Mapa de Teozacoalco (fig. 5.23) with those found in a group of Mixtec screenfold manuscripts to prove that these manuscripts were also historical accounts, rather than mythical ones as had been presumed. Using the map, Caso began to reconstruct the histories of Mixtec ruling families reaching back to the tenth century. Caso's lifework culminated in the posthumous publication of *Reyes y reinos de la Mixteca* in 1977–79.[18]

Fixing his gaze on the genealogies sketched in the Teozacoalco map, Caso gave short shrift to the dozens of hieroglyphic place-names that also distinguished it. The study of epigraphy was a separate concern from the study of history, and the decoding of hieroglyphic toponyms in Nahuatl had received so much attention since the nineteenth century that it had come to dominate the study of maps. The great tide of nationalism that swept Mexico after independence (1821) had buoyed up interest in the pre-Hispanic period in general, with epigraphy also receiving its due. In addition, the deluxe publication of the Codex Mendoza in 1831 delivered a Rosetta Stone into the hands of scholars.[19] This book of about 1541 records Nahuatl hieroglyphic place-names along with alphabetic transliterations (fols. 17–55). In 1877 the Mexican scholar Manuel Orozco y Berra (1810–81) published the first of a series of articles on hieroglyphic place-names, particularly those of the Codex Mendoza; his earlier *Materiales para una cartografía mexicana* of 1871 amply demonstrates how the study of Mesoamerican cartography centered on the distinctive hieroglyphic place-names of indigenous maps.[20] By the 1880s, decoding rebuslike Nahuatl place-names was something of a popular sport for educated Mexicans, as is made clear by Antonio Peñafiel's 1885 *Nombres geográficos de México,* a color-

of Mesoamerica: Cosmovision and Ceremonial Centers (New York: Harper and Row, 1990); Mary Ellen Miller, "The Meaning and Function of the Main Acropolis, Copan," in *The Southeast Classic Maya Zone,* ed. Elizabeth Hill Boone and Gordon Randolph Willey (Washington, D.C.: Dumbarton Oaks, 1988), 149–94; Johanna Broda, "Templo Mayor as Ritual Space," in *The Great Temple of Tenochtitlan: Center and Periphery in the Aztec World,* by Johanna Broda, Davíd Carrasco, and Eduardo Matos Moctezuma (Berkeley: University of California Press, 1987), 61–123; Eduardo Matos Moctezuma, "Symbolism of the Templo Mayor," and Johanna Broda, "The Provenience of the Offerings: Tribute and *Cosmovisión,*" both in *The Aztec Templo Mayor,* ed. Elizabeth Hill Boone (Washington, D.C.: Dumbarton Oaks, 1987), 185–209, 211–56; María Elena Bernal-García, "Carving Mountains in a Blue/ Green Bowl: Mythological Urban Planning in Mesoamerica," 2 vols. (Ph.D. diss., University of Texas, 1993); Elizabeth P. Benson, ed., *Mesoamerican Sites and World-Views* (Washington, D.C.: Dumbarton Oaks, 1981); and Linda Schele, "The Olmec Mountain and Tree of Creation in Mesoamerican Cosmology," in *The Olmec World: Ritual and Rulership* (Princeton: Art Museum, Princeton University, 1995), 105–17.

17. Ixtlilxochitl may also have used the Mapa Quinantzin and the Mapa Tlotzin. See Charles Gibson, "A Survey of Middle American Prose Manuscripts in the Native Historical Tradition," in *Handbook of Middle American Indians,* vol. 15, ed. Howard Francis Cline (Austin: University of Texas Press, 1975), 311–21, and Charles Gibson and John B. Glass, "A Census of Middle American Prose Manuscripts in the Native Historical Tradition," in *Handbook of Middle American Indians,* vol. 15, ed. Howard Francis Cline (Austin: University of Texas Press, 1975), 322–400, esp. 337–38.

18. Alfonso Caso, "El Mapa de Teozacoalco," *Cuadernos Americanos* 47, no. 5 (año 8) (1949): 145–81; idem, *Reyes y reinos de la Mixteca,* 2 vols. (Mexico City: Fondo de Cultura Económica, 1977–79).

19. Edward King, Viscount Kingsborough, *Antiquities of Mexico, Comprising Fac-similes of Ancient Mexican Paintings and Hieroglyphics* (London: Robert Havell and Conaghi, 1831), vol. 1.

20. Manuel Orozco y Berra, "Códice Mendocino: Ensayo de descifración geroglífica," *Anales del Museo Nacional de México,* época 1, vol. 1 (1877): 120–86, 242–70, 289–339; vol. 2 (1882): 47–82, 127–30, 205–32, and idem, *Materiales para una cartografía mexicana* (Mexico City: Imprenta del Gobierno, 1871).

fully illustrated edition based on place-names from the Codex Mendoza.[21]

This work of decoding–figuring out the hieroglyphic place-names on maps–was needed to understand what places were being represented, which in turn was a preamble to questions of how and why. Cartography of Nahuatl speakers came first, in part as a legacy of the Codex Mendoza "codebook." The studies of Kirchhoff, Reyes García, Bittmann Simons, and Yoneda in particular have advanced our understanding of the cartography of Nahuatl speakers in the modern-day state of Puebla.[22] Kirchhoff, Güema, Reyes García, Bittmann Simons, and Kubler have all shown the influence social structure had on pre-Hispanic and colonial spatial arrangements and demonstrated that this influence is reflected in maps.[23] Van Zantwijk has followed this trend with provocative work on the Valley of Mexico.[24]

The corpus of Mixtec maps received scholarly attention later than its Nahuatl brethren, since it lacked a code-breaking equivalent of the Codex Mendoza and few scholars knew the Mixtec language. But Caso's work on Mixtec archaeology and history brought more attention to the Mixtecs. One person he influenced was Mary Elizabeth Smith, who revealed the phonetic nature of Mixtec hieroglyphs and was able to decode a substantial corpus of hieroglyphic place-names. In *Picture Writing from Ancient Southern Mexico* (1973), she scrutinized a number of *lienzos,* and one result of her work was to show how these cartographic histories function as maps.[25] Later, Ross Parmenter would establish that a number of the *lienzos* from the region of Coixtlahuaca in Oaxaca were likewise cartographic.[26] More recently, Jansen, Pohl, and Byland have shown the subtle representations of space in a number of Mixtec codices; these and other scholars have enriched their understanding of both maps and spatial constructs by returning to the Mixtec communities that made these maps and manuscripts centuries ago and by drawing on the current knowledge of toponymy of Mixtec-speaking peoples.[27] Thus some Mesoamerican maps have moved full circle: from their creation in indigenous communities, they came into the hands of bibliophiles, historians, and collectors, but it is only with their return to their sources–indigenous communities–that they are fully understood as maps.

Because Mesoamerican maps depend on writing systems not generally accessible, and because their spatial dimensions were imperfectly understood, they have been denied their rightful place in studies of cartographic traditions. Two often-cited articles published in *Imago Mundi,* by Guzmán and Burland, attempted to introduce Mesoamerican cartography to a nonspecialist audience.[28] Since Mesoamerican cartography had no measurable influence on Western mapping, however, it has yet to transcend its peripheral status.

Mesoamerican Maps and the Spatialization of Time

Among the categories of maps outlined above, we can identify some salient features of Mesoamerican maps and note how much their cadences differ from those of their Old World counterparts. The distinctiveness of Mesoamerican cartography can be identified in two arenas: what elements were included within the spatial framework of the map, and how these various elements were represented.

21. Antonio Peñafiel, *Nombres geográficos de México* (Mexico City: Oficina Tipográfica de la Secretaria de Fomento, 1885). See also idem, *Nomenclatura geográfica de México: Etimologías de los nombres de lugar* (Mexico City: Oficina Tipográfica de la Secretaria de Fomento, 1897).

22. Paul Kirchhoff, Lina Odena Güema, and Luis Reyes García, eds. and trans., *Historia tolteca-chichimeca* (Mexico City: Instituto Nacional de Antropología e Historia, 1976); Luis Reyes García, *Cuauhtinchan del siglo XII al XVI: Formación y desarrollo histórico de un señorío prehispanico* (Wiesbaden: Steiner, 1977); Luis Reyes García, ed., *Documentos sobre tierras y señorio en Cuauhtinchan* (Mexico City: Instituto Nacional de Antropología e Historia, 1978); Bente Bittmann Simons, "The Codex of Cholula: A Preliminary Study," *Tlalocan* 5 (1965–68): 267–339; idem, *Los mapas de Cuauhtinchan y la Historia tolteca-chichimeca* (Mexico City: Instituto Nacional de Antropología e Historia, 1968); and Keiko Yoneda, *Los mapas de Cuauhtinchan y la historia cartográfica prehispánica,* 2d ed. (Mexico City: Centro de Investigaciones y Estudios Superiores en Antropología, 1991).

23. See especially Kirchhoff, Odena Güema, and Reyes García, *Historia tolteca-chichimeca,* and George Kubler, "The Colonial Plan of Cholula," in *Studies in Ancient American and European Art: The Collected Essays of George Kubler,* ed. Thomas Ford Reese (New Haven: Yale University Press, 1985), 92–101.

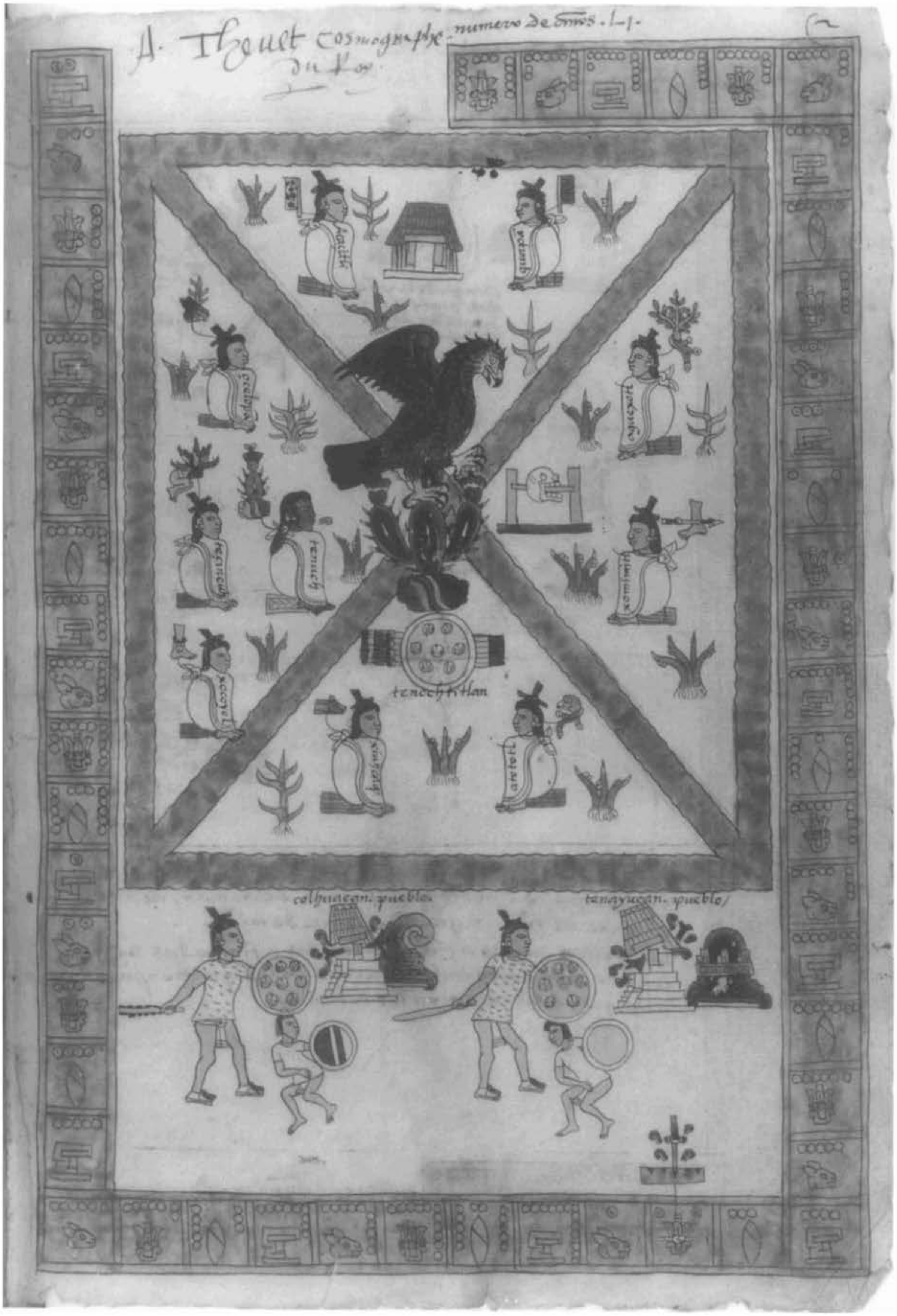
24. R. A. M. van Zantwijk, *The Aztec Arrangement: The Social History of Pre-Spanish Mexico* (Norman: University of Oklahoma Press, 1985).

25. Mary Elizabeth Smith, *Picture Writing from Ancient Southern Mexico: Mixtec Place Signs and Maps* (Norman: University of Oklahoma Press, 1973).

26. Ross Parmenter, *Four Lienzos of the Coixtlahuaca Valley,* Studies in Pre-Columbian Art and Archaeology 26 (Washington, D.C.: Dumbarton Oaks, 1982).

27. John M. D. Pohl and Bruce E. Byland, "Mixtec Landscape Perception and Archaeological Settlement Patterns," *Ancient Mesoamerica* 1 (1990): 113–31; Bruce E. Byland and John M. D. Pohl, *In the Realm of 8 Deer: The Archaeology of the Mixtec Codices* (Norman: University of Oklahoma Press, 1994); Maarten E. R. G. N. Jansen, *Huisi Tacu: Estudio interpretativo de un libro mixteco antiguo. Codex Vindobonensis Mexicanus 1,* 2 vols. (Amsterdam: Centrum voor Studie en Documentatie van Latijns Amerika, 1982); idem, "Mixtec Pictography: Conventions and Contents," in *Supplement to the Handbook of Middle American Indians,* vol. 5, ed. Victoria Reifler Bricker (Austin: University of Texas Press, 1992), 20–33; and idem, "Apoala y su importancia para la interpretación de los códices Vindobonensis y Nuttall," in *Actes du XLII^e Congrès International des Américanistes (1976),* 10 vols. (Paris: Société des Américanistes, 1977–79), 7:161–72.

28. Guzmán, "Map-Making among the Ancient Mexicans" (note 6), and C. A. Burland, "The Map as a Vehicle of Mexican History," *Imago Mundi* 15 (1960): 11–18.


A. Thevet cosmographe du Roy
numero de años . l.i.
tenuchtitlan
colhuacan. pueblo.
tenayucan. pueblo

(Facing page)
FIG. 5.6. TENOCHTITLAN IN THE CODEX MENDOZA. This indigenous colored manuscript map, painted ca. 1541, shows Tenochtitlan at its founding by the Culhua-Mexicas, 216 years earlier, in the year 2 Calli (2 House). The symbol for this date, a house in profile (compare fig. 5.10 below) crowned by two dots, is shown in the first blue square in the upper left corner. The count of the years proceeds counterclockwise, ending with the year 13 Acatl (13 Reed). Within this year count, the map of Tenochtitlan is dominated by a blue X, marking the four canals that divided the city both geographically and socially. Around the four quadrants sit the ten original founders of the city. Their leader, Tenoch, is seen immediately left of center; to the left of his head, his name is formed by its hieroglyphic components: a stone (*tetl* in Nahuatl) out of which grows a prickly pear cactus (*nochtli*). Tenoch's name mirrors the name of the city he founded: Tenochtitlan. Its hieroglyphic place-name lies in the middle of this page, at the juncture of the canals, and at its base is a stone with a cactus growing out of it. On top of the cactus sits an eagle, the sign the deity Huitzilopochtli had sent to the Culhua-Mexicas, to show them they should found Tenochtitlan. Below the stone is a circular shield in front of a line of arrows, these being both a symbol of Huitzilopochtli and the means of the bellicose Culhua-Mexicas' subsequent rise to power.
Size of the original: ca. 31.5 × 22 cm. Photograph courtesy of the Bodleian Library, Oxford (MS. Arch. Selden. A. 1, fol. 2r).

A key element was time. Before contact with Spaniards, Mesoamericans would not normally have separated depictions of space from renderings of time; León-Portilla identifies this as the "spatialization of time."[29] That is, Mesoamericans might map community boundaries, but they would also include a depiction or account of the historical conquest that brought the boundaries into being. And they might show the layout of the world, but only within a calendar of the days. In turn, they might create a circular calendar and assign each quadrant to a cardinal direction. If the way societies map mirrors their understanding of space, then many Mesoamerican societies *did* see the world differently than did contemporary Europeans. They saw space as so deeply connected to time, be it historical or calendrical, that the two could not be rent apart. Thus, in the secular sphere the line between "map" and "history" is a blurry one, as is the line between "map" and "almanac-calendar" in the sacred sphere. In practical terms, this spatialization of time meant that Mesoamericans would include kinds of information–on a regional map, for example–that went beyond the geographic and settlement information that dominated the European topographical map.[30]

Second, Mesoamericans encoded a map's information into hieroglyphs, pictorial images, and abstract signs, a system parallel to the use of words, pictures, and symbols on European topographical maps. Although the pictures might be seen as "universal," able to be read by anyone in any culture, the hieroglyphs were often language specific and the signs culture specific. This complex interplay of hieroglyphs, pictures, and signs escaped the map historian P. D. A. Harvey, who has described Aztec (and other Mesoamerican) maps as simple picture maps, wherein features of the landscape are shown as "universally recognized representations."[31] If we examine one Aztec map of the capital city of Tenochtitlan, however, we will see clearly that most of the information was conveyed not by pictures, but by symbols and hieroglyphs. Second, we will see the "spatialization of time" described above.

Tenochtitlan was mapped in a traditional manner by a Culhua-Mexica artist in the Codex Mendoza, a manuscript book of about 1541 (fig. 5.6).[32] The map was meant to show Tenochtitlan in the first "century" of its founding (an Aztec century lasted fifty-two years), beginning in 1325. The city is identified with a hieroglyph, a cactus growing out of rock, representing its name at center. The geographic space of Tenochtitlan is shown by a blue band, forming the inner border of the page, that denotes the city's encircling lakes. The main canals that transected this island city are represented by the blue X.[33] This representation of lakes and canals was not a geometric projection of the island capital, as a glance at figure 5.17 (below) will reveal. But the quadripartite divisions are a faithful representation of the social layout of the city, whose residents saw it divided into four equivalent quadrants.

The map is concerned with the passage of time as well

29. Miguel León-Portilla, *Aztec Thought and Culture: A Study of the Ancient Nahuatl Mind,* trans. Jack E. Davis (Norman: University of Oklahoma Press, 1963), 54–57. In a brief but perceptive article, Burland identified this key feature of Mesoamerican maps, writing that "Mexicans conceived a pathway through time as being closely akin to a pathway through space," Burland, "Map as a Vehicle," 11 (note 28). Although early medieval Europeans often included a temporal aspect in *mappaemundi,* this inclusion of space would not continue to shape Western cartography in the modern period.

30. Donald Robertson, *Mexican Manuscript Painting of the Early Colonial Period: The Metropolitan Schools* (New Haven: Yale University Press, 1959), 179–89 (chap. 10, "Cartography and Landscape").

31. P. D. A. Harvey, *The History of Topographical Maps: Symbols, Pictures and Surveys* (London: Thames and Hudson, 1980), 14 and 116.

32. The Codex Mendoza is assumed to have been painted at the behest of the Spanish viceroy Antonio de Mendoza (r. 1535–50). See Frances Berdan and Patricia Rieff Anawalt, eds., *The Codex Mendoza,* 4 vols. (Berkeley: University of California Press, 1992).

33. Whether these blue bands represented actual canals in the city is open to question. See Elizabeth Hill Boone, "The Aztec Pictorial History of the *Codex Mendoza,*" in *The Codex Mendoza,* 4 vols., ed. Frances Berdan and Patricia Rieff Anawalt (Berkeley: University of California Press, 1992), 1:35–54, as well as idem, "Glorious Imperium: Understanding Land and Community in Moctezuma's Mexico," in *Moctezuma's Mexico: Visions of the Aztec World,* by David Carrasco and Eduardo Matos Moctezuma (Niwot: University Press of Colorado, 1992), 159–73. Van Zantwijk provides a provocative analysis of the map, interpreting it as a diagram of the social structure of the early Culhua-Mexica city, and some of his interpretations inform my discussion; see van Zantwijk, *Aztec Arrangement,* 57–93 (note 24).

as with topographic and social space. The outermost frame of the page is composed of turquoise-colored blocks. The first, in the upper left corner, shows the hieroglyph for the year 2 House, or 1325 in the Gregorian calendar, when Tenochtitlan was founded. Each successive block marks another year, this count running through 13 Reed, or the year 1375. This fifty-one-year period coincided with the reign of Tenoch, a founder of the city, whose figure can be seen within the left quadrant of Tenochtitlan, labeled *tenuch*.[34]

The map uses pictorial and symbolic shorthand to convey the events of Tenochtitlan's first "century." First, in the middle of the page, an eagle alights on the cactus (*tenochtli* in Nahuatl) that forms the hieroglyph of Tenochtitlan's name. This was a defining moment in Tenochtitlan's history: the eagle was sent by Huitzilopochtli, a tribal deity, to show ten Culhua-Mexica clan leaders where they could settle and end their long peregrination. At the eagle's appearance, the clan leaders, Tenoch among them, founded Tenochtitlan. The map shows these ten sitting within the quadrants of the newly established city. Their order and placement here are important, since the groups they led, and here represent, were to settle in the quadrants where their leaders are shown. Many of their descendants still lived in the same quadrants when the map was painted in the sixteenth century. After Tenochtitlan was founded, its army headed out to conquer neighboring cities, so as to enrich its coffers and extend its domain. The first two of these ongoing campaigns of conquest are shown in the symbols lying below the blue square that represents the lake. In each a warrior, representing Tenochtitlan's army, triumphs over another warrior, representing the vanquished army of a lakeside city. To the right of each of these battling groups is a picture of a burning temple, another symbol of conquest, and the hieroglyphic name of the defeated city.

If we compare this Aztec map of Tenochtitlan with a European map of the same city, we can clearly see the differences. The earliest known European map of Tenochtitlan was printed in Nuremberg in 1524 to accompany an edition of Cortés's second letter to the Spanish king Charles V (r. 1517–56).[35] Its author is unknown, but it was presumably a local Nuremberg artist, working from the description and perhaps a native map provided by Cortés. This map shows the same city as the Codex Mendoza page, but the surrounding landscape is represented from a panoramic view (fig. 5.7). Within the lake, the city stretches out house after house, palace after palace; its form is much as a person directly above the center might view it, and set within are buildings shown in elevation. Written language is used for toponyms, just as hieroglyphs were used on the Codex Mendoza. Compared with the Culhua-Mexica map, this European map has fewer symbols. It is also unconcerned with time: the map shows Tenochtitlan at one instant of its history, as if captured in a photograph. Unlike the highly symbolic human figures included in the Culhua-Mexica map, most of the nameless humans in this map are engaged in mundane activities, as they paddle boats around the lake.

In contrast, the Culhua-Mexica map includes a temporal dimension, showing the passage of time and the events that occurred. It also depends on culturally specific hieroglyphs and symbols to convey much of its information. Underlying this is the issue of authority: these conventional elements gave the Mesoamerican map its authority with its native audience, as did its socially accurate portrayal of quadripartite Tenochtitlan.

If we turn to the Cortés map, a map reproduced widely in Europe, being perhaps the most famous contemporary image of the New World, we find that its authority accrued from looking as if the mapmaker had "been there" and brought this captured view back to Europe as a token of his visual conquest. He further appealed to his audience by working in a style familiar to them. The mapmaker does not aim to impress with a systematic geometrical transformation of the landscape; the European's Tenochtitlan–a circle within a circle–is as geometrically abstract and unsystematic as the cross within a square of its indigenous counterpart (compare fig. 5.17 below). Instead, it is the veracity of the mapmaker's gaze, which "sees" the houses, temples, and boatmen in the city, that is underscored here. Whereas the artist of the Cortés map sought to represent the visible attributes of space, Mesoamerican mapmakers strove for a representation of space that embraced its social and historical dimensions.

MEDIA AND FORMATS

Maps were made on a variety of media, among them paper, cloth, animal hides (probably deerskin), parchment, and walls. Similar maps from the same region were often on similar media; general correlations are summarized in tables 5.1 and 5.2.[36] Large sheets of cloth, woven of cot-

34. The Codex Mendoza shows fifty-one years, one short of the Aztec "century" of fifty-two years. But as Boone points out, this page does not record Tenoch's first year of rule, since he did not reign for the entire year. Nonetheless, the temporal span covered by the page was a full fifty-two-year cycle (Boone, "Aztec Pictorial History," 37).

35. See Barbara E. Mundy, "Mapping the Aztec Capital: The 1524 Nuremberg Map of Tenochtitlan, Its Sources and Meanings," *Imago Mundi* 50 (1998): 1–22.

36. For an overview of native manuscripts, see Glass, "Survey" (note 4), and John B. Glass with Donald Robertson, "A Census of Native Middle American Pictorial Manuscripts," in *Handbook of Middle American Indians*, vol. 14, ed. Howard Francis Cline (Austin: University of Texas Press, 1975), 81–252. The full bibliography for Glass and Robertson, "Census," is found in John B. Glass, "Annotated References," in *Handbook of Middle American Indians*, vol. 15, ed. Howard Francis Cline (Austin: University of Texas Press, 1975), 537–724. The

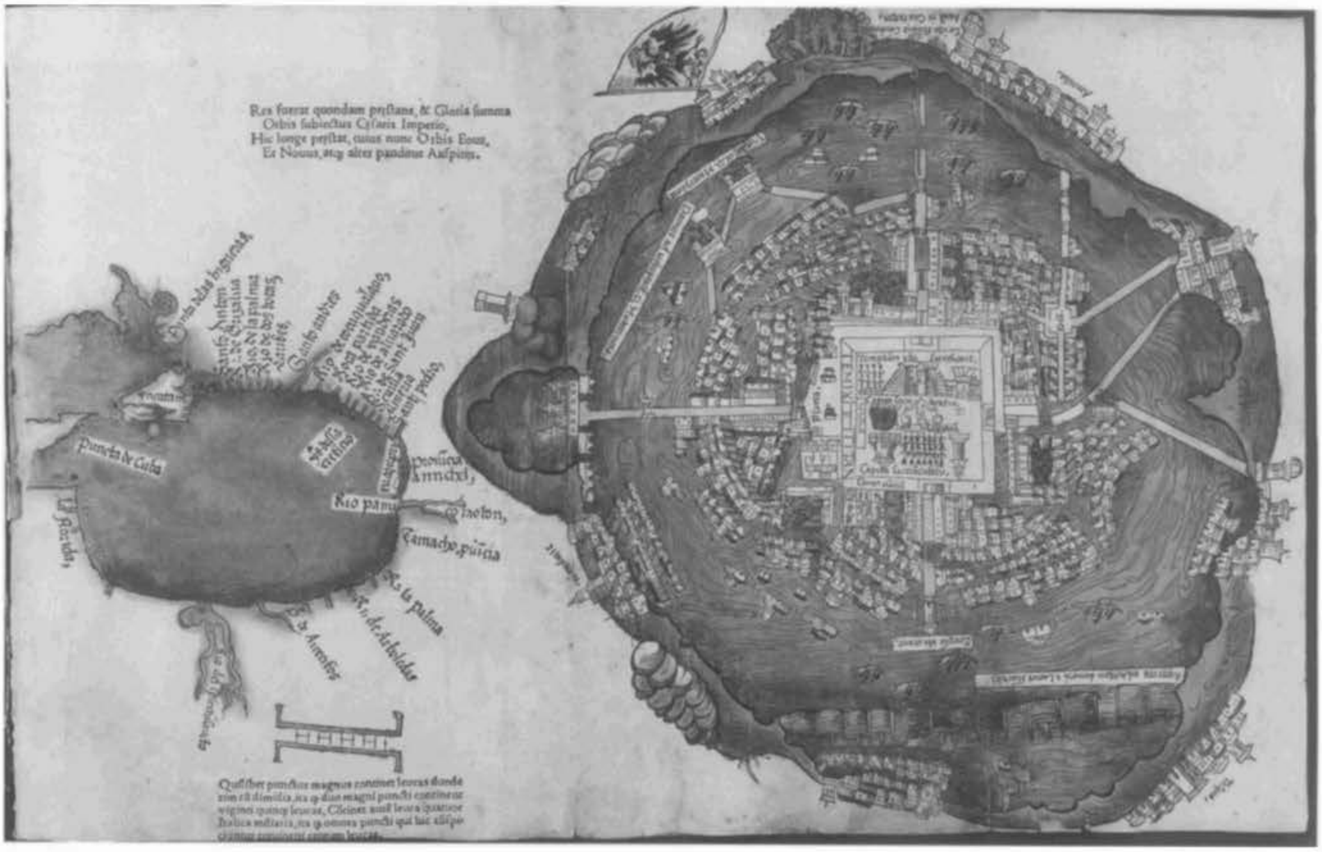


FIG. 5.7. THE CORTÉS MAP OF TENOCHTITLAN, 1524. When the second letter of the conquistador Hernán Cortés to Charles V of Spain was printed in 1524, an anonymous European draftsman created this woodblock print map of Tenochtitlan, along with a sketch of the Gulf Coast at left, to accompany Cortés's vibrant description of the Aztec capital city. The island capital is shown at the center of the circular map, its walled temple precinct greatly enlarged in the center of its urban population. Causeways connect it to the surrounding lakeshore, where neighboring cities lie. Since this was the first European map of the Aztec city, its sources are of interest. Some of it is drawn from Cortés's written account. For example, Cortés describes splendid aviaries, and the draftsman shows the caged birds below the temple precinct. Some of the map derives from European traditions of city mapping; its maker undoubtedly called to mind images of Venice when drawing this lacustrine city, showing its residents in high-prowed boats like gondolas. Yet other elements of the map reveal an insider's knowledge of Tenochtitlan, suggesting that this European map may have been derived from an indigenous map of the city. A tiny face emerges between the twin temples at the center of the map; it may be the sun, which rose at that point on the summer solstice. By the time this map appeared in Europe, the city it portrayed was gone, reduced to rubble and ashes in the destructive wars of conquest.
Size of the original: 30 × 47.5 cm. Photograph courtesy of the Newberry Library, Chicago (Ayer *655.51 C8 1524d).

ton or maguey fiber, were favored for the large cartographic histories, which usually included the boundaries and history of a single community. Such cloth was frequently used by the speakers of Nahuatl, Mixtec, and Zapotec who lived in and around the modern state of Puebla and Oaxaca, as well as by other ethnic groups in these regions.[37] Communities probably used cloth because it was readily available, and cloth panels could be sewn together into the large sheets they favored for community histories. Spanish conquistadores also noticed that the itinerary maps Mesoamericans supplied to them were painted on cloth sheets. Unfortunately, cloth is ravaged by the Mesoamerican climate, and thus the only extant community maps date from after the conquest, and no itinerary maps like those the Spanish described survive at all (table 5.3).

Maps were also made on animal skin that was carefully treated and sized with gesso. This highly valued material

"Census" should be consulted for all manuscript maps cited herein. See also Robertson, *Mexican Manuscript Painting* (note 30); Esther Pasztory, *Aztec Art* (New York: Harry N. Abrams, 1983), 179–208; and Smith, *Picture Writing* (note 25).

37. Glass counts about fifty surviving *lienzos*–manuscripts on single panels of cloth–noting their rarity in the State of Mexico and the Federal District (the Aztec heartland) as well as their absence in southeastern Mexico, the Yucatan, and Guatemala (the Maya region) and the Mexican state of Hidalgo ("Survey," 9). By association, the term *lienzo* is used to name any manuscript painted on a panel of cloth. Although *lienzos* can have any content, they are often cartographic histories.

TABLE 5.1 General Correlations between Map Types, Media, and Origin

Type	Media	Place of Origin	Examples
Cartographic history	Native paper, unsized sheets	Valley of Mexico (Nahua)	Codex Xolotl, p. 1
Cartographic history	Hide	Puebla (Nahua)	Mapa circular de Cuauhquechollan
Cartographic history	Cloth sheets	Puebla and Oaxaca (Nahua, Mixtec, and others)	Lienzo of Coixtlahuaca 1; Lienzo of Cuauhquechollan[a]
Cosmographical map	Native paper, sized sheets in screenfold manuscript	Maya region (Yucatan, Guatemala)	Codex Madrid, fols. 76–77
Cosmographical map	Sized hide	Mexico, north of Isthmus of Tehuantepec	Codex Fejérváry-Mayer, p. 2; Codex Borgia, pp. 29–46; Codex Aubin, no. 20

[a]John B. Glass with Donald Robertson, "A Census of Native Middle American Pictorial Manuscripts," in *Handbook of Middle American Indians*, vol. 14, ed. Howard Francis Cline (Austin: University of Texas Press, 1975), 116–17 (no. 89).

TABLE 5.2 Formats of Mesoamerican Maps

Format	Frequency	Examples
Rectangular	Common, frequently used for cartographic histories	Lienzo of Zacatepec 1, Historia tolteca-chichimeca maps
Circular	Relatively rare, about six examples known	Relaciones geográficas maps from Amoltepec and Teozacoalco, Mapa circular de Cuauhquechollan, Map of Maní, Plano de San Andres Sinaxtla, map of the province of Sotuta
Square	Rare	Codex Fejérváry-Mayer, p. 2
Irregular shapes	Often used for property plans, to conform to planimetry	Oztoticpac lands map; Plano en papel de maguey

TABLE 5.3 Relative Frequency or Survival Rates of Map Types

Cartographic/itinerary histories	
Central Mexican	Frequent (over eighty examples known)
Maya	Known by report only
Other terrestrial maps	
Property plans: cadastral maps	Rare
Property plans: maps of individual property	Fairly common
Urban maps	Rare
Trading and war maps[a]	Known by report only
Cosmographical maps	
Manuscript	Rare
Sculptural models	Frequent
Architectural models	Frequent
Celestial maps	Rare

[a]This category includes the itinerary maps that the Spanish conquistadores used for travel and exploration; lacking any extant examples, I assume they were an offshoot of maps used by the long-distance merchants.

was also extremely durable; of the fifteen surviving preconquest manuscripts, all but the four from the Maya region were painted on sized hide. In most cases the hides were neatly trimmed and glued together into a long strip (*tira*), then folded accordion fashion. The result was a rectangular screenfold (called a codex) that looked somewhat like a book.[38] Three of the pre-Hispanic screenfolds contain cosmographical maps; another postconquest example is found in a bound book that was probably copied from a preconquest screenfold (appendix 5.1).

Paper, too, was often used for maps. Indigenous paper (*amatl;* sometimes *amate*) was created from the inner bark of a native fig tree or made out of maguey fiber.[39] Paper seems to have been the favored medium for the com-

38. Nomenclature for Mesoamerican manuscripts is not standarized and can be somewhat misleading. All screenfolds, manuscripts created by folding a long strip of paper or hide accordion fashion into a compact square or rectangle, are called codices, but so are manuscripts that are painted on large sheets (like the Codex Xolotl, discussed below) or those postconquest books that are bound on one side, like the Codex Mendoza or the Codex Ríos (also discussed below).

39. Hans Lenz, "Las fibras y las plantas del papel indígena mexicano," *Cuadernos Americanos* 45, no. 3 (año 8) (1949): 157–69.

munity histories made in the Valley of Mexico. As a valued tribute item, paper flowed into the Valley of Mexico, where mapmakers likely had greater access to it than elsewhere. Paper had important ritual uses and was probably prized above plain cloth. In the Maya region long sheets of paper, not hide, were sized and folded to be used for precious screenfold manuscripts. Like cloth, paper is highly perishable in the Mesoamerican climate, and with one exception (in the Maya Codex Madrid) all extant maps on indigenous paper were painted after the conquest.

Whether painted on cloth, paper, or hide, Mesoamerican maps were drawn with a resin-based ink, deep black and durable. Artists would apply this ink with a reed pen, and they aimed to create a line of consistent width. Every form was outlined in black, and often the outlined forms were filled in with colored pigment.[40] Ceramic vessels were also painted, and potters across Mesoamerica decorated their unfired vessels with various clays, dissolved in water to make slips, resulting in a subtle range of postfire colors. To increase the chromatic range of pottery, some cultures favored postfire decorations of painted stucco. The painting on ceramic vessels ranged from domestic scenes to geometric abstraction; sometimes vessels bore a cosmogram, a schematic version of the vertical arrangement of the cosmos–heavens above, earth in the middle, Underworld below.

Murals were another important forum for painting; they often covered important buildings and dwellings, both inside and out. The handful of surviving landscape paintings that may have been related to maps are all murals (appendix 5.2). At least one, found in a royal tomb in the Maya city of Río Azul, shows a schematic cosmogram.

Murals had a more permanent counterpart in the bas-relief and three-dimensional sculpture made of carved stone or molded stucco that adorned exteriors and interiors of many buildings. Sculpture was the medium that Mesoamericans often used to represent parts of the cosmic layers. Scholars are now beginning to recognize that entire architectural complexes brought together representations of the component parts of the cosmos. These architectural and sculptural counterparts to graphic maps will be discussed below with cosmographical maps.

After the conquest in the sixteenth century, many mapmakers preferred imported European paper over cloth or native paper. Its merits were both practical and symbolic. Imported paper had a smoother finish, making it easier to apply ink in the even lines that artists favored. It was also rare and expensive, and it elevated the status of whatever writing it carried. Native maps on European paper were generally made under Spanish patronage: because of their context, as well as their stronger medium, they have proved more durable than those made on native paper.[41] As the Spanish colonists introduced new media and devalued some traditional ones, the correlations between medium and types summarized in table 5.1 blurred and grew indistinct through time.

MODES OF PRODUCTION

Many Mesoamerican societies boasted professional sculptors, painters, and scribes. Artists and scribes seem to have been elites, members of the ruling castes. Among the various duties of these men, and occasionally women, was the production of maps. In large, highly specialized societies, artists might have worked in only one or two media, but in smaller communities it is likely they were called on to paint everything from maps to pots.

Creating the screenfold manuscripts that housed cosmographical maps was the most rarefied of endeavors. Artists would probably copy most, if not all, of their new manuscripts from existing ones in special workshops.[42] But they were not mere scriveners. Artists were highly trained, and they had to be well versed in cosmology, divination, or history to faithfully replicate the mass of complex detail each manuscript page contained. This way of producing manuscripts was by nature conservative, well fitted to representing a cosmos whose nature remained remarkably consistent over centuries.

Making terrestrial maps was probably a less weighty enterprise than making cosmographical maps, and also a much more inventive and collaborative one. Two rare early colonial documents preserve records of territorial demarcation in indigenous communities, one of them Maya (fig. 5.22 below, the map of Maní), the other Nahua. Maps seem to have been made as a result of the demarcation in both cases, and these postconquest documents are probably a good indication of pre-Hispanic practice.[43] They describe community leaders identifying and naming an area during a ritual of circumambulation. It was probably after leaders carried out these acts that their fellow elites, the painter-scribes, created graphic re-

40. Robertson, *Mexican Manuscript Painting,* 16 (note 30).

41. Robertson, *Mexican Manuscript Painting,* 112.

42. For a description of how manuscripts were created in early colonial times, see Ellen T. Baird, *The Drawings of Sahagún's "Primeros Memoriales": Structure and Style* (Norman: University of Oklahoma Press, 1993), 155–57.

43. However, only a copy of one of the maps survives in the map of Maní of 1596. The documents associated with this Maya example are transcribed and published in Roys, *Indian Background,* 175–94 (note 8). The Nahua example is found in Reyes García, *Documentos sobre tierras* (note 22). A record of the pre-Hispanic feud between Cuauhtinchan and Tepeyacac that prompted the demarcation comes from court testimony taken when the same feud broke out again in 1546–47. On the related topic of foundation ritual, see Angel J. García Zambrano, "El poblamiento de México en la época del contacto, 1520–1540," *Mesoamérica* 24 (1992): 239–96.

presentations of the space traveled. Most likely the painter-scribes made rough measurements by pacing during circumambulation and gauged orientation from visible landmarks like outlying hills or from the path of the sun. Postconquest documentation also indicates that when the tract of land was a small individual holding, a scribe would have estimated dimensions or measured it directly using ropes or paces, then would have drawn up a small map on paper, whose veracity would be attested by witnesses.[44] With all maps, whether of the cosmos or of a tract of land, it was the collective nature of their production, as pages were copied within workshops, territories were circumambulated by elites, and possessions were certified by witnesses, that was the wellspring of their authority.

CARTOGRAPHIC CONVENTIONS

Mesoamerican maps relied heavily on hieroglyphs, pictures, and abstract signs to carry meaning, and this lent them a close kinship to all other Mesoamerican written works. Central Mexican writing has been called picture writing, and it is heavily pictorial, conveying general ideas and facts with combinations of hieroglyphs, images, and signs; it is not as prescriptive as written English, which spells out phrases word for word.[45] Writing and mapmaking therefore rested on the same graphic substrate, employing the same pictorial conventions. Of all Mesoamerican writing systems, only that of the Mayas was used to create more systematic texts; Maya stelae contain registers of hieroglyphs, each hieroglyph standing for a whole word or its component syllables. Very few examples of indigenous terrestrial maps come from the Maya region,[46] perhaps because textual writing crowded out graphic representation.

Since most non-Maya Mesoamerican maps used the same system of hieroglyphs, pictures, and symbols as did histories or almanacs, these works shared many of the same conventions. The costume, pose, and gesture of a figure would convey gender, status, and intent.[47] Hieroglyphs were used for personal names, place-names, and dates. For instance, the man named Atototl or "Water Bird" in the Codex Mendoza was identified by the hieroglyph of his name–comprising a bird and a conventional stream of water connected to his head (fig. 5.8). His gender is made clear by his costume, a man's cloak knotted at his shoulder. Travel and direction or movement were shown with lines of footprints (see figs. 5.4 and 5.5). Expressed with pictorial images and conventional signs, much of the content of maps could be understood across the linguistic boundaries dividing Mesoamerica.

PICTURES AND WRITING

Because terrestrial maps above all represented a framework of space, they relied heavily on a limited repertory of pictures and symbols–standardized abstracted images–to denote topographic features.[48] The most common of these are shown in figure 5.9, and architectural depictions are shown in figure 5.10. Often these topographic pictures and symbols were not images but parts of hieroglyphs, or picture writing; that is, they stood not for the visible appearance of things but for words or word parts, and usually the words they denoted were toponyms. For instance, it is highly uncommon in a preconquest-style map to find a symbol or pictograph for a hill representing a hill in the landscape. Instead, the hill pictograph would be part of a toponym, standing for the name, rather than being an image of the geographic feature. This distinction between image and hieroglyph is subtle but important: it means that Mesoamerican maps show us spaces that are made visible through names, rather than through contour lines or apparent features.

Mesoamerican writing, by convention, is called hieroglyphic (synonymous with logographic), and hieroglyphic toponyms are usually simple to decode, because many are simple word pictures, or rebuses, in which pictures (which we call pictographs when they denote language) indicate the word or its component parts.[49] For example,

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44. See James Lockhart, *Nahuas and Spaniards: Postconquest Central Mexican History and Philology* (Stanford: Stanford University Press, 1991), 97–101, for example.

45. Boone, "Writing and Recording Knowledge" (note 3), and Joyce Marcus, *Mesoamerican Writing Systems: Propaganda, Myth, and History in Four Ancient Civilizations* (Princeton: Princeton University Press, 1992).

46. A brief survey of the material evidence of Maya maps is found in Thompson, *Dresden Codex*, 9–10 (note 5).

47. On the use of gesture in the Mixtec codices, see Nancy P. Troike, "The Interpretation of Postures and Gestures in the Mixtec Codices," in *The Art and Iconography of Late Post-classic Central Mexico*, ed. Elizabeth Hill Boone (Washington, D.C.: Dumbarton Oaks, 1982), 175–206. For a description of pictorial conventions, see Smith, *Picture Writing*, 20–35 (note 25). On costume, see Patricia Rieff Anawalt, *Indian Clothing before Cortés: Mesoamerican Costumes from the Codices* (Norman: University of Oklahoma Press, 1981).

48. Here I use "symbol" as a subset of the more general "sign," with symbols being abstracted images standing for objects or ideas; pictographs have a direct pictorial relation to the things they represent.

49. On writing systems in general, see Michael D. Coe, *Breaking the Maya Code* (New York: Thames and Hudson, 1992), esp. 13–45. Two early studies of Nahuatl place-names are Peñafiel, *Nombres geográficos*, and idem, *Nomenclatura geográfica* (both in note 21). For a sampling of more recent discussion of both place-names and writing, see Joaquín Galarza, *Estudios de escritura indígena tradicional (azteca-náhuatl)* (Mexico City: Archivo General de la Nación, 1979); Charles E. Dibble, "Writing in Central Mexico," in *Handbook of Middle American Indians*, vol. 10, ed. Gordon F. Ekholm and Ignacio Bernal (Austin: University of Texas Press, 1971), 322–32; and also Hanns J. Prem, "Aztec Writing," in *Handbook of Middle American Indians*, suppl. vol. 5, ed. Victoria Reifler Bricker (Austin: University of Texas Press, 1992), 53–69. A study that centers on the Codex Mendoza is Karl Anton Nowotny, "Die Hieroglyphen des Codex Mendoza: Der Bau einer mittelamerikanischen Wortschrift," *Mitteilungen aus dem Museum für Völkerkunde in Hamburg* 25 (1959): 97–113, and more recently,

the town of Xilotepec, or "Hill of Green Ears of Maize," would be written in Nahuatl with a simple pictograph combining ears of maize, *xilotl,* on top of a bell-shaped hill pictograph, *tepetl* (fig. 5.11). In central Mexico pictography prevailed, but the writing systems also employed some elements phonetically to indicate the sounds of words; this mix of pictures and phonics is called hieroglyphic writing, and with it Nahuatl speakers represented dates, personal names, and toponyms.[50] Mixtec and Zapotec maps used hieroglyphic writing to construct personal and place-names, but the names, as their phonetic component reveals, refer to words in the Mixtec or Zapotec language, not in Nahuatl.[51]

Hieroglyphs referring to certain cities and sites appear in the texts that Mayas carved in stone during the classic period (A.D. 250–900). These hieroglyphs, like Maya writing in general, could spell out the toponyms syllabically, and this heavier use of phonics puts Maya hieroglyphic writing on the opposite end of the spectrum from the more predominately pictographic writing used in the rest of Mesoamerica. Maya epigraphers have linked about a dozen hieroglyphs to known sites.[52] If we hypothesize that the classic Mayas made maps, then they may have identified places with toponymic hieroglyphs, but the only surviving use of these is within written texts and on historical monuments. No Maya maps using place-name hieroglyphs are known to have survived the conquest.

In central Mexico, by contrast, hieroglyphic place-names were widely used in all kinds of written works, most particularly maps, throughout the sixteenth century–well after the conquest and the introduction of the Latin alphabet. To the eye of the contemporary reader, including the Spanish friars who scrutinized native manuscripts, hieroglyphic place-names were simply toponyms. But a closer look at the iconography of these hieroglyphs shows that they reflect native understandings of the nature of the world.

Consider the pictograph for "hill," read *tepetl* in Nahuatl or *yucu* in Mixtec (see fig. 5.9*a–c*). This pictograph is used in hundreds of hieroglyphs, for two reasons.

FIG. 5.8. DETAIL OF ATOTOTL FROM THE CODEX MENDOZA. Atototl, one of the founders of Tenochtitlan, is identified by the hieroglyph of his name. The head of a bird (*tototl* in Nahuatl) rises out of a stream of water (*atl*). After this page was painted, another hand added the glosses, spelling out Atototl's name in the Latin alphabet (see also fig. 5.6). Size of the detail: ca. 3.3 × 2.6 cm. Photograph courtesy of the Bodleian Library, Oxford (MS. Arch. Selden. A. 1, fol. 2r).

Frances Berdan, "Glyphic Conventions of the *Codex Mendoza,*" in *The Codex Mendoza,* 4 vols., ed. Frances Berdan and Patricia Rieff Anawalt (Berkeley: University of California Press, 1992), 1:93–102. A helpful overview of the subject is provided in James Lockhart, *The Nahuas after the Conquest: A Social and Cultural History of the Indians of Central Mexico, Sixteenth through Eighteenth Centuries* (Stanford: Stanford University Press, 1992), 326–73, and in Marcus, *Mesoamerican Writing,* 153–89 (note 45).

50. For discussions of the phoneticism in these place-names, see H. B. Nicholson, "Phoneticism in the Late Pre-Hispanic Central Mexican Writing System," in *Mesoamerican Writing Systems,* ed. Elizabeth P. Benson (Washington, D.C.: Dumbarton Oaks, 1973), 1–46; Charles E. Dibble, "The Syllabic-Alphabetic Trend in Mexican Codices," in *Atti del XL Congresso Internazionale degli Americanisti (1972),* 4 vols. (Genoa: Tilgher, 1973–76), 1:373–78; and Hanns J. Prem, "Aztec Hieroglyphic Writing System–Possibilities and Limits," in *Verhandlungen des XXXVIII. Internationalen Amerikanistenkongresses (1968),* 4 vols. (Munich: Klaus Renner, 1969–72), 2:159–65; as well as Nowotny, "Die Hieroglyphen," Berdan, "Glyphic Conventions," Dibble, "Writing in Central Mexico," and Galarza, *Estudios* (all in note 49).

51. On the construction of Mixtec place-names, see Smith, *Picture Writing,* 36–54 (note 25), and Caso, *Reyes y reinos,* 1:34–36, 165–67, and pls. 16–20 (note 18). On Zapotec writing, see Joyce Marcus, "Zapotec Writing," *Scientific American* 242, no. 2 (1980): 50–64, and Javier Urcid Serrano, "Zapotec Hieroglyphic Writing," 2 vols. (Ph.D. diss., Yale University, 1992).

52. David Stuart and Stephen D. Houston, *Classic Maya Place Names,* Studies in Pre-Columbian Art and Archaeology 33 (Washington, D.C.: Dumbarton Oaks, 1993); Joyce Marcus, *Emblem and State in the Classic Maya Lowlands: An Epigraphic Approach to Territorial Organization* (Washington, D.C.: Dumbarton Oaks, 1976); and Heinrich Berlin, "El glifo 'emblema' en las inscripciones mayas," *Journal de la Société des Américanistes,* n.s. 47 (1958): 111–19.

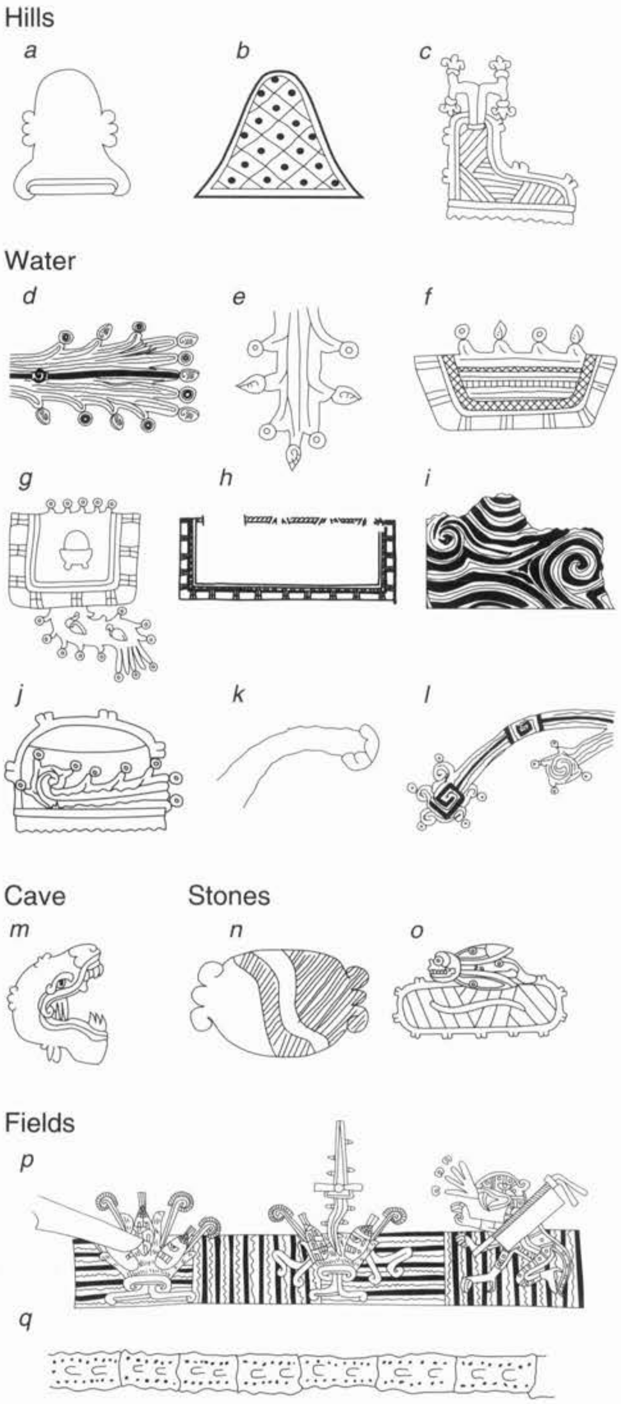


FIG. 5.9. COMMON GEOGRAPHIC PICTOGRAPHS IN MESOAMERICAN MANUSCRIPTS. Geographical and topographical pictographs from various manuscripts show regional and ethnic differences.

Hills: (*a*) Aztec (Culhua-Mexica) hill pictograph showing curved volutes on side (after Codex Mendoza, fol. 31r); (*b*) Aztec (Acolhua) hill pictograph (after Codex Xolotl, p. 6); (*c*) Mixtec hill pictograph (after Codex Selden 10-ii).

Water: (*d*) running water (after Codex Borbonicus, p. 5); (*e*) running water (after Codex Mendoza, fol. 28r); (*f*) water symbol frequently used in Nahuatl place-names (after Codex Mendoza, fol. 16v); (*g*) Mixtec pictograph for river or body of water (after Codex Nuttall, p. 51); (*h*) lake with turbulent waters (after Codex Nuttall, p. 75); (*i*) lake from the Valley of Mexico (after Relación geográfica map of Ixtapalapa); (*j*) Mixtec place sign showing flowing water (after Codex Selden 5-III); (*k*) crescent symbol used to show spring or water source (after Codex Xolotl, p. 6); (*l*) springs (after Relación geográfica map of Oaxtepec).

Cave: (*m*) (after Codex Mendoza, fol. 18r).

Stones: (*n*) pictograph for stone (after Codex Mendoza, fol. 18r); (*o*) Mixtec large stone, with insect on top (after Codex Vienna, p. 49).

Fields: (*p*) fields growing with corn plants, center and left (after Codex Borgia, p. 20); (*q*) tilled field (after Humboldt Fragment 2).

Tepe is a widespread component of Nahuatl place-names, and *yucu* is also common in Mixtec, much as "town" or "burg" appears in American place-names. Additionally, in Aztec pictorial manuscripts the hill pictograph was often used as part of a place-name even when *tepe* was not a component of the name. In these cases it simply stood for a named place. One scholar calls it a "determinative," a marker of the category the word belongs to, opposing this to a hieroglyph, a picture or symbol of the word itself.[53] Whether as a hieroglyph (standing for a word or word part) or a determinative (standing for a category), the hill pictograph was often decorated with a pattern of diamonds and dots. This motif had a long history in the northern part of Mesoamerica, standing for the rough skin of a crocodile. According to northern Mesoamerican belief, this monstrous crocodilian creature was the earth itself (fig. 5.12).[54] Thus, even in secular contexts the pictographs used in maps carried the imprint of the earth's sacred design.

SCALE AND DIRECTIONALITY

Whereas scale and conventional orientation were of increasing concern to Western mapmakers in the sixteenth century, Mesoamerican painters placed little emphasis on consistent scale to structure terrestrial maps. Instead, the most important place in the map was drawn largest and usually placed at its center. As one moved out toward the periphery, the territory was represented at an increasingly

53. Prem, "Aztec Writing," 66 (note 49). Mary Elizabeth Smith (personal communication, 1993) points out that the Mixtec word *ñuu*, represented by a panel with a stepped pattern inside, is a closer equivalent to the determinative use of the Nahuatl *tepetl*.

54. Edouard de Jonghe, "Histoyre du Mechique: Manuscrit français inédit du XVI^{e} siècle," *Journal de la Société des Américanistes de Paris*, n.s. 2 (1905): 1–41, esp. 25, and *Codex Borgia: Biblioteca Apostolica Vaticana (Messicano Riserva 28)* (Graz: Akademische Druck- u. Verlagsanstalt, 1976), 3, 22, 39, 71. Maya representations of the earth's surface are marked with spirals with drooping tails, whereas the diamond-and-dot pattern is reserved for water-lily pads, symbols of bodies of water. See Linda Schele and Mary Ellen Miller, *The Blood of Kings: Dynasty and Ritual in Maya Art* (New York: George Braziller, 1986), 46–47.

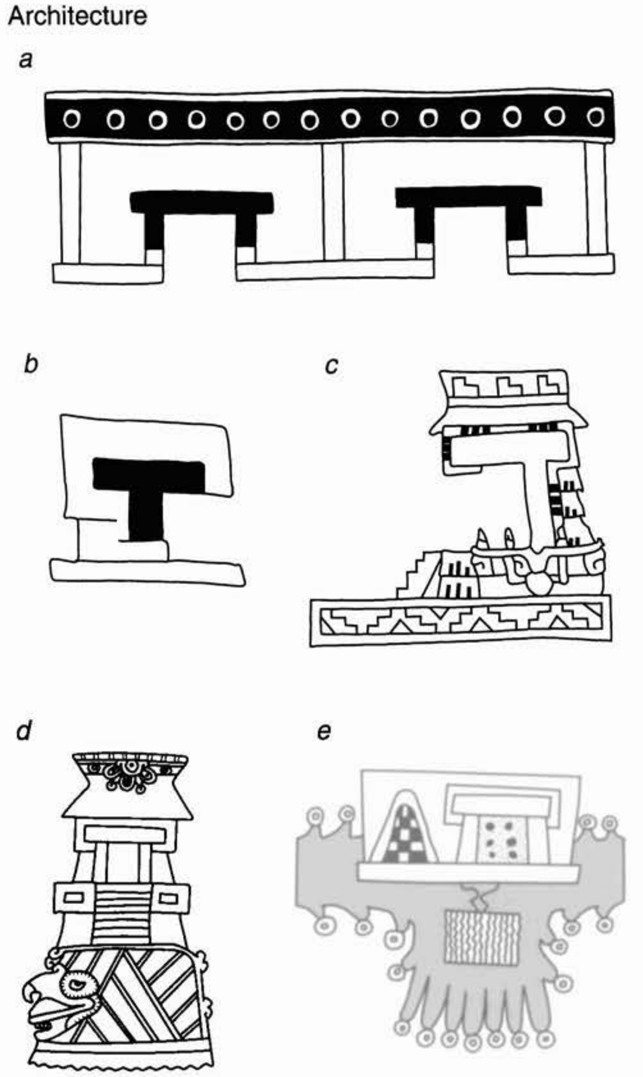


FIG. 5.10. COMMON REPRESENTATIONS OF ARCHITECTURE IN MESOAMERICAN MANUSCRIPTS. (*a*) Nahuatl house shown frontally, with two large door lintels (after Relación geográfica map of Ixtapalapa); (*b*) Nahuatl structure shown in profile (after Relación geográfica map of Coatepec Chalco); (*c*) Mixtec temple shown in profile (after Codex Selden 9-III); (*d*) Mixtec place-name of Tututepec, shown by a hill pictograph topped with an elaborate temple and presented frontally (after Codex Nuttall, p. 50); and (*e*) sweat bath within two merging rivers (after Codex Vienna, p. 46d).

smaller scale. Thus the distances to faraway places were collapsed so they could be represented on the map. On the Lienzo of Zacatepec 1, for instance, the places represented on the edges of the map lie anywhere from thirteen to forty-seven kilometers away from the town of Zacatepec, shown in the map's upper center (fig. 5.13). The Mesoamerican viewer understood that peripheral placement usually conveyed great distance from the center.

Mesoamericans saw the world as organized along three

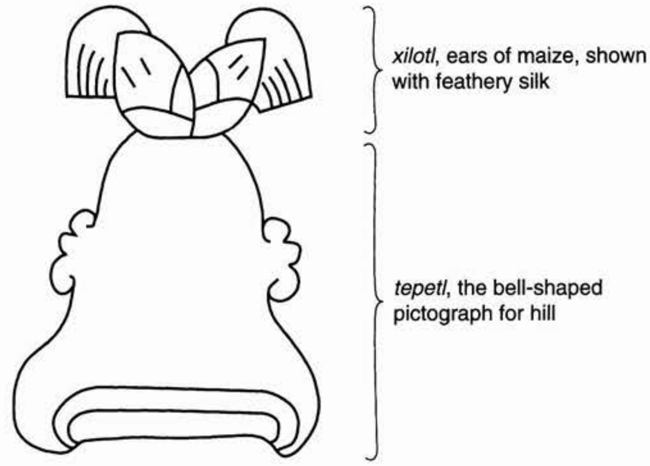


FIG. 5.11. HIEROGLYPHIC PLACE-NAME OF XILOTEPEC. A pictograph for "ears of maize" sits atop the hill pictograph. Pictographs like these are images that have been slightly abstracted into a conventional form, and they often denote words or word parts.

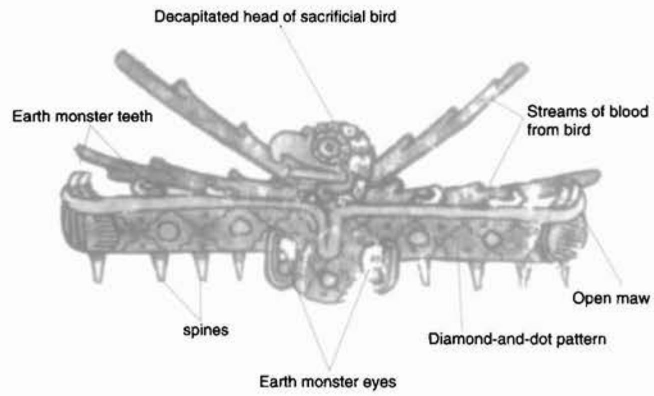
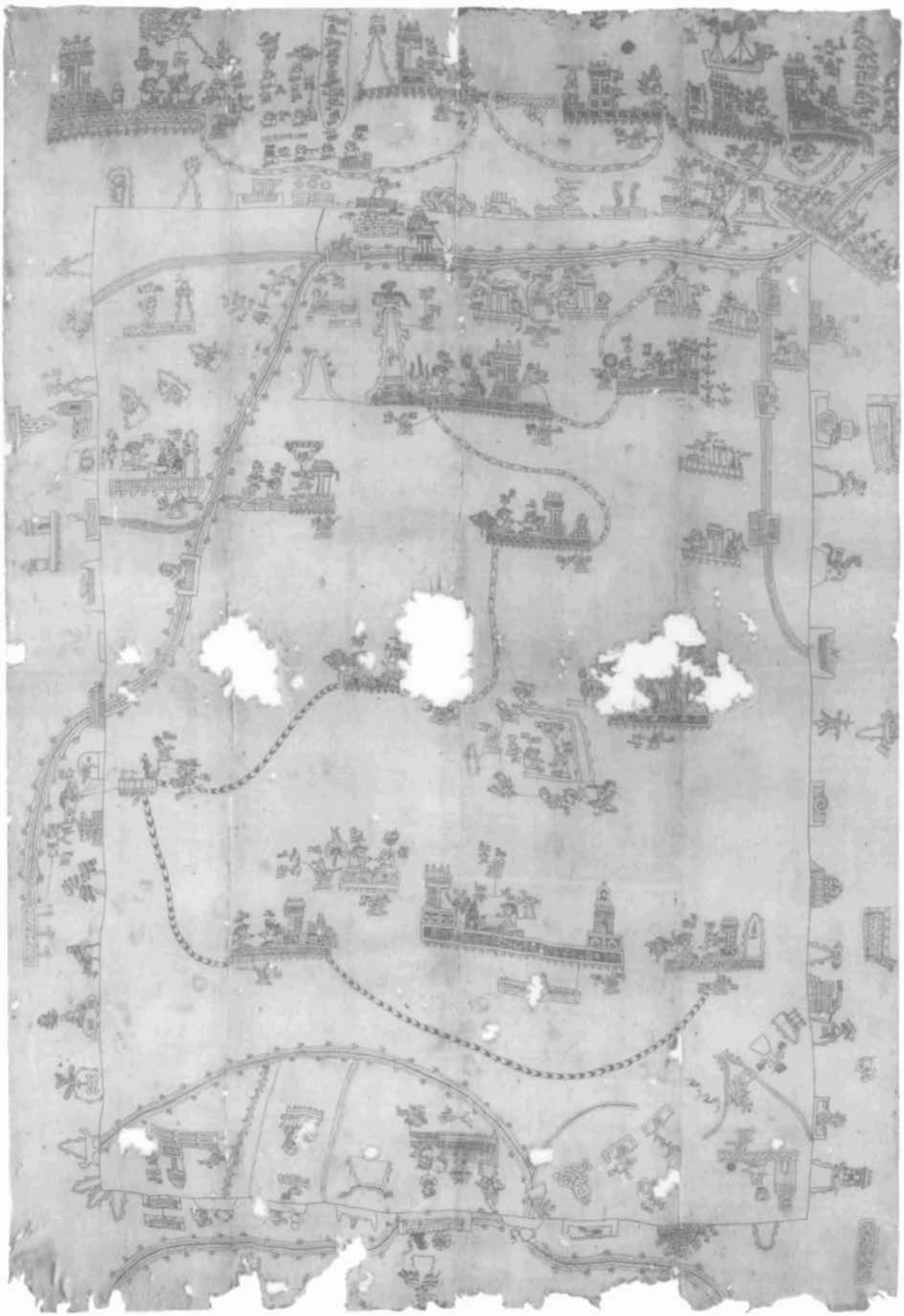


FIG. 5.12. CROCODILIAN EARTH MONSTER. In this representation from a preconquest ritual almanac (Codex Borgia, p. 71), the earth receives an offering of the blood of a decapitated bird. Here, as in other places, the earth is symbolized by the gaping maw of the crocodilian earth monster. Its jaws stretch so far apart that they form a flat surface, studded with hook-shaped teeth. The monster's eyes lie below, heavy lidded yet unblinking. The skin of this reptile is shown with a pattern of diamonds and dots, which serves as a shorthand for the earthly surface and is found on hill pictographs as well (compare fig. 5.9*b*).

axes. The east-west axis, the path of the sun, was the principal horizontal axis and was likely calculated by solar observation.[55] Lying perpendicular was the north-south

55. Early Mesoamericans probably knew of compasses and used them to orient ceremonial sites, but there is little evidence that they were used in mapmaking. See Robert H. Fuson, "The Orientation of Mayan Ceremonial Centers," *Annals of the Association of American Geographers* 59 (1969): 494–511, and John B. Carlson, "Lodestone Compass: Chinese or Olmec Primacy?" *Science* 189 (1975): 753–60.



(Facing page)
FIG. 5.13. THE LIENZO OF ZACATEPEC 1. This postconquest Mixtec *lienzo* shows a record of the history and the boundaries of the Mixtec town of Zacatepec. This large cloth sheet was painted ca. 1540–60 in Zacatepec and held in community hands until the end of the nineteenth century. Much of the *lienzo*'s content concerns the genealogy of Zacatepec's rulers. The top register of the *lienzo* is not cartographic; it shows a sequence of five platforms that represent different community kingdoms. Each platform bears a hieroglyphic place-name and a ruler or ruling couple. A path, marked by conventional footprints, loops between them, looking like a scalloped fringe. This is the path of a man named 11 Tiger, who would be the first ruler of Zacatepec, as he journeys from place to place, perhaps in a ritual of accession or confirmation. The son of 11 Tiger, 8 Crocodile, and his wife 13 Wind, are the first of the dynasty to be shown seated at Zacatepec. The hieroglyphic place-name of the town is shown at the top center of the *lienzo,* marked by a tall hill symbol topped with a zacate tree (see fig. 5.20 below). In contrast to the row of places at the top of the manuscript, Zacatepec is set in cartographic space. Surrounding it, on an inscribed rectangle, are the hieroglyphic place-names that mark Zacatepec's boundaries. The place-names falling outside the boundary are those of communities adjacent to Zacatepec, set on the sheet to correlate with their arrangement in space. Thus the *lienzo* shows not only the physical space that Zacatepec occupies, but also the historical events that led to the creation of Zacatepec and the definition of its territory. The subject matter and conventions of this map and other Mixtec *lienzos* link them closely to the Mixtec historical screenfolds. However, artists who painted screenfolds were confined by the narrow registers and strict reading order that ruled most manuscripts; in contrast, the large format of the cloth sheets used to make *lienzos* allowed them to show spatial arrangements.
Size of the original: 325 × 225 cm. Photograph courtesy of the Instituto Nacional de Antropología e Historia, Museo Nacional de Antropología, Mexico City (35-63).

axis. In addition, a vertical axis ran through the layers of the Upperworld and Underworld.[56]

Each of the cardinal directions was associated with a particular color and particular years in the fifty-two-year "century." Different Mesoamerican cultures (and sources) assigned different colors to the directions and years (table 5.4).[57] These directional schemes and colors were most often expressed in cosmographical maps and calendars. Maps were sometimes oriented with east at the top, but this was hardly standard across Mesoamerica. Often a map would have no "top," being meant to be read from all sides. An overriding organizational principle for terrestrial maps was the opposition between center and periphery. This principle, more than directionality, ordered the location of elements on maps.

TABLE 5.4 Year Bearers and Colors Associated with Cardinal Directions, Central Mexico and Maya

	Central Mexico		Maya	
Direction	Year Bearer	Color	Year Bearer	Color
East	Acatl	Red	Kan	Red
North	Tecpatl	Yellow	Muluc	White
West	Calli	Blue	Ix	Black
South	Tochtli	Green	Cauac	Yellow

MENSURATION

A limited known group of terrestrial maps of small areas was drawn to an absolute scale, using a system of mensuration and notation of measurement. Many property plans from the Valley of Mexico are carefully annotated with numerical measurements corresponding to the native *quahuitl* (about 2.5 m) and with measurements, thought to be fractions thereof, whose length varied from region to region.[58] These other measures were based on human proportions; most common was the *cemmatl* (meaning "one arm" or "one hand" in Nahuatl), which many scholars have found to measure about 1.67 meters, and which probably was thought of as the distance from the foot to the raised hand. Other measurements used by Nahuatl speakers included the *cemmitl* (one arrow), symbolized by an arrowhead, the *cenyollotli* (one heart), symbolized by a heart, and the *omitl* (one bone), symbolized by a bone. Ropes knotted at intervals were probably used to measure *quahuitl.*

Postconquest maps and property documents attest to a concern with precise mensuration, not only because Mesoamericans owned property and wanted to know its

56. This axis may have run along the earth's polar axis. See David A. Freidel, Linda Schele, and Joy Parker, *Maya Cosmos: Three Thousand Years on the Shaman's Path* (New York: William Morrow, 1993).

57. Anthony F. Aveni, *Skywatchers of Ancient Mexico* (Austin: University of Texas Press, 1980), 135, and John Eric Sidney Thompson, *Sky Bearers, Colors and Directions in Maya and Mexican Religion,* Carnegie Institution of Washington Contributions to American Archeology, vol. 2, no. 10 (Washington, D.C.: Carnegie Institution of Washington, 1934), 209–43.

58. See studies of the Oztoticpac Lands Map of ca. 1540 (and mention of the related Humboldt Fragment 4): Howard Francis Cline, "The Oztoticpac Lands Map of Texcoco, 1540," *Quarterly Journal of the Library of Congress,* 1966, 77–115, reprinted in *A la Carte: Selected Papers on Maps and Atlases,* comp. Walter W. Ristow (Washington, D.C.: Library of Congress, 1972), 5–33, and H. R. Harvey, "The Oztoticpac Lands Map: A Reexamination," in *Land and Politics in the Valley of Mexico: A Two Thousand Year Perspective,* ed. H. R. Harvey (Albuquerque: University of New Mexico Press, 1991), 163–86. See also Barbara J. Williams, "Mexican Pictorial Cadastral Registers: An Analysis of the Códice de Santa María Asunción and the Codex Vergara," in *Explorations in Ethnohistory: Indians of Central Mexico in the Sixteenth Century,* ed. H. R. Harvey and Hanns J. Prem (Albuquerque: University of New Mexico Press, 1984), 103–25. On Aztec measuring systems, see Victor M. Castillo F., "Unidades nahuas de medida," *Estudios de Cultura Náhuatl* 10 (1972): 195–223, and Lockhart, *Nahuas after the Conquest,* 144–46 (note 49). Few studies treat property maps from the Mixtec regions.

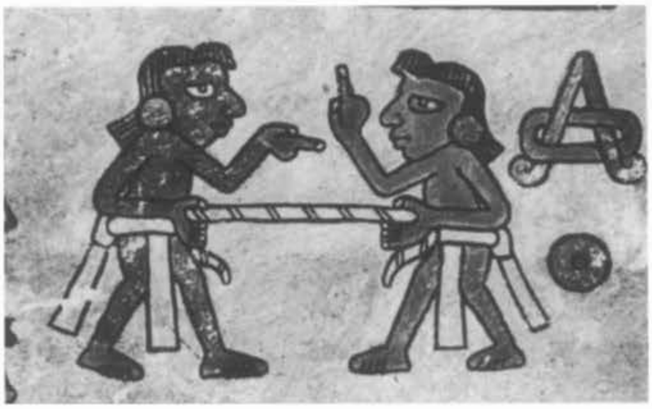


FIG. 5.14. DETAIL OF A RITUAL MEASURING FROM THE CODEX VIENNA. This drawing from the pre-Hispanic Mixtec Codex Vienna shows two unnamed and uncostumed figures as they stretch a rope between them. The pair could be engaged in mundane land measurement, but the context makes this unlikely. They are shown in the part of the codex that describes a creation of the world and subsequent ordering of the earth's surface, so their task seems to be a ritual measurement at the beginning of the world. This illustration is one of the few preconquest pictures relating to mensuration. Taken together with colonial descriptions of land measurement carried out with ropes, it establishes that mensuration was both a ritual and a mundane activity.
Size of the detail: ca. 4 × 7 cm. Photograph courtesy of the Österreichische Nationalbibliothek, Handschriftensammlung, Vienna (Cod. Mex. 1, p. 21).

dimensions, but also because Mesoamerican peoples seem to have associated measuring with the important task of ordering the world. The Quiché Maya creation epic, the *Popol Vuh,* begins with the creation of the world, and it is described as

> the fourfold siding, fourfold cornering,
> measuring, fourfold staking,
> halving the cord, stretching the cord
> in the sky, on the earth,
> the four sides, the four corners.[59]

In the preconquest Mixtec screenfold Codex Vienna, two figures are likewise shown measuring with ropes at the inception of the world (fig. 5.14). Through measuring property, many Mesoamericans may have been reenacting one of the acts of their creation.

Types of Mesoamerican Maps

Mesoamericans left a legacy of maps, but not a system by which to organize them. The map corpus can, however, be divided into groups by way of subject matter, a schema that can embrace all maps and has the additional advantage of showing similarities of media between map types. The relative frequencies of these map types are shown in table 5.3. This schema does, however, gloss over regional differences between maps, a subject of rich possibilities.

Cartographic Histories

Dominating the horizon of Mesoamerican cartography was the cartographic history. Communities throughout Mesoamerica made their own; each map would typically show the community's territory using hieroglyphic toponyms, with the community's own place-name lying at or near the map's center.[60] Often, near the edges of the map would be set hieroglyphic place-names of boundary markers: a line connecting them would correspond to the boundary line separating the community's landholdings from those of its neighbors. And somewhere on the map an account of the community's history would be included. Across Mesoamerica, this history had defined parameters: it was concerned with genealogies of the elite, campaigns of conquest, founding of cities, and migrations.

In taking as their subject single communities, cartographic histories captured the dominant sociopolitical unit of Mesoamerica. Autonomous community-kingdoms, called *altepetl* by Nahuatl speakers, were the norm; Mesoamericans felt a fierce attachment to their own individual polities rather than to some larger state. Community-kingdoms were ruled by a hereditary elite, and this elite was the subject of the histories contained in these maps. The community-kingdoms varied considerably in size and population; in this they are analogous to counties in the United States. For instance, the most populous *altepetl* at the time of conquest was Tenochtitlan–along with its sister city Tlatelolco, it had a population of between 250,000 and 400,000. The Mixtec community-kingdom of Texupa, although well peopled by Mixtec standards, may have had a population of about 6,500.[61]

Cartographic histories present selected truths about the communities that made them; the Mixtec scholar Mary Elizabeth Smith has compared them to modern Chamber

59. Dennis Tedlock, trans., *Popol Vuh: The Mayan Book of the Dawn of Life,* rev. ed. (New York: Simon and Schuster, 1996), 63–64.

60. Cartographic histories are often called *lienzos,* but this term is vague, describing medium rather than content. See Glass, "Survey" (note 4), for a guide to cartographic histories, and Glass and Robertson, "Census" (note 36), for an annotated list. Recent studies of cartographic histories include María del Carmen Aguilera García, "Códice de Huamantla: Estudio iconográfico, cartográfico e histórico," in *Códice de Huamantla* ([Tlaxcala]: Instituto Tlaxcalteca de la Cultura, 1984); José Luis Melgarejo Vivanco, *Los lienzos de Tuxpan* (Mexico City: Editorial la Estampa Mexicana, 1970); and Elizabeth Hill Boone, "Manuscript Painting in Service of Imperial Ideology," in *Aztec Imperial Strategies,* by Frances Berdan et al. (Washington, D.C.: Dumbarton Oaks, 1993), 181–206.

61. Charles Gibson, *The Aztecs under Spanish Rule: A History of the Indians of the Valley of Mexico, 1519–1810* (Stanford: Stanford University Press, 1964), 378; Ronald Spores, *The Mixtecs in Ancient and Colonial Times* (Norman: University of Oklahoma Press, 1984), 96; and Bruce E. Byland, "Political and Economic Evolution in the Tamazulapan Valley, Mixteca Alta, Oaxaca, Mexico: A Regional Approach" (Ph.D. diss., Pennsylvania State University, 1980).

of Commerce maps, showing the rosy picture the community wanted to present.[62] Thus cartographic histories resist judgment by what we might consider objective standards. For example, the physical expanse of a community-kingdom would be difficult to measure using its cartographic history. The hieroglyphic place-names are usually shown at the edges of the map rather than plotted on a grid. The size of the map, in proportion to the territory depicted, varies with each example. And the history, written by the elites in control, shows what they wanted to be made known.

One representative cartographic history, in the post-conquest book the Historia tolteca-chichimeca of 1547–60, emphasizes the boundaries and the history of one *altepetl* (fig. 5.15). This map shows Cuauhtinchan, a community kingdom in the modern state of Puebla. The pictographic place-name of Cuauhtinchan, "Place of the Eagle," lies in the center of the paper pages, where an eagle stands inside a cave mouth.[63] Place-names, most of them comprising the hill pictograph, line the edges of the map, representing the names of Cuauhtinchan's boundary markers that separated it from neighboring *altepetl*. Although the sequence of these hieroglyphic place-names correlates with Cuauhtinchan's boundaries, their placement on the map does not correspond exactly to the location of those boundaries on the ground.[64] The area delimited by these boundaries has been plotted on a modern map, and it covers a region in central Puebla that is a rough polygon about ninety kilometers across (fig. 5.16).

Upon this map of territory, a historical narrative is projected, like a movie on a screen. A group of recently arrived Nahuatl speakers is shown conquering the indigenous population of the region; each local leader, flanking the place-name of his town, has been sacrificed. Eight at right and center have arrows piercing their necks; two others, at lower left and upper right, are stretched on frames and shot through with arrows. In the midst of their conquests, victorious leaders surveyed their boundaries. Their activities are marked on the map by a string of footprints, as if left in their wake.

The Codex Xolotl is one of the earliest extant cartographic histories, dating to about 1542.[65] It is one of the few such works to survive from the Valley of Mexico (fig. 5.17), one of many map histories that must have been made in all the different *altepetl* of the valley.[66] The Codex Xolotl spans ten large unbound sheets of native paper that tell in chronological sequence the history of the community-kingdom of the Acolhuas, an Aztec group. Page 1 begins with the ruler Xolotl (ca. 1150–ca. 1230), who entered the valley to found his capital in Tenayuca (plate 9).[67] Each page of the codex uses pictures, hieroglyphs, and abstract signs to recount a part of the story of Xolotl and his extended family. Through conquest or marriage, Xolotl and his family seized control of much of the valley, eventually making their capital in Texcoco. The power of this family was eclipsed after defeat by neighboring Tepanecs in 1418; it was only partly restored by their partnership in the Aztec Triple Alliance, where the Culhua-Mexica dominance was nonetheless unchallenged.

Most pages of the Codex Xolotl use as their backdrops maps of the Valley of Mexico. They are oriented to the east like many native maps, with the large valley lakes pictured in the center, their form abstracted into the shape of a hook. This series of maps delicately meters the rise and decline of city-states in the valley. For example, the city-state of Culhuacan was a major power at the time Xolotl arrived in the valley. Thus, on the first pages of the Codex Xolotl the hieroglyphic place-name of Culhuacan appears prominently. Tenochtitlan was late to emerge in valley politics, founded in 1325, and its hieroglyphic name does not appear until page 4, which covers much of the thirteenth and early fourteenth centuries. As the size of Tenochtitlan's hieroglyphic name grows across the subsequent pages, Culhuacan's shrinks, then disappears; from historical and archaeological evidence, we know the balance of power tipped as well.[68] Thus the Codex Xo-

62. Mary Elizabeth Smith, personal communication, 1994.

63. On the Historia tolteca-chichimeca, see Kirchhoff, Odena Güemes, and Reyes García, *Historia tolteca-chichimeca,* and Reyes García, *Cuauhtinchan* (both in note 22), as well as Dana Leibsohn, "The Historia Tolteca-Chichimeca: Recollecting Identity in a Nahua Manuscript" (Ph.D. diss., University of California, Los Angeles, 1993). No cave is known to exist at the center of Cuauhtinchan (Dana Leibsohn, personal communication, 1994). The cave is probably incorporated into Cuauhtinchan's place-name because caves in Mesoamerica were often sites of origin myths.

64. Kirchhoff, Odena Güemes, and Reyes García, *Historia tolteca-chichimeca,* esp. map 7. The same general point is made by Robertson, *Mexican Manuscript Painting,* 180 (note 30).

65. See commentary and reproduction by Charles E. Dibble, ed., *Códice Xolotl,* 2d ed., 2 vols. (Mexico City: Instituto de Investigaciones Históricas, Universidad Nacional Autónoma de Mexico, 1980).

66. There seem to have been different versions of the Xolotl story. Pages i bis and ii bis were probably part of another codex, also post-conquest, that told the Xolotl story (Dibble, *Códice Xolotl,* 1:12 and 46). Yet another version of Acolhua migration and settlement is recorded in the Mapa Quinantzin of ca. 1542–48, now in the Bibliothèque Nationale, Paris. For color reproductions, drawing, and description of the Mapa Quinatzin, see Pasztory, *Aztec Art,* 202–4, color pls. 39 and 40, and pl. 152 (note 36).

67. Xolotl's story was written out by the colonial historian Ixtlilxochitl, who seems to have used the Codex Xolotl as a source for this history. See Fernando de Alva Ixtlilxochitl, *Obras históricas,* 4th ed., 2 vols., ed. Edmundo O'Gorman (Mexico City: Universidad Nacional Autónoma de México, 1985). Ixtlilxochitl dates Xolotl's entry into the valley to the tenth century, but Dibble assigns the thirteenth-century date (Dibble, *Códice Xolotl,* 1:122 [note 65]). However, at least one archaeologist has argued that the earlier date of Xolotl's entry better fits the archaeological record: Jeffrey R. Parsons, "An Archaeological Evaluation of the Codice Xolotl," *American Antiquity* 35 (1970): 431–40.

68. On the history of the valley, see Nigel Davies, *The Aztecs: A History* (London: Macmillan, 1973; reprinted Norman: University of

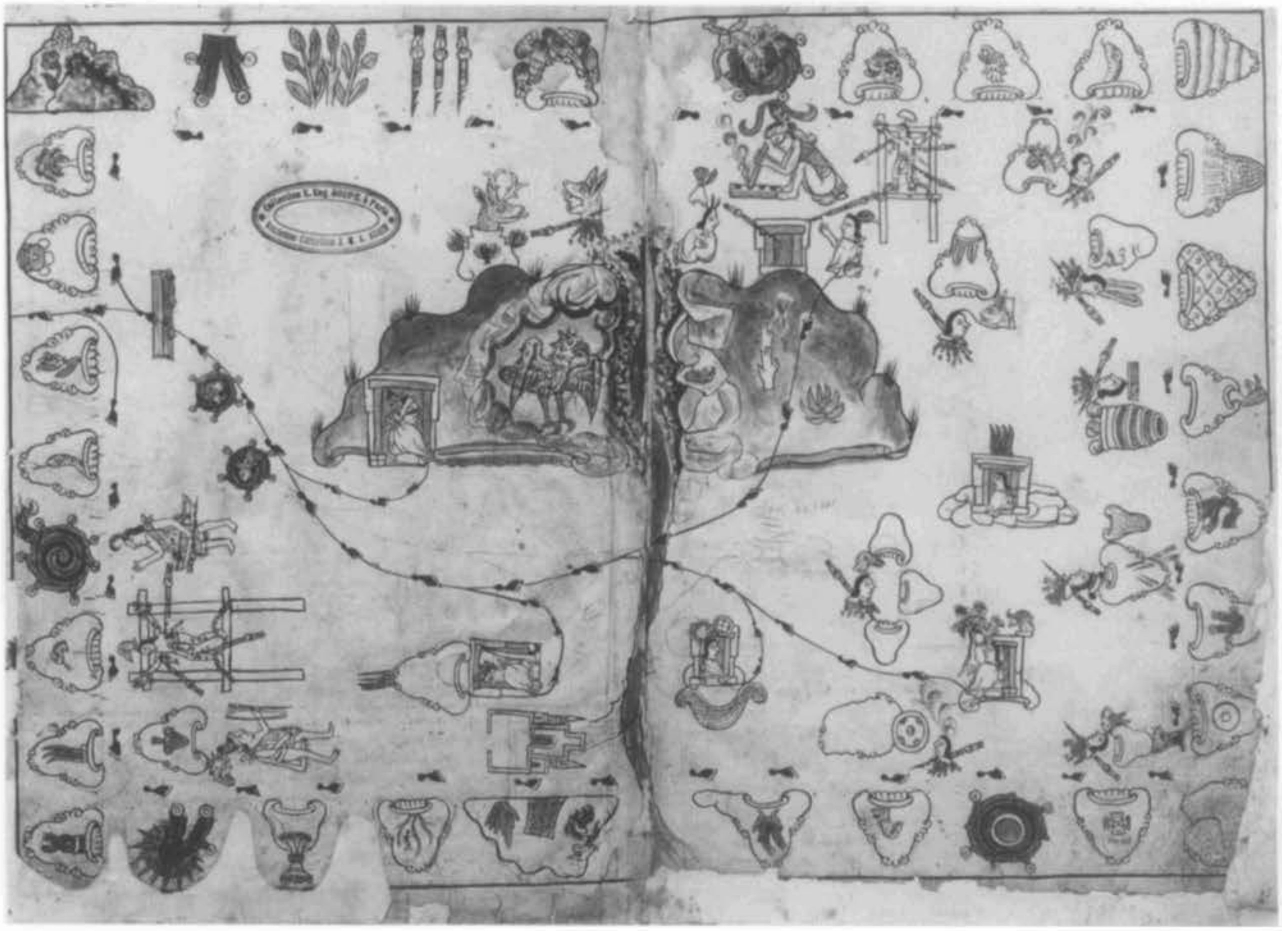


FIG. 5.15. CUAUHTINCHAN IN THE HISTORIA TOLTECA-CHICHIMECA. This map of the community-kingdom of Cuauhtinchan shows both the territory claimed by the people of Cuauhtinchan and the history of its possession. At its center is an elongated hill symbol; the left half is open, like a cave, and contains an eagle (*cuauhtli* in Nahuatl) to stand for the name Cuauhtinchan, "Place of the Eagle." The cave is unknown in Cuauhtinchan and probably is a conventional visual metaphor meaning "place of origin." The edges of the map are lined by the hieroglyphic place-names standing for the boundaries of Cuauhtinchan's territories with those of its neighbors. Almost all of these include the hill pictograph, either to stand for the Nahuatl word *tepetl* or as a marker for a more generalized idea of place. The boundaries pictured on these pages outline an area of about five thousand square kilometers in the modern Mexican state of Puebla, shaped roughly like a kite. The rhythmic arrangement of boundaries in a rectangular format adheres more to artistic convention than to the planimetry of the boundaries shown.

The land is shown after its conquest by Cuauhtinchan leaders, and footprints order the postconquest narrative. We begin at the middle of the left border, as footprints are shown entering the bounded region. This is the path of the five Cuauhtinchan leaders as they circumambulated these lands after waging war on the inhabitants. After making a counterclockwise circuit, they each took possession of the sacrificed former leaders' lands by occupying their palaces, thus cementing their claim to the region.
Size of the original: 30 × 44 cm. Photograph courtesy of the Bibliothèque Nationale, Paris (46-50, fols. 32v–33r).

lotl's maps are not strictly geographical reckonings but are closely keyed to political changes in the valley during the course of the history.

The Codex Xolotl is a traditional cartographic history, yet it is one broadcast at enormous volume in that it embraces a huge region–much larger than most cartographic histories show. It adheres to convention by including a boundary map on its first page. Along the edges of this page, now sadly deteriorated, lie hieroglyphic place-names representing cities and mountain peaks. Planimetrically, they form a rough loop about 240 kilometers in diameter in whose middle lies the Valley of Mexico (fig. 5.18). These bounding places, according to the seventeenth-century historian Ixtlilxochitl, were visited by Xolotl during a ritual perambulation of the limits of the region he was one day to control.[69] The Codex Xolotl commemorates his walk by showing Xolotl's

Oklahoma Press, 1980). The archaeological history of the valley is covered in William T. Sanders, Jeffrey R. Parsons, and Robert S. Santley, *The Basin of Mexico: Ecological Processes in the Evolution of a Civilization* (New York: Academic Press, 1979).

69. Ixtlilxochitl, *Obras históricas,* 1:295–96 (note 67).

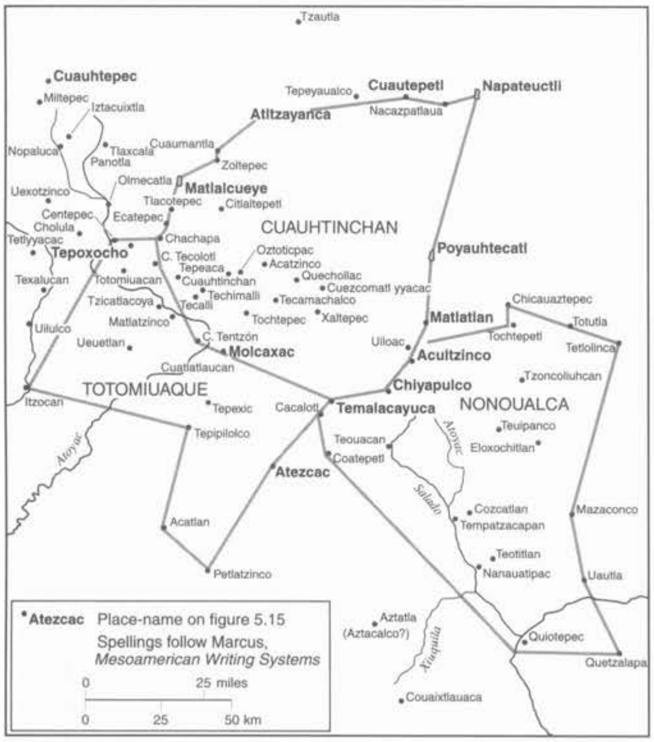


FIG. 5.16. REFERENCE MAP OF CUAUHTINCHAN LANDS. This modern map shows the historical lands of the people of Cuauhtinchan, the same regions shown in the boundary map of the Historia tolteca-chichimeca (fig. 5.15). These lands lie to the southeast of Cholula, Puebla, in Mexico, and many modern place-names correlate with the ones rendered hieroglyphically in the manuscript. This reveals that the planimetry of Cuauhtinchan's boundaries is somewhat different from that shown on the map, but that the sequence is consistent.
After Joyce Marcus, *Mesoamerican Writing Systems: Propaganda, Myth, and History in Four Ancient Civilizations* (Princeton: Princeton University Press, 1992), 164.

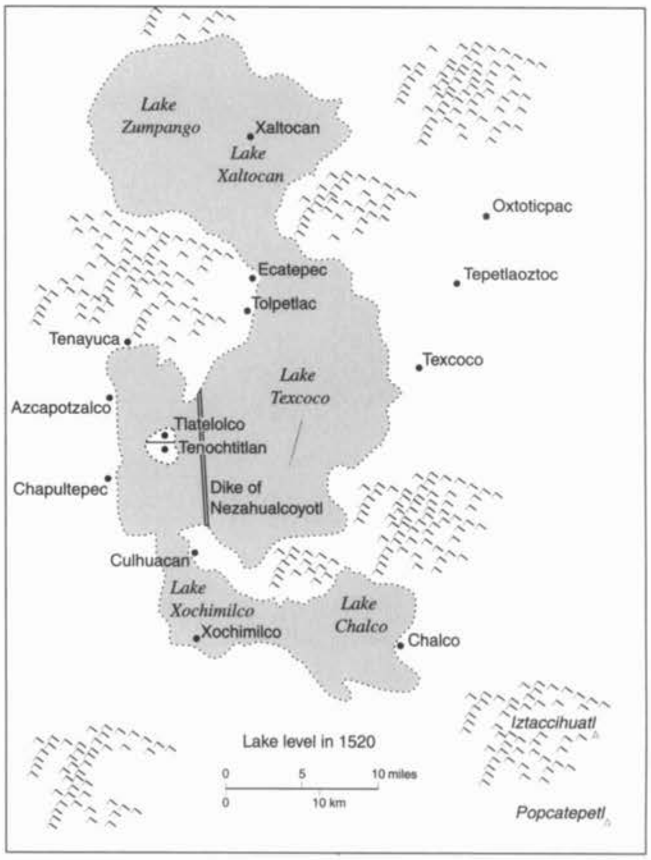


FIG. 5.17. REFERENCE MAP OF THE VALLEY OF MEXICO.

footprints threading through some of the boundary place-names, akin to the circumambulation carried out by the leaders of Cuauhtinchan in the Historia tolteca-chichimeca. This map, however, departs from convention in that the territory mapped shows more than one *altepetl;* it includes many of those that checkered the valley floor. By framing this territory with boundaries, the Codex Xolotl makes the exaggerated claim that all these *altepetl* were once subsumed and subordinate to that of the Acolhuas. Cartographic histories were, after all, efforts at self-promotion.

After it was made, this postconquest version of the Xolotl story was amended with alphabetic glosses to guide the uninitiated through the labyrinthine twists of the story. In contrast, pre-Hispanic versions of this cartographic history, none of which survive, would have relied only on the hieroglyphs, pictorial images, and signs as well as the foreknowledge of the reader-reciter. Consequently, the Xolotl map was never meant as a geographic guide for one unfamiliar with the valley. Instead, it served to anchor this story to an ancient arena: the Valley of Mexico.

Cartographic histories were made by other ethnic groups. Members of the important Coixtlahuaca group, for example, were made by speakers of Chocho and Popoluca (see fig. 5.19).[70] Mixtec speakers created the Lienzo of Zacatepec 1, a large cloth sheet (thus given the name *lienzo*) of about 1540–60 (see fig. 5.13). Hieroglyphic place-names, arranged along the edge of this large sheet, map the boundaries of the community of Zacatepec, whose hieroglyphic place-name lies in the middle of the ring (fig. 5.20). Hieroglyphic place-names of neighboring towns are shown outside this ring. Mary Elizabeth Smith, using documents and maps, has identified some of these hieroglyphic place-names; the Lienzo of Zacatepec

70. The Coixtlahuaca group comprises native-style manuscripts from the Coixtlahuaca Valley, mostly cartographic histories. See Parmenter, *Four Lienzos* (note 26); Carlos Rincón-Mautner, "A Reconstruction of the History of San Miguel Tulancingo, Coixtlahuaca, Mexico, from Indigenous Painted Sources," *Texas Notes on Precolumbian Art, Writing, and Culture,* no. 64 (1994): 1–18; and Rincón-Mautner's forthcoming dissertation, Department of Geography, University of Texas.

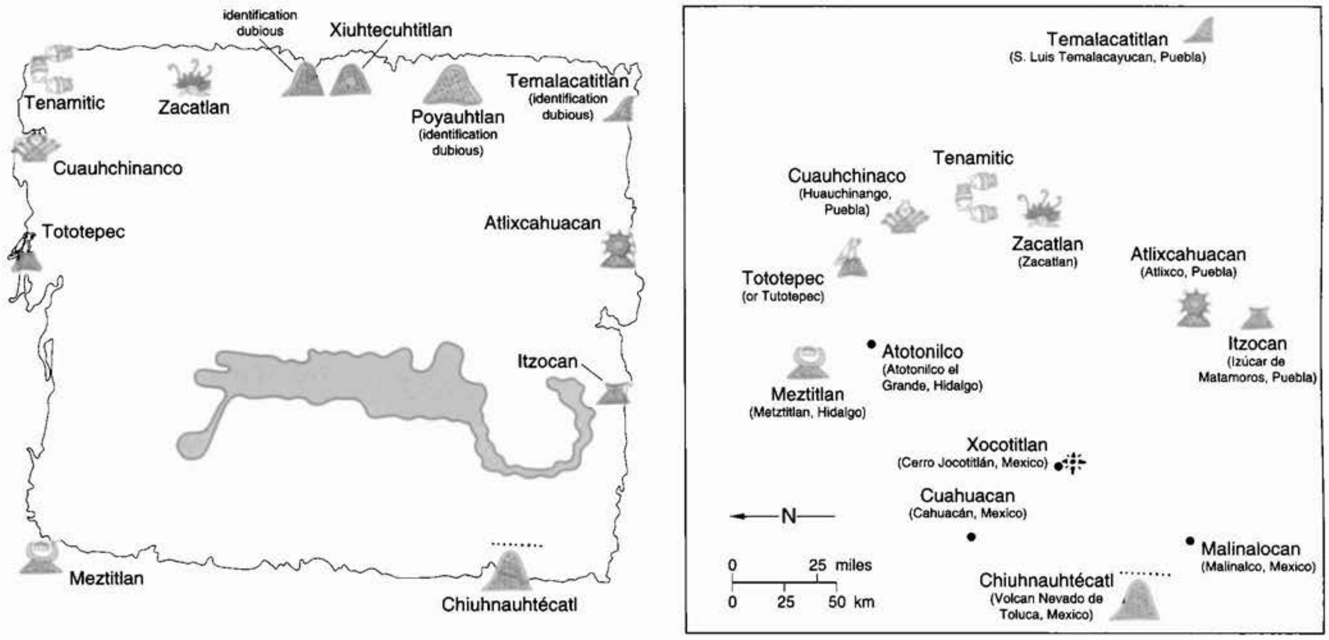


FIG. 5.18. MAP OF CODEX XOLOTL BOUNDARY HIEROGLYPHS. The exterior hieroglyphic place-names on page 1 of the Codex Xolotl limn the boundaries of Xolotl's realm in central Mexico; their placement was dictated as much by the composition of the page as by the planimetry of its subject. The left frame shows the enlarged outer border of hieroglyphic place-names found on page 1 of the Codex Xolotl (compare plate 9). The identifications of these boundary points are based on those given by the seventeenth-century mestizo historian Fernando de Alva Ixtlilxochitl. At right, the known boundaries are arranged planimetrically, following a modern map of central Mexico. The star in the center marks Tenochtitlan, and dots mark the boundary sites named by Ixtlilxochitl but not found on the codex. The comparison makes it clear that the Xolotl painter adhered to the sequence and rough orientation of boundary sites. For instance, Zacatlan does lie to the east of the valley and to the south of Tenamitic on both maps. However, the painter was unconcerned with representing absolute distances from the Valley of Mexico or the placement of sites along a scale model grid. As with many native maps, the scale decreases as one moves farther from the center.

probably describes an irregularly shaped region about twenty kilometers across.[71]

This cartographic structure is furnished with a historical narrative. The genealogy of the rulers of Zacatepec–shown by pairs of human figures–appears above and within the boundary map established by the ring of place-names.[72] The *lienzo* shows three generations of Zacatepec's rulers entwined in a historical tale that begins in A.D. 1068 and leads to the foundation of the town of Zacatepec and the establishment of its territory.

The cartographic history was widespread throughout Mesoamerica, and the Mayas may have made such works as well (fig. 5.21). A rare account, recorded about 1690, describes a cartographic history written in Maya or possibly a neighboring language, Pibil.[73] This Maya or Pibil map seems to have resembled its central Mexican counterparts, for it reportedly combined a map of territory with a history of its possession. However, this map is known only through a description, and no examples survive to answer the question of the existence of a Maya cartographic history.

The presence or absence of a cartographic history is just one of the many puzzles that surround the subject of Maya maps. In central Mexico, the many postconquest maps that exist allow us to postulate large numbers of preconquest counterparts. The Spanish conquest hit when the Aztec empire was in full glory, so we have scores of written records and maps that vividly capture the preconquest Aztecs. But the Maya case is different. Few Maya maps survive to tell us of the qualities and breadth

71. The Lienzo of Zacatepec 1 has been studied by Smith (*Picture Writing*, 89–121 [note 25]), and her analysis is the basis for the following discussion.

72. The historical narrative overlying the map may have been drawn from a screenfold manuscript, for it is read in boustrophedon fashion–from left to right then right to left, moving up or (as in this case) down the registers of the page, a reading order shared by some Mixtec screenfolds (Smith, *Picture Writing*, 10, 93, fig. 1). A further connection between this *lienzo* and screenfolds comes with one of the figures in the historical narrative, a man named 4 Wind, who is also an actor in four of the pre-Columbian-style Mixtec screenfolds; see Alfonso Caso, "Vida y aventuras de 4 Viento 'Serpiente de Fuego,'" in *Miscelánea de estudios dedicados a Fernando Ortíz*, 3 vols. (Havana, 1955–57), 1:289–98, and idem, *Reyes y reinos*, 1:137–44 (note 18).

73. Francisco Antonio de Fuentes y Guzmán, *Recordación Florida*, 3 vols., Biblioteca "Goathemala" de la Sociedad de Geografía e Historia, vols. 6–8 (Guatemala City, 1932–33), 2:107–8 (pt. 2, bk. 2, chap. 11).

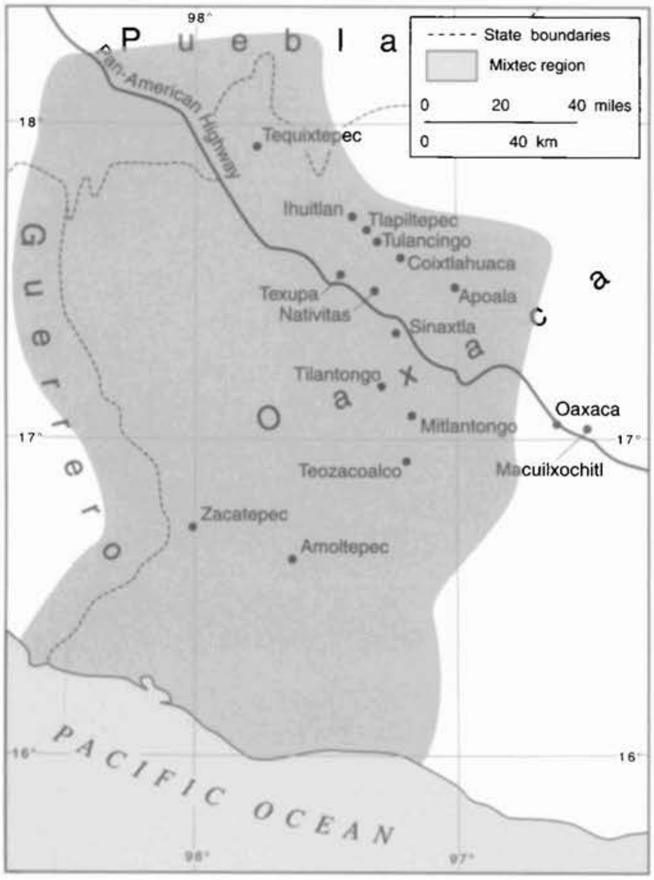


FIG. 5.19. REFERENCE MAP OF MIXTEC REGION.

FIG. 5.20. DETAIL OF THE PLACE-NAME OF ZACATEPEC FROM THE LIENZO OF ZACATEPEC 1. The place-name of Zacatepec is bilingual, expressing both that town's Nahuatl name (Zacatepec, meaning Hill of the Zacate Plant) and its Mixtec one (*yucu satuta,* meaning Hill of Seven Waters). The smaller Nahuatl toponym, at left, shows a hill sign sprouting with zacate plants. A thin black line extends from its base connecting it to the Mixtec toponym, lying at center. Taller and more prominent, it contains within it the symbol for the day sign "water," connected to seven dots. The Mixtec toponym sports some unusual and notable features. The hill sign is marked on its base with an open-mawed earth monster, and on top with a double-faced bird head and a three-branched tree. This combination of monster, bird, and tree is also a feature of cosmographical maps (compare fig. 5.40 below).
Size of the detail: ca. 31 × 66 cm. Photograph courtesy of the Instituto Nacional de Antropología e Historia, Museo Nacional de Antropología, Mexico City (35-63).

of their mapping tradition. And the great classic Maya civilization collapsed sometime in the ninth century, so it was at great remove from the collective memory some seven centuries later. The Maya scholar John Eric Sidney Thompson argued for a wide array of preconquest Maya maps, but the secondhand accounts of colonial maps he was able to marshal offer unsteady support for his hypothesis.[74]

A recent study offers a plausible reason for the paucity of Maya terrestrial maps, suggesting that the Mayas, with their textual writing–that is, writing that organized hieroglyphs into blocks of text–primarily recorded territory and history in a textual format, making graphic forms secondary.[75] The map of the boundaries of the Maya province of Maní is a second- or, more likely, third-generation copy made in 1596 from a 1557 original. In it, boundary markers (platforms topped with Christian crosses) are all set on the outside of a double circle, oriented to the east (fig. 5.22). In the zone between the circles, the names of the boundaries are written in alphabetic script; having a partly syllabic script themselves, the Mayas were quick to adapt the alphabetic script brought by the Spanish. In the interior of the circle, Maya towns are marked with symbols of churches and likewise named.[76]

If the Maní map were more like a central Mexican cartographic history, we would expect the history associated with the map to be written–with pictures, hieroglyphs, and symbols–right on the map's surface. Instead, it is recounted in accompanying documents written in alphabetic script. These tell how the high lord, the *halach uinic* Don Francisco de Montejo Xiu (fl. ca. 1557), gathered with other nobles from both within and outside his province of Maní to agree on and consecrate boundaries.[77] In her detailed study of the Maní maps and documents, Frauke Johanna Riese has found the map to be wholly ancillary–a secondary version of the information contained in the text. From the documents–not the map–we learn that Don Francisco then traveled with certain of the nobles around the limits of the province of

74. Thompson, *Dresden Codex,* 9 (note 5).

75. Frauke Johanna Riese, *Indianische Landrechte in Yukatan um die Mitte des 16. Jahrhunderts: Dokumentenanalyse und Konstruktion von Wirklichkeitsmodellen am Fall des Landvertrages von Mani* (Hamburg: Hamburgisches Museum für Völkerkunde, 1981), 175–77.

76. For discussion and reproduction of the Maní map and another noncircular copy, along with associated documents, see Roys, *Indian Background,* 175–94 and figs. 1–3 (note 8). These maps are discussed and their prototypes reconstructed by Riese, *Indianische Landrechte.*

77. Roys, *Indian Background,* 185–86.

FIG. 5.21. REFERENCE MAP OF MAYA REGION.

(*Facing page*)
FIG. 5.22. THE MAP OF THE PROVINCE OF MANÍ, 1596. A copy of a now-lost Maya boundary map, this map of Maní is one of the few Maya maps known from the colonial period. It is heavily influenced by Spanish conventions: the town of Maní (center) is represented by a Catholic church and identified by an alphabetic gloss. Radiating out from Maní are other towns in its jurisdiction, most of them identified by churches and alphabetic glosses. The entire province of Maní is ringed by a boundary represented as a double circle, and this circular format seems to be an indigenous one, for examples of it are found throughout Mesoamerica. On the outside of the circle, rectangles topped with crosses likely represent the actual boundary markers–stone piles with crosses. On the inner circle, the names of these boundaries appear. Although some of these boundaries were settlements, others were probably topographic features, like trees or springs. Modern scholars have correlated many of these boundary names to sites on the Yucatan Peninsula around Maní, and they form a rough oval with an east-west axis of about seventy kilometers and a northwest one of about one hundred kilometers. The town of Maní lies within this oval, slightly to the northeast of its center.
Size of this copy: 41 × 31 cm. Photograph courtesy of the Latin American Library, Tulane University, New Orleans.

Maní to consecrate these boundaries. This account of perambulation is like the graphically rendered footprints we saw in the Historia tolteca-chichimeca and the Codex Xolotl (fig. 5.15 and plate 9), but it is strictly confined to the text rather than set on the map.[78]

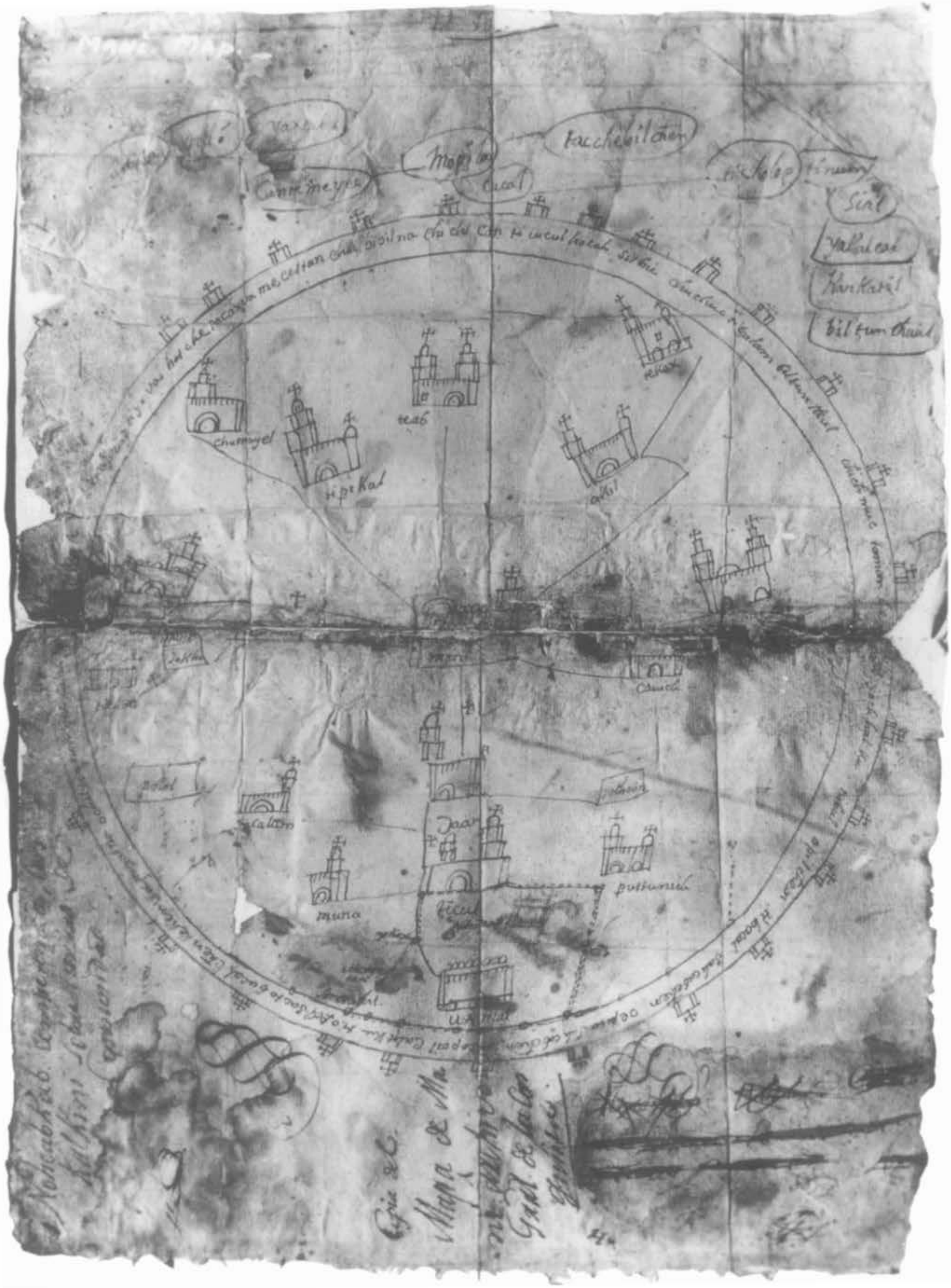
The primacy of the alphabetic text distances the map of Maní from the tradition of cartographic histories; its circular format brings it closer to other Mesoamerican maps. Circular cartographic histories and boundary maps were made across Mesoamerica. Although a rectangular format is more common, perhaps because the media of maps were usually rectangular, a number of such maps are circular; the description of Maya maps as *pepet dz'ibil* (circular paintings or writings) suggests that many Maya maps may have been circular. A map of Sotuta, a province adjoining Maní, shows the boundaries of this province arranged in a circular format, as does a schematic map (without boundaries) of towns in the northern Yucatan.[79] In addition, a 1579 map from Tabasco, though drawn by a European, is also circular and may have been based on Maya convention.[80] Two Mixtec maps made in the 1580s, one in Teozacoalco and one in Amoltepec, are circular maps, their rings defined by pictographic place-names of Teozacoalco's and Amoltepec's boundaries (figs. 5.23–5.25); much later, in the eighteenth century, the circular format of Mixtec boundary maps resurfaced in a schematic map made in San Andres Sinaxtla.[81] An Aztec example, the Mapa circular de

78. Riese, *Indianische Landrechte* (note 75).

79. A drawing of the Sotuta map is reproduced in Ralph Loveland Roys, *The Titles of Ebtun* (Washington, D.C.: Carnegie Institution, 1939), 9. The map of northern Yucatan is discussed and a drawing is provided in Ralph Loveland Roys, trans., *The Book of Chilam Balam of Chumayel* (Washington, D.C.: Carnegie Institution, 1933), 125.

80. This map is reproduced, with a translation of the glosses, in France Vinton Scholes and Ralph Loveland Roys, *The Maya Chontal Indians of Acalan-Tixchel: A Contribution to the History and Ethnography of the Yucatan Peninsula,* 2d ed. (Norman: University of Oklahoma Press, 1968), 16, map 2.

81. Both Amoltepec and Teozacoalco maps are cataloged by Donald Robertson, "The Pinturas (Maps) of the Relaciones Geográficas, with a Catalog," in *Handbook of Middle American Indians,* vol. 12, ed. Howard Francis Cline (Austin: University of Texas Press, 1972), 243–78. See Caso, "El Mapa de Teozacoalco" (note 18); Barbara E. Mundy, *The Mapping of New Spain: Indigenous Cartography and the Maps of the Relaciones Geográficas* (Chicago: University of Chicago Press, 1996), 112–17; and Ferdinand Anders, Maarten E. R. G. N. Jansen, and Gabina Aurora Pérez Jiménez, *Crónica mixteca: El rey 8 Venado, Garra de Jaguar, y la dinastía de Teozacualco-Zaachila, libro explicative del llamado Códice Zouche-Nuttall, MS. 39671 British Museum, Londres* (Mexico City: Fondo de Cultura Económica; Graz: Akademische Druck- u. Verlagsanstalt, 1992), for a current account of the map's hieroglyphic toponyms. The San Andres Sinaxtla map is listed in Glass and Robertson, "Census," 198 (no. 291) (note 36).


Chumayel
teab
tipikal
muna
Sisal

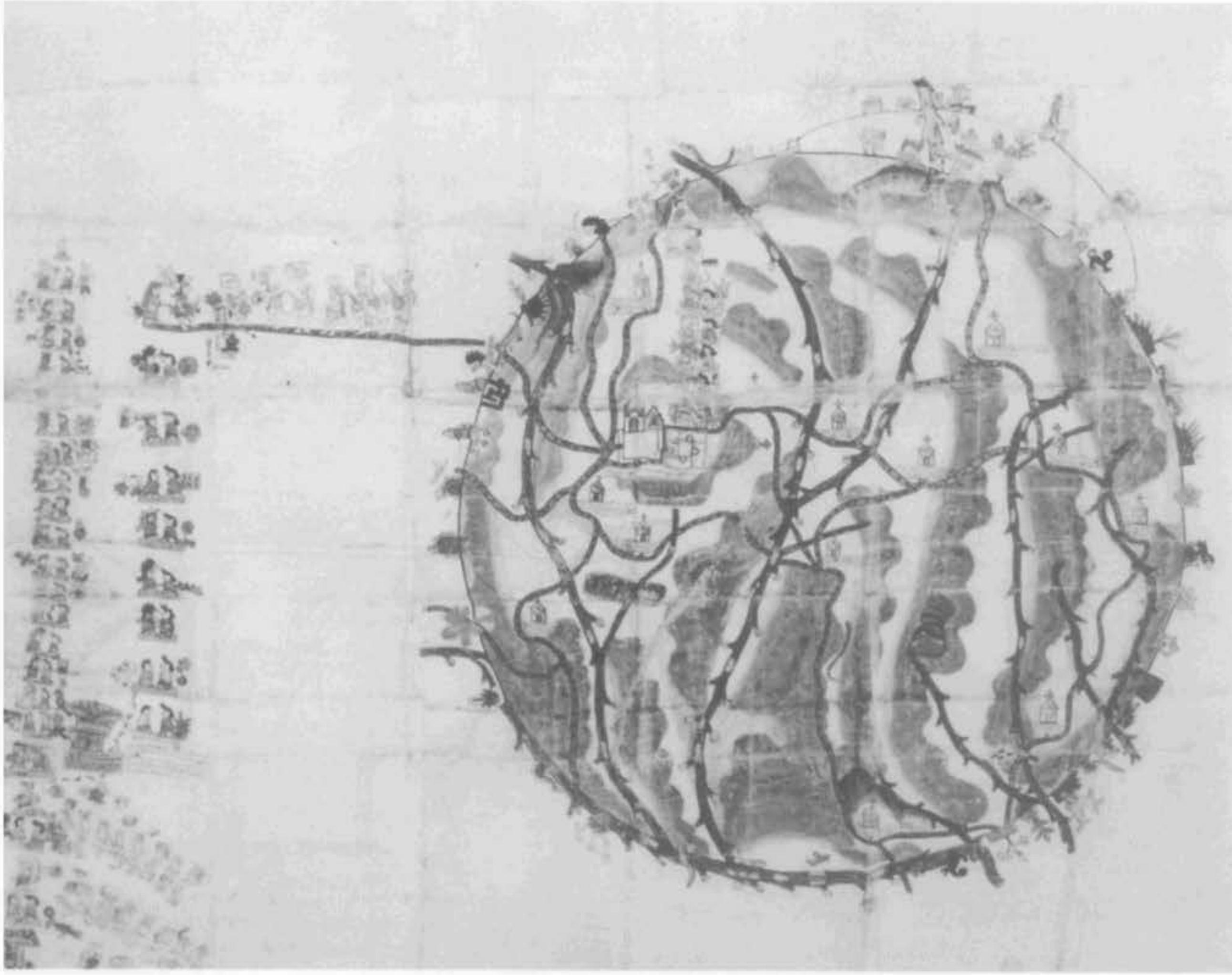


FIG. 5.23. RELACIÓN GEOGRÁFICA MAP OF TEOZACOALCO. This manuscript map was made in a small Mixtec town in 1580, one of many such community maps commissioned by the Spanish king, Philip II. It shows the territory controlled by Teozacoalco as a large circle defined by Teozacoalco's boundaries with its neighbors; this ring encloses a vivid topographical map of the region. The map oscillates between European and Mesoamerican mapping traditions. It is quite large, much like Mixtec community histories painted on cloth, yet the Teozacoalco map is made out of twenty-three sheets of European paper pasted together at their edges. The circular format of the map connects it to the indigenous tradition, yet its painter was undoubtedly exposed to conventions of European maps and landscape paintings. Within the circle, Teozacoalco and its subject towns are each designated by Catholic churches and set within an elaborate European-style landscape of undulating hills. In many respects, the European elements are just filler; at its heart the map mirrors indigenous cartographic traditions. True to the requirements of cartographic histories, the map includes a genealogical record of the rulers of Teozacoalco and another town, Tilantongo, who supplied Teozacoalco with its ruling caste. This genealogy is shown by columns of human figures that can be seen to the left of and within the circular map; it begins in the tenth century and ends with a postconquest ruler of Teozacoalco. The inscribed circle defining Teozacoalco's territory is studded with forty-six hieroglyphs that refer to the names of Teozacoalco's boundaries. The crescent-shaped hump at the upper right of the map is also lined with hieroglyphic place-names; these mark a former set of boundaries. The correlation of the Teozacoalco map with a modern map can be seen in figure 5.24.
Size of the original: 142 × 177 cm. Photograph courtesy of the Nettie Lee Benson Latin American Collection, University of Texas, Austin (JGI xxv-3).

Cuauhquechollan, also exists.[82] Thus the circular map was made throughout Mesoamerica and is, in my view, wholly indigenous in origin.[83]

Purpose and Contexts

We know that a large number of Mesoamerican commu-

82. The Mapa circular de Cuauhquechollan is described and reproduced in Glass and Robertson, "Census," 117 (no. 90) and fig. 34 (note 36).

83. Smith (*Picture Writing,* 166 [note 25]) points to the possible influence of European T–O maps on native artists, such maps being well known to the Aztec artists illustrating Sahagún's Codex Florentine. Smith describes the format as "a European import," while Robertson thinks the circular form "had Pre-Conquest antecedents" (*Mexican Manuscript Painting,* 180 [note 30]). I argue in support of Robertson's

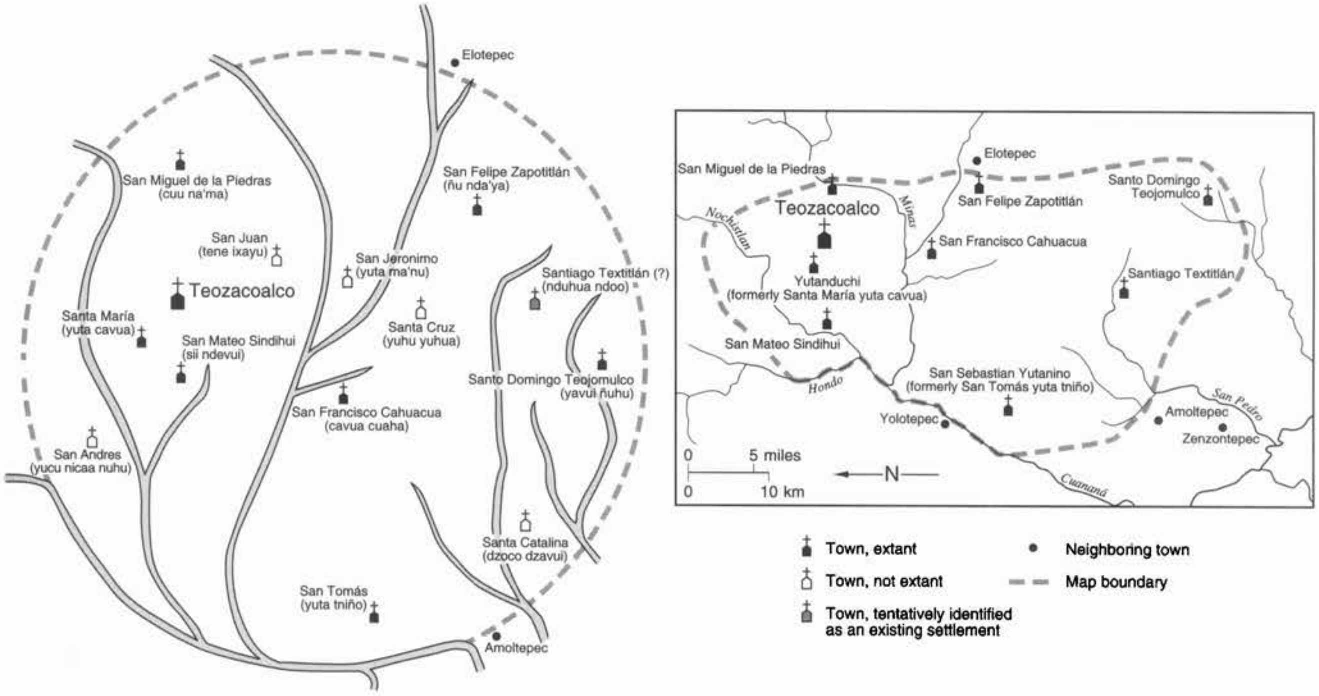


FIG. 5.24. COMPARISON OF THE TEOZACOALCO REGION AND THE RELACIÓN GEOGRÁFICA MAP OF TEOZACOALCO. On the left is the topography of the Relación geográfica map of Teozacoalco (see fig. 5.23), and on the right is a modern map of the region. Mixtec names are shown in parentheses.

nities held cartographic histories because many survive today. These maps functioned on two levels, their cartographic information playing an instrumental role in a community's dealings with other communities, and their historical component defining relations among community members.

The extracommunal role of community maps is clear. Since Mesoamerican peoples held most land communally,[84] the fields, watersheds, and forests that boundaries fenced in were the source of both their subsistence and their wealth; boundaries were carefully guarded for good reason. Border disputes between communities flared both before and after the conquest, and a detailed map of boundaries not only reminded a community of its own holdings but served as a kind of legal title during territorial disputes with neighbors.

Before the conquest, Mesoamericans might have used maps in appeals to their region's higher political authority. After the conquest, they also used them to appeal to authorities outside the community, in this case the courts of law established by the Spanish: many indigenous maps are attached to or referred to in court records from the sixteenth century on.[85] We see a continuity of purpose in the two versions of the Lienzo of Zacatepec. The first version (fig. 5.13) is a detailed map of the boundaries of the town of Zacatepec. It was written almost entirely in Mixtec style, with hieroglyphs naming places, and no doubt was meant to be used by a wholly Mixtec audience, most likely to prove Zacatepec's claim to the territory shown. Some forty or sixty years after this *lienzo* was painted, a copy was made, but in this one the hieroglyphs were all glossed with alphabetic transcriptions.[86] This change seems to show that the new *lienzo,* called the Lienzo of Zacatepec 2, was aimed not only at Mixtecs, who would read the hieroglyphs, but also at Spaniards, who would read the alphabetic glosses and who ultimately controlled all land rights. Both these *lienzos* were brought to Mexico City to be presented as evidence before Spanish-speaking authorities in a land dispute in 1892, and it seems likely that the second *lienzo* had been made centuries earlier for a similar appeal.

Although cartographic histories were used to prove

view in Barbara E. Mundy, "The Maps of the Relaciones Geográficas, 1579–c. 1584: Native Mapping in the Conquered Land" (Ph.D. diss., Yale University, 1993), 209–10.

84. Systems of native land tenure throughout Mexico have been the subject of much study. Although the picture has grown clearer in recent years for the Valley of Mexico, it is still dim for other regions. See Lockhart, *Nahuas after the Conquest,* 141–76 (note 49), for discussion and pertinent bibliography.

85. On pre-Hispanic disputes, see John M. D. Pohl, *The Politics of Symbolism in the Mixtec Codices* (Nashville: Vanderbilt University, 1994). For postconquest suits, see Lockhart, *Nahuas after the Conquest,* 353–57 (note 49); Gibson, *Aztecs under Spanish Rule,* 268 (note 61); and Mundy, *Mapping of New Spain,* 180–211 (note 81).

86. The two *lienzos* are discussed in Smith, *Picture Writing,* 89–121 (note 25).

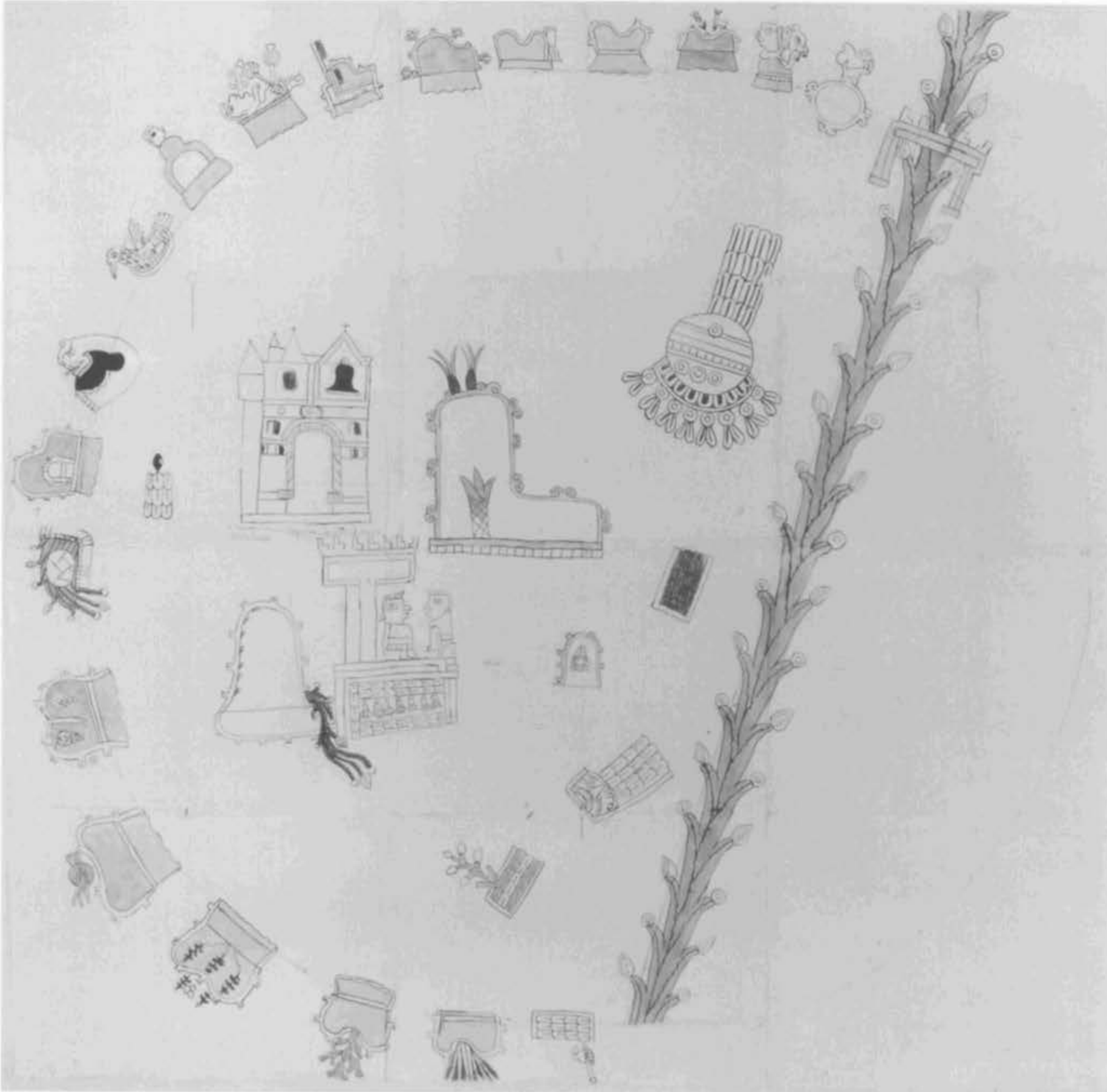


FIG. 5.25. RELACIÓN GEOGRÁFICA MAP OF AMOLTEPEC, 1580. The small Mixtec town of Amoltepec, responding to Philip II's request for a community map, produced one that is similar in many respects to that of its close neighbor, Teozacoalco. Amoltepec's boundaries are also arranged in a circular format, with nineteen hieroglyphic place-names set on an inscribed circle. This circle of boundaries is cut on the right by a river, represented as a straight line of flowing water. Within this enclosure of boundaries and river are several hieroglyphs. The toponym of Amoltepec, or *yucu nama* in Mixtec, meaning "Hill of the Soap Plant" is at the center. It is an L-shaped hill symbol that encloses a plant and also has two similar plants growing from its apex. To the left of the Amoltepec place-name lies the town's Catholic church, with its arched doorway and belfry. Below the church and hieroglyphic place-name, Amoltepec's ruling couple are shown facing each other, seated in a T-shaped palace. Unlike the Teozacoalco map, this map offers little in the way of history; the ruling couple are not named, nor is their genealogy traced.
Size of the original: 86 × 92 cm. Nettie Lee Benson Latin American Collection, University of Texas, Austin (JGI xxv-3). Photograph courtesy of Barbara Mundy.

land rights, we have scant record of how they were used within the communities that made them. Here, no doubt, the histories recorded were crucial. The histories centered on elites and often provided rationales for elite predominance; Joyce Marcus has gone so far as to call them propaganda.[87] Whether propaganda or enlightenment, *lienzo*-format cartographic histories were a means of showing this history to the community at large. The very large format of *lienzos*–the size of a bedsheet–suggests they were meant for public viewing, perhaps hung out like banners during community celebrations. In addition, the hieroglyphic, pictorial, and symbolic vocabulary used on these community histories is quite simple; the hieroglyphic toponyms and genealogies could be easily decoded by almost any member of the community. Their semipermanent medium, cloth, tells us they were not intended to last forever and thus could be recopied and updated as boundaries shifted and historical narratives changed course.

Cartographic histories in other formats may have been meant for elites only, to bolster their authority within a clique. For example, the manuscript book the Historia tolteca-chichimeca includes four intact cartographic histories telling of various groups settling around Cholula. It seems to have been painted for a local leader, Don Alonso de Casteñeda (fl. ca. 1550), to establish the antiquity and prominence of his lineage among all Cholula elites.[88]

Origins

Cartographic histories are not the only place we see a concern with elite genealogies and conquest; this was the business of historical writing throughout Mesoamerica. In fact, cartographic histories were probably an offshoot of written histories. They may have begun as pages in historical codices–painted in registers in screenfold manuscripts–and come to have a life of their own. The evidence for this origin is inferential rather than direct. First, the kind of history and the conventions of its presentation are nearly identical in many cartographic histories and screenfold histories. Both established the authority of elites through genealogy and conquest,[89] and both used the same written forms. Second, a pre-Hispanic screenfold manuscript, the Codex Nuttall, reveals pages that look like cartographic histories.[90]

The Codex Nuttall was a Mixtec history that most agree was painted before the Spanish conquest, for it shows no trace of European influence. Most of its pages are lined with figures, places, and dates arranged in registers that were read in sequence.[91] But the arrangement of page 36 is markedly different from that of most of the rest of the manuscript. It is not broken into registers. Instead, the whole page is taken up with a schematic map of the Apoala Valley, the *fons et origo* of Mixtec kingly lineages (fig. 5.26), for it was here that royal ancestors were miraculously born from a tree.[92] Figures 5.27 and 5.28 compare the toponyms and geographic features of page 36 of the Codex Nuttall with a sketch of the Apoala Valley, showing the correlations scholars have made. The open-mouthed serpent at the left edge stands for the Mixtec toponym *yahui coo maa* (Deep Cave of the Serpent), the name of a spring on the northeast edge of the valley. The central symbol within each of the two rivers pictured on the valley floor is a toponym. On the left, a hank of knotted grass within the river represents the Mixtec name *yuta ndua nama* (River of the Barranca of the Soap Plant). In the river to the right, a hand grabbing a bunch of feathers is used to show *yuta tnuhu* (River of the Lineages). *Tnuhu* means "lineages" but is represented on this map by a near homonym, *tnoho,* meaning "to pluck, as birds," and is shown by the hand holding a bunch of feathers.[93] These two rivers do in fact run across the floor of the valley. The figure of the lower half of a human may represent the drop-off between the upper and lower plains of the Apoala Valley, or it may be a rendering of the name *cahua quina* (Cliff of the Childbirth), as this precipice is known today.[94] A comparison with the schematic map confirms that the rendering on Codex Nuttall, page 36, is a perfectly readable map of the Apoala Valley, one that combines a southward-directed view with certain elements shown in cross section.

This map is a stage for a drama. The principal players in this scene are named, as were most Mesoamerican peoples, after their birthdates. This combination of a number with a day name would be akin to calling William Shakespeare "23 Sunday." At bottom we see the deities 13 Flower and her husband 1 Flower, their daughter 9 Crocodile, and her husband 5 Wind. 13 Flower is identified by a pictograph for flower flanked by thirteen dots, while her husband is shown with a flower and one dot. The characters 9 Crocodile and 5 Wind are likewise identified; the pictograph for Crocodile and the symbol for Wind are flanked by corresponding numbers. As we

87. See Marcus, *Mesoamerican Writing* (note 45).

88. See Kirchhoff, Odena Güemes, and Reyes García, *Historia tolteca-chichimeca;* Reyes García, *Cuauhtinchan* (both in note 22); and Leibsohn, "Historia Tolteca-Chichimeca" (note 63).

89. See Caso, *Reyes y reinos,* vol. 1, passim (note 18).

90. Also called the Codex Zouche-Nuttall. See Zelia Nuttall, ed., *The Codex Nuttall: A Picture Manuscript from Ancient Mexico* (New York: Dover, 1975). See also Anders, Jansen, and Pérez Jiménez, *Crónica mixteca* (note 81); Byland and Pohl, *Realm of 8 Deer* (note 27); and Pohl, *Politics of Symbolism* (note 85).

91. The Codex Nuttall, like other Mixtec screenfolds, was read in boustrophedon fashion.

92. Jill Leslie Furst, "The Tree Birth Tradition in the Mixteca, Mexico," *Journal of Latin American Lore* 3 (1977): 183–226. Jansen has identified the map as showing the Apoala Valley and correlated the Codex Nuttall hieroglyphic place-names to Apoala toponyms. Jansen, "Apoala y su importancia" (note 27).

93. Smith, *Picture Writing,* 75 (note 25).

94. Compare the interpretation of Jansen, "Apoala y su importancia" (note 27), and Ferdinand Anders and Maarten E. R. G. N. Jansen, *Schrift und Buch im alten Mexiko* (Graz: Akademische Druck- u. Verlagsanstalt, 1988), 173.

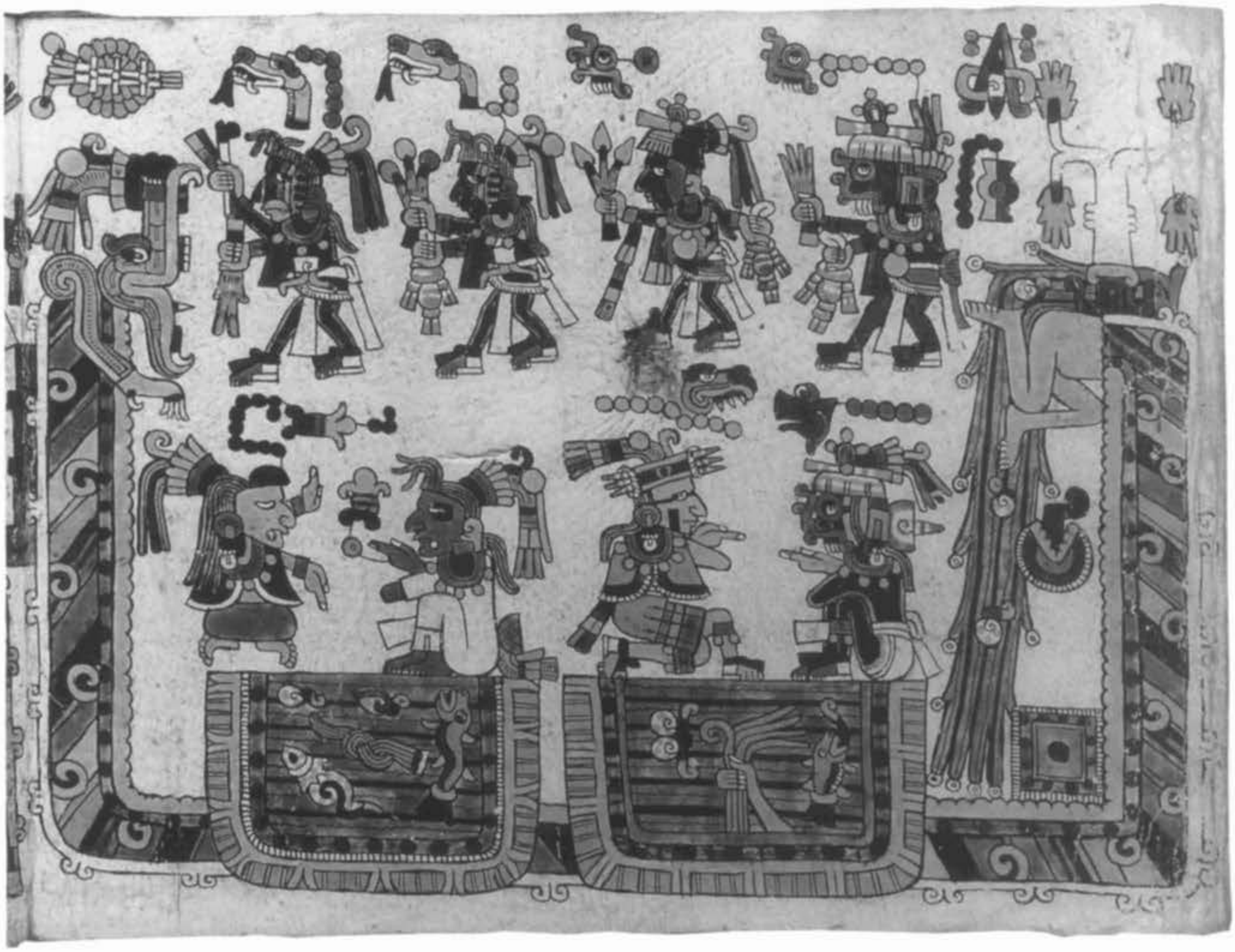


FIG. 5.26. PRE-HISPANIC MAP IN THE CODEX NUTTALL. This page from a rare preconquest Mixtec screenfold is one of the few pre-Hispanic maps to survive. It is a schematic map of the Apoala Valley, an important Mixtec site. Much of the valley is shown in cross section. The large U-shaped frame that runs two-thirds of the way up the page represents the steep valley walls and floor. This striated band is meant to symbolize the earthly surface: it is marked on its exterior with double curlicues, the symbol of stoniness. The base of this valley U is inlaid with two smaller U shapes, the conventional Mixtec symbol for river, again presented as if seen in cross section (see fig. 5.9*g* above). These two river symbols are filled with alternating wavy and straight horizontal bands, blue pigment, and aquatic images to represent water. Both the left and the right side of the U-shaped valley end with important features. At the left, the U terminates in a snake with the open maw of the earth monster, meant to symbolize a cave. The right part of the U ends with a four-branched tree; near its base there springs a waterfall, and below it the buttocks and legs of a human emerge from the earth. These are a combination of topographic features and toponyms. For instance, a waterfall cascades over a cliff in the middle of the Apoala Valley. The tree may refer to the Apoala birth tree, from which important Mixtec lineages were born, and which Apoala residents have recently identified as a huge tejocote or perhaps ceiba tree that once grew on the bank of the river above the waterfall. (Note that although the page the map appears on is generally identified as page 36, the British Museum uses page number 37 and uses the title Codex Zouche Nuttall.)
Size of the original: ca. 19 × 23.5 cm. Copyright the British Museum, London (Add. MS. 39671, p. 37).

know from other pre-Hispanic codices, 9 Crocodile and 5 Wind founded Apoala's ruling dynasty.[95] They sit in the lower register of the page and are framed by both the toponyms and landscape features that define the Apoala Valley.

This map page of the Codex Nuttall may point to the cartographic history as developing out of a narrative, noncartographic history written in screenfold manuscripts. This Codex Nuttall page is not unique, for it is similar to two others in the manuscript, pages 19 and 21,

95. Jill Leslie Furst, *Codex Vindobonensis Mexicanus I: A Commentary* (Albany: Institute for Mesoamerican Studies, State University of New York, 1978), 62. Also, Jansen, *Huisi Tacu* (note 27).

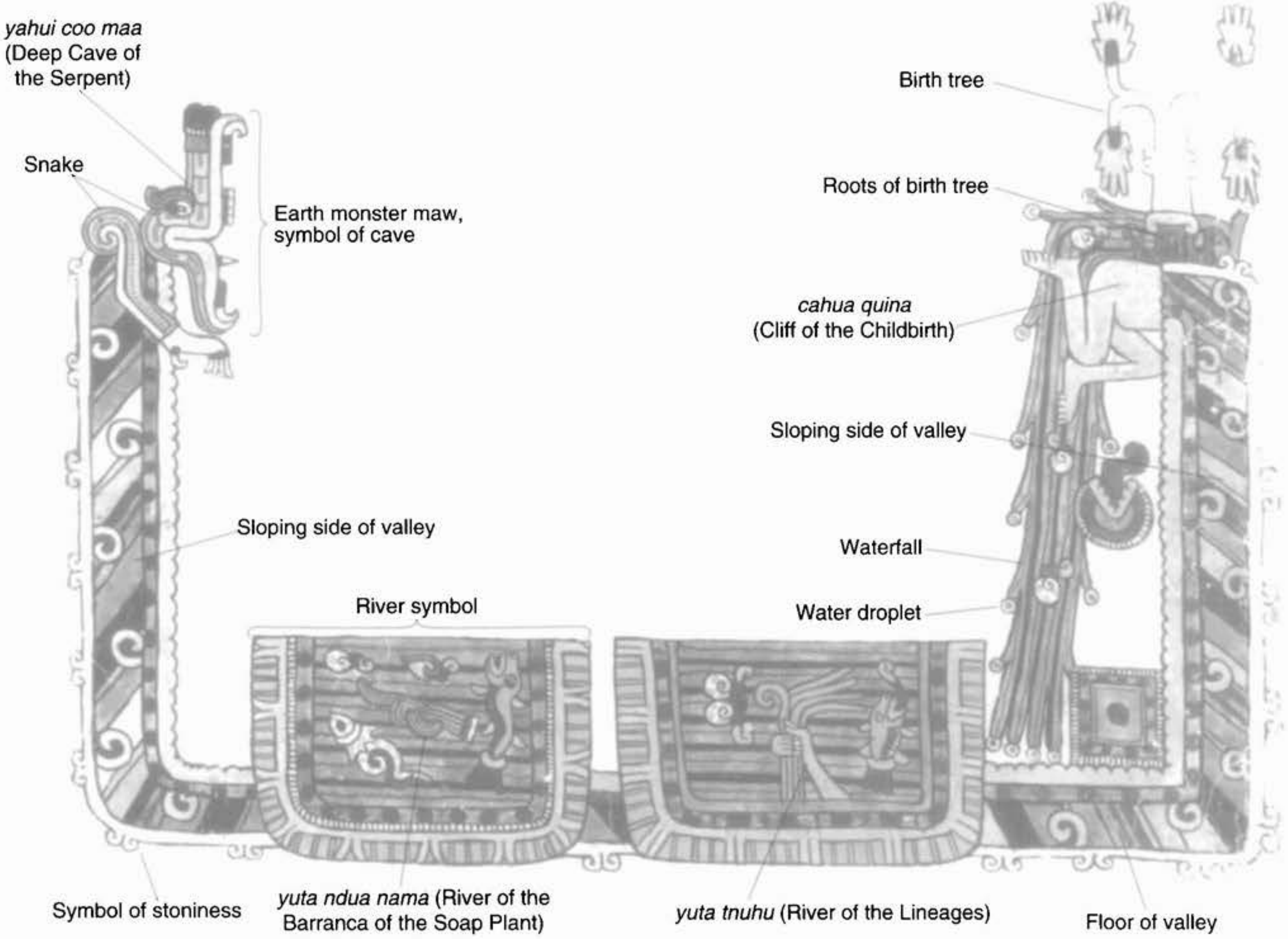


FIG. 5.27. DRAWING OF LANDSCAPE ELEMENTS AFTER THE CODEX NUTTALL. Compare figure 5.26. Mixtec names in italic.

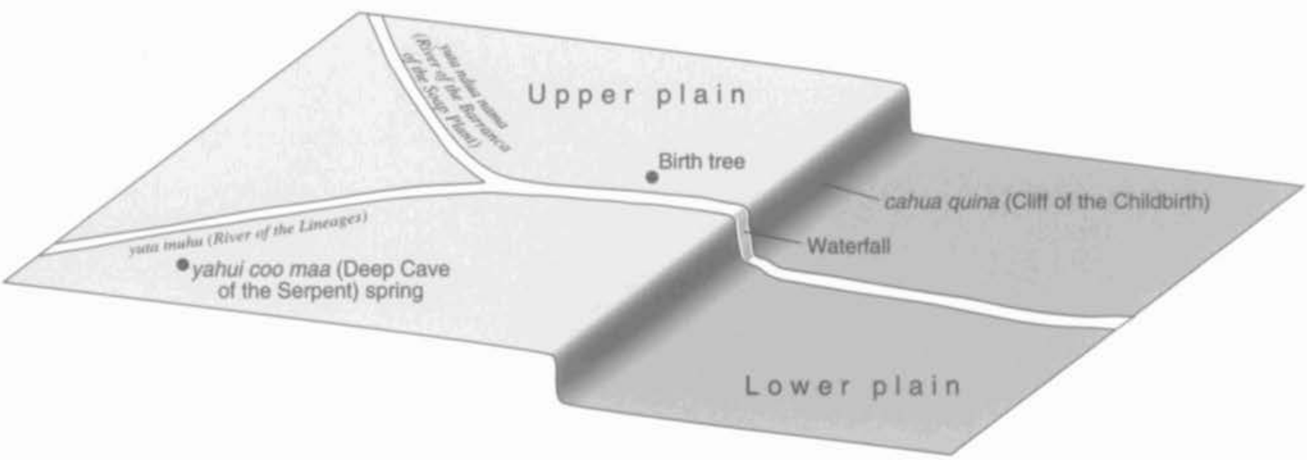


FIG. 5.28. MAP OF THE APOALA VALLEY. Compare figures 5.26 and 5.27.

that seem to be projections of other parts of the Mixtec region.[96] These pages are similar in turn to sections of the Codex Vienna (for example, 45c and 14b), which show series of hieroglyphs that seem to be arranged cartographically.

In sum, cartographic histories, as their compound name suggests, had dual purposes. The first, arising from the history, was to confirm the identification, origin, and status of ruling elites in that territory. The second, arising from the map, was to record the extent of territory a community held. The earliest known context of these maps–in the Codex Nuttall–seems to confirm that the historical purpose was a precursor of the cartographic.

RELATED ITINERARY HISTORIES

Cartographic histories as described above did not exist in isolation. I have discussed their close relation to, and inclusion in, books of history, whether postconquest ones or preconquest screenfolds. Also related to cartographic histories are the itinerary histories. Like cartographic histories, itinerary histories seem to be an offshoot of the tradition of written histories and flourished among some ethnic groups in the Valley of Mexico and among others throughout Puebla. They differ from cartographic histories in their format, which was essentially linear and showed a sequence of places. Notable events en route would be rendered like dramatic tableaus along the itinerary. The difference between the spatial arrangements of the itinerary history and the cartographic history is analogous to that between a straight line and a net, but their function was much the same. In the Codex Xolotl, the Acolhuas of Texcoco employed a map to record the historical conquests and marriages of Xolotl and his family and thus expressed their rights to territory. In nearby Tenochtitlan, the Culhua-Mexicas used an itinerary instead of a map to document their rights to territory.

Perhaps the Culhua-Mexicas favored the itinerary because it fit their ideology of possession. Sometime in the semimythic past, the Culhua-Mexicas claimed to have been called out from the island paradise of Aztlan, and they then traveled for years, enduring hardships and defeats in search of a new homeland.[97] The driving force behind their move was their tutelary god, Huitzilopochtli, who in time led them to Tenochtitlan. The Culhua-Mexicas believed this long journey was their initiation as a chosen people, conferring on them the right to settle in Tenochtitlan. In representing their history, the Culhua-Mexicas found that the itinerary format, a sequence of places leading irrevocably to Tenochtitlan, best captured their sense of divinely ordained mission.

One of these pictorial migration histories is the Mapa de Sigüenza (fig. 5.29), and its name "Mapa" suggests it maps the Culhua-Mexica migration route. But in truth, the Mapa de Sigüenza lies somewhere between the linear itinerary form and the two-dimensional format of the cartographic history. The arrangement of places on the right side is determined by their sequential order along the itinerary route rather than by their planimetric relations. In the left quadrants, however, the planimetric relations between places are more specifically expressed (fig. 5.30). Here, Culhuacan, a town in the Valley of Mexico, and the swampy valley lakes are prominent. The placement of the lakes, of Culhuacan, and of the identifiable hieroglyphic toponyms in the valley show that this side of the Mapa de Sigüenza–and this side alone–roughly shows the planimetric relations between these features.

The Codex Boturini (also known as the Tira de la peregrinación; fig. 5.31) tells a narrative similar to that of the Mapa de Sigüenza, but the linear format, which offers little in the way of orientation, underscores the predominance of the itinerary sequence.[98] The places the Culhua-Mexicas visited on their migration are arranged along a long strip of *amatl* paper, a *tira,* one hieroglyphic toponym following the next like beads on a string. Upon this spatial trajectory, the artist of the Codex Boturini imposed a temporal ordering, interspersing hieroglyphic year dates among the hieroglyphic toponyms. The uneventful train of dates and places is broken by events that are rendered as tableaus, as in the Mapa de Sigüenza. Whether he is cajoling or punishing, the deity Huitzilopochtli figures prominently as he prods the Culhua-Mexicas toward their predestined capital of Tenochtitlan.

The Culhua-Mexicas were not alone among the Nahuatl-speaking peoples in using itineraries to show divinely ordained arrival and, by extension, a right to possess a particular territory. To the east, in the center of the modern state of Puebla, other Nahuatl speakers used itinerary maps to show their emigrations from the mythic cave of origin, Chicomoztoc, or from the ancient Toltec capital of Tula. The left side of the Mapa de Cuauhtinchan 2, for example, shows the travels of two heroic figures, Icxicohuatl and Quetzaltehueyac, from the city of

96. Pohl and Byland, "Mixtec Landscape Perception" (note 27).

97. The Culhua-Mexica migration history seems to have been based in historical events, as are the migration histories of other Nahuas who pushed southward into the valley sometime in the postclassic period. Michael Smith, "The Aztlan Migrations of the Nahuatl Chronicles: Myth or History?" *Ethnohistory* 31 (1984): 153–86. On the larger group of migration histories, including the Codex Sigüenza, below, see Elizabeth Hill Boone, "Migration Histories as Ritual Performance," in *To Change Place: Aztec Ceremonial Landscapes,* ed. Davíd Carrasco (Niwot: University Press of Colorado, 1991), 121–51.

98. This migration is also told in the pictographic history of the Codex Azcatitlan (Bibliothèque Nationale, Paris), which shares many characteristics with the Codex Boturini. It has been published and discussed by R. H. Barlow and Michel Graulich, *Codex Azcatitlan/Códice Azcatitlan* (Paris: Bibliothèque Nationale de France/Société des Américanistes, 1995).

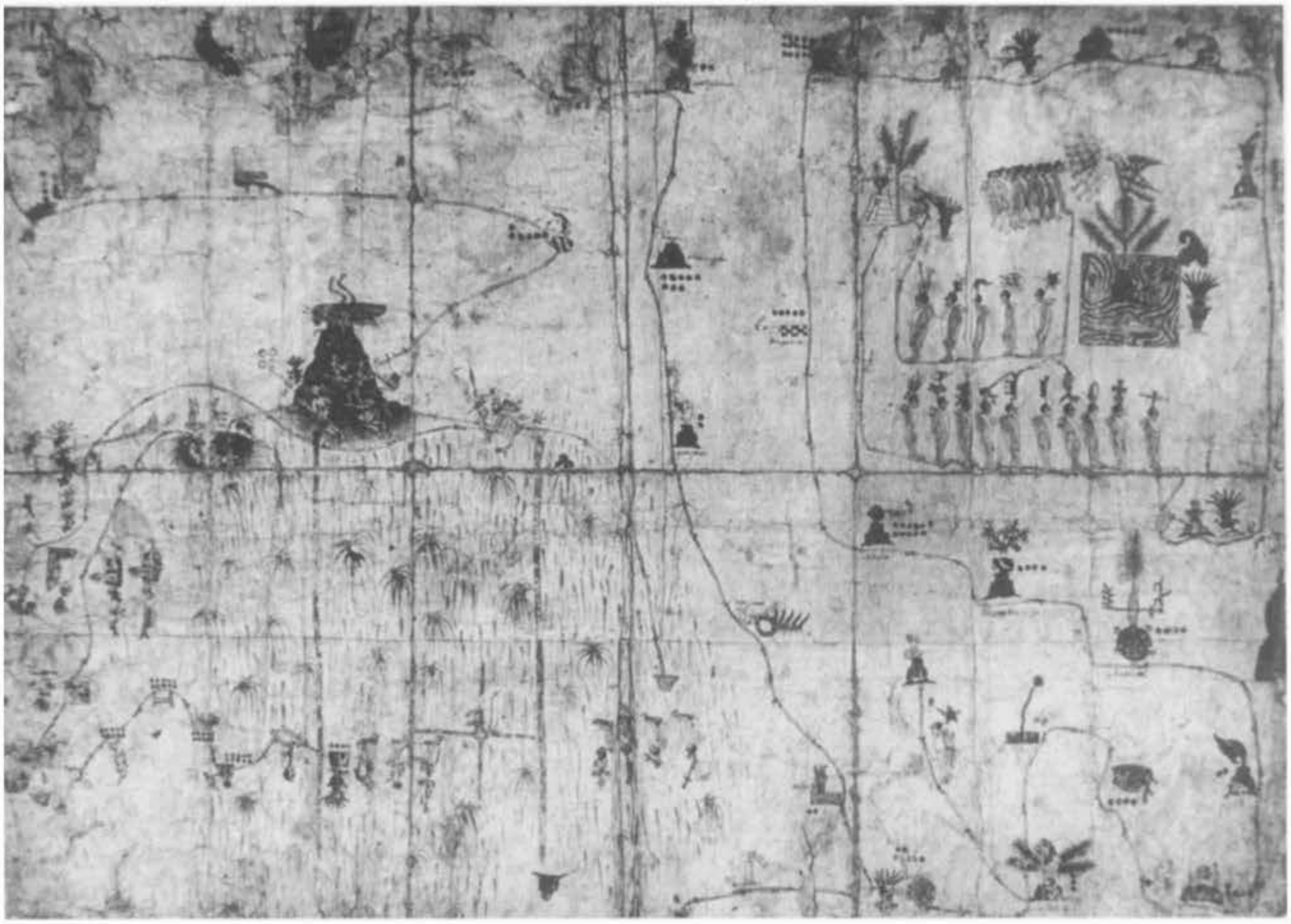


FIG. 5.29. MAPA DE SIGÜENZA. This late sixteenth-century map or early seventeenth-century copy shows the peregrination of the Culhua-Mexicas as they left their homeland of Aztlan and migrated southward into the Valley of Mexico. The narrative begins at the square cartouche in center of the upper right quadrant. The square is filled with water; within lies a hill symbol topped by a tree with a bird rising from it. This singing bird, the guise of the deity Huitzilopochtli, speaks to a pack of Aztec leaders, probably urging them to leave, for below this scene they are shown setting out on a long migration. Their path, marked by footprints, weaves back and forth, up, over, and down the page, then loops around before cutting up the middle of the page and over to the left half, where the map is meant to be inverted. From the scant place-names that can be matched to extant places, we find that the right part of the map reproduces a circuitous itinerary but does not show known places relative to planimetric positions. In the left side, planimetric relations are more faithfully expressed. This part of the map pictures the area of the Valley of Mexico around the Culhua-Mexica capital of Tenochtitlan at the time of its founding in 1325. It is filled with reed plants to show the swampy, shallow lake bed and hosts a number of historical players in the Culhua-Mexica drama. Prominently placed in the center of the left half is Chapultepec, "Grasshopper Hill," which lay to the west of Tenochtitlan. Planimetry of this section of the map is shown in figure 5.30.
Size of the original: 54.5 × 77.5 cm. Photograph courtesy of the Instituto Nacional de Antropología e Historia, Museo Nacional de Antropología, Mexico City (35-14).

Cholula to the mythic Chicomoztoc (Seven Cave) and back to Cholula again (fig. 5.32).[99] Like the Culhua-Mexica Mapa de Sigüenza, this part of the Mapa de Cuauhtinchan 2 emphasizes linear itinerary over two-dimensional representation. The Lienzo of Tlapiltepec, a member of the Coixtlahuaca group, also combines an itinerary beginning at Chicomoztoc with a more planimetric rendering of the Coixtlahuaca region in Oaxaca, where Tlapiltepec lies.[100]

To Western eyes, works like the Mapa de Sigüenza, Codex Boturini, and Mapa de Cuauhtinchan 2 might be seen as veering toward planimetric rendering without reaching consistent scale. But to pass such a judgment would be to ignore the primary aim of these works: to impart a narrative. The itinerary format, with its carefully delineated sequence of places, easily lent itself to telling a linear narrative about a journey, where one place fol-

99. Bittmann Simons, *Mapas de Cuauhtinchan,* 25–80 (note 22); Glass and Robertson, "Census," 119 (no. 95) (note 36); and Yoneda, *Mapas de Cuauhtinchan* (note 22).

100. Parmenter, *Four Lienzos,* 15–44 (note 26).

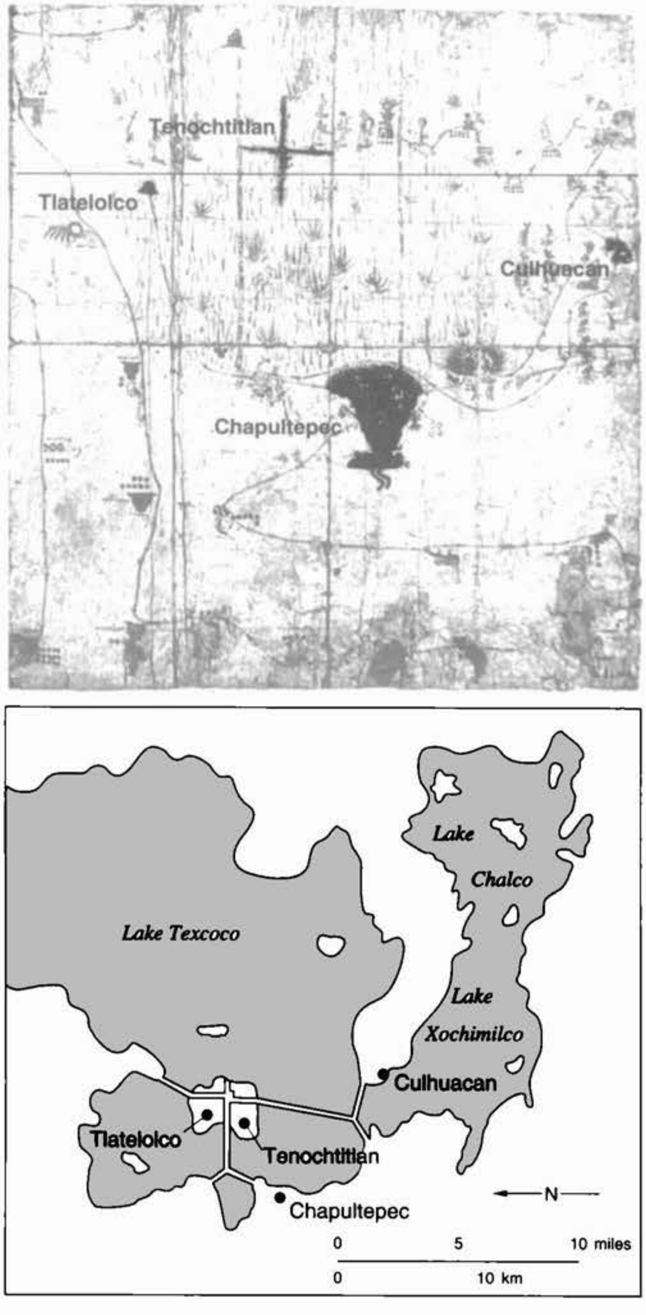


FIG. 5.30. COMPARISON OF PLACE-NAMES IN THE LEFT SIDE OF THE MAPA DE SIGÜENZA WITH A MODERN MAP OF THE SAME REGION. This detail of the map has been inverted from its appearance in figure 5.29 because readers of the map were meant to invert it as they followed its narrative from the right side over to the left.

lowed the next. Compare the itinerary-based Codex Boturini with the more planimetric Codex Xolotl. The narrative sequence of the former makes itself absolutely clear, even to the novice reader of hieroglyphs. By contrast, a page of the Codex Xolotl provides a greater wealth of information, but with no linear path of narrative. The story line is obtuse and unyielding except to the most adroit historian. Although the competing claims that narrative progression and cartographic acuity would make on the telling of history might ultimately be irreconcilable, central Mexicans were nonetheless compelled to combine history and space. Their search for forms to accommodate their understanding of the world led to the continuum of maps that range from the Codex Xolotl to the Codex Boturini.

RELATIONS BETWEEN PERMANENT AND GESTURAL CARTOGRAPHIC HISTORIES

Cartographic histories offer insight into the procedures that led to the map. In some, like those of the Historia tolteca-chichimeca described above, the maps are marked by footprints, indicating the path traveled, that run parallel to the hieroglyphic place-names of the boundaries (fig. 5.15). The text accompanying this figure also tells us that the leaders of Cuauhtinchan carried out a ritual circumambulation to establish these boundaries. Page 1 of the Codex Xolotl (plate 9; discussed above) shows Xolotl circumambulating boundaries to validate his possession of territory. This leads me to believe that a ritual circumambulation would be recorded in a map; if boundaries changed, the maps would be redrawn or, in the case of the Mapa de Teozacoalco (fig. 5.23), amended.

Rituals of circumambulation are still carried out in hundreds of Mexican and Central American communities today, especially in towns with histories of border disputes. For instance, in the Zapotec town of Macuilxóchitl in Oaxaca, the boundaries are walked every year or so by the *comisario de bienes comunales* (commissioner of communal assets) and his assistants to ensure that boundary markers are clearly marked and have remained undisturbed by neighboring towns, assumed to be perpetually acquisitive. It is not a map that guides him around community property, although such a boundary map exists, but an oral litany of boundary sites committed to memory.[101] No doubt the value of these circumambulations from the sixteenth century onward was confirmed by the Spanish, who practiced a similar perambulation as part of establishing legal title.[102] Whatever the Spanish influ-

101. Personal communication, Victorino Zarate (*agente* of Macuilxóchitl), Matías Santiago, Saturnino Mendoza Valeriano, Saturnino García Jiménez, Jacobo Lopez, and Aron Villanueva Martínez, August 1990. A similar spoken boundary map was used by the Mayas of Yucatan in 1600 (Roys, *Titles of Ebtun,* 87–89 [note 79]). A document describing the foundation of the town of Ajusco also describes boundary walking (Marcelo Díaz de Salas and Luís Reyes García, "Testimonio de la fundación de Santo Tomás Ajusco," *Tlalocan* 6 [1970]: 193–212, esp. 200–201).

102. Evidence of the impression Spanish practices of legal title made upon Nahuas is seen in a document, "Sale of Land, with All the Acts of Investigation, Confirmation, and Possession; Will Attached, Azcapotzalco, 1738," in *Beyond the Codices: The Nahua View of Colonial Mexico,* ed. and trans. Arthur J. O. Anderson, Frances Berdan, and

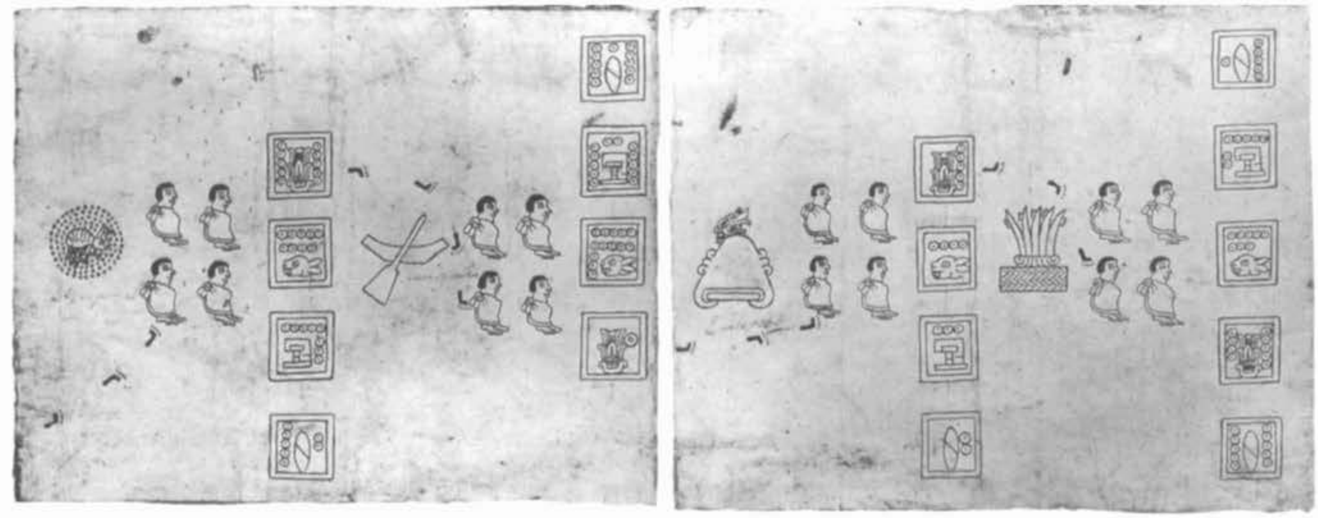


FIG. 5.31. TWO PAGES OF THE CODEX BOTURINI. Two of the twenty-one leaves of the Codex Boturini, or Tira de la peregrinación, an early postconquest manuscript. The unwavering outline, clear and precise, distinguishes the Codex Boturini as a masterwork of Aztec drawing. It depicts the long migration of the Culhua-Mexicas as they searched for a homeland. Page 11 (left) shows the itinerant Culhua-Mexicas–represented by four men wearing cloaks–arriving at Xaltocan, a city in the Valley of Mexico. The Mexica's act of travel is conveyed by the line of footprints; the places are represented by hieroglyphic place-names that are read like rebuses. Xaltocan's name means "Place of the Spiders in the Sand," and its place-name, showing a spider on a disk of dotted ground, is seen at far left. The four Mexicas face four square cartouches, each one containing the number (counted in dots) and the hieroglyphic name of a year. Reading from the bottom, these dates are 7 Tecpatl (Flint Knife), 8 Calli (House), 9 Tochtli (Rabbit), and 10 Acatl (Reed) and show that the Mexicas stayed at Xaltocan for this four-year period. They then move to Acalhuacan (Place of Those Who Have Canoes) for four years, from 11 Tecpatl (top) through 1 Acatl (bottom). At the end of this time they journey to Ecatepec (Hill of the Wind God), pictured on the left of page 12 (right). Again, they stay four years and then go to Tolpetlac (Place of the Reed Mats) pictured at center right.
Size of each page: 19.8 × 25.5 cm. Photographs courtesy of the Instituto Nacional de Antropología e Historia, Museo Nacional de Antropología, Mexico City (35-38, pp. 11–12).

ence on these rituals may have been, the records that native peoples made of perambulations in the sixteenth century and the emphasis placed on them in the present suggest that the extant boundary maps we know may have been the graphic record of a performative tradition.

OTHER TERRESTRIAL MAPS

Although cartographic histories were dominant and widespread, other kinds of terrestrial maps existed as well. Most of these other maps were produced in highly specialized contexts and were a minor chord of the native mapping traditions. Many came from the Valley of Mexico, where they were designed to serve the ends of the sleek and centralized bureaucracy of the Aztecs, whose high level of state organization was unparalleled in coeval Mesoamerica. However, we know of them only through postconquest examples, when the Spanish took over the machinery of the Aztec state. They can be divided into two broad categories: property plans, which usually mapped lands devoted to agriculture and house lots and were held by individuals or communities; and maps, often schematic, of urban centers.

Property Plans: Cadastral Maps

Spanish commentators observing facets of Aztec life in the mid- and late sixteenth century commented on the carefully drawn maps of agricultural lands that community leaders made.[103] In the densely populated Valley of Mexico, where residents reclaimed acres of swamp and farmed every foot of arable land, survival depended on the smooth functioning of complex land tenure systems–an apparatus that was recorded in maps. Most land was not owned per se but was allocated to various groups. Aztec maps showed this with color codes to mark out different lands: dark red for lands of the imperial household, pink or cochineal for the nobility, and yellow for the *calpolli,* the social groups that made up most of the population.[104] Although no such colored map illustrating this

James Lockhart (Berkeley: University of California Press, 1976), 101–9, esp. 107.

103. Juan de Torquemada, *Monarquía indiana,* 3d ed., 7 vols. (Mexico City: Instituto Nacional de Antropología e Historia, 1975), 4:332–34 (bk. 14, chap. 7), and Zorita, *Life and Labor,* 110 (note 15).

104. This follows the schema described by Torquemada, *Monarquía indiana,* 4:332–34 (bk. 14, chap. 7); Yoneda gives a reference to a slightly different color system used in the valley in *Mapas de Cuauhtin-*

FIG. 5.32. COPY OF THE MAPA DE CUAUHTINCHAN 2. The Mapa de Cuauhtinchan 2 is an important cartographic history from Cuauhtinchan, a Nahuatl-speaking region to the east of the Valley of Mexico; the map is akin to the Mapa de Sigüenza both formally and thematically. Like the Mapa de Sigüenza, it has two sides; the left shows a ritual pilgrimage made by the leaders Icxicohuatl and Quetzaltehueyac between Cholula and the mythical Chicomoztoc, a seven-chambered cave of origin. On this side, place-names are arranged sequentially rather than planimetrically. The leaders' itinerary is sometimes twisted into the meander pattern common to screenfold manuscripts, suggesting that it may have also been recorded in a screenfold. The right side is a boundary map of the Cuauhtinchan-Tecali-Tepeaca region, including the ritual center of Cholula. Also like the Mapa de Sigüenza, the Mapa de Cuauhtinchan 2 relates the history of an exodus and the establishment of a homeland. Despite regional differences, the itinerary-based cartographic history was a widespread vehicle for recording peregrination histories throughout Mesoamerica. This copy was made at the end of the nineteenth century when the original was still held in Cuauhtinchan; the original now lies in private hands.
Size of this copy: ca. 109 × 204 cm. Photograph courtesy of the Instituto Nacional de Antropología e Historia, Museo Nacional de Antropología, Mexico City (35-24).

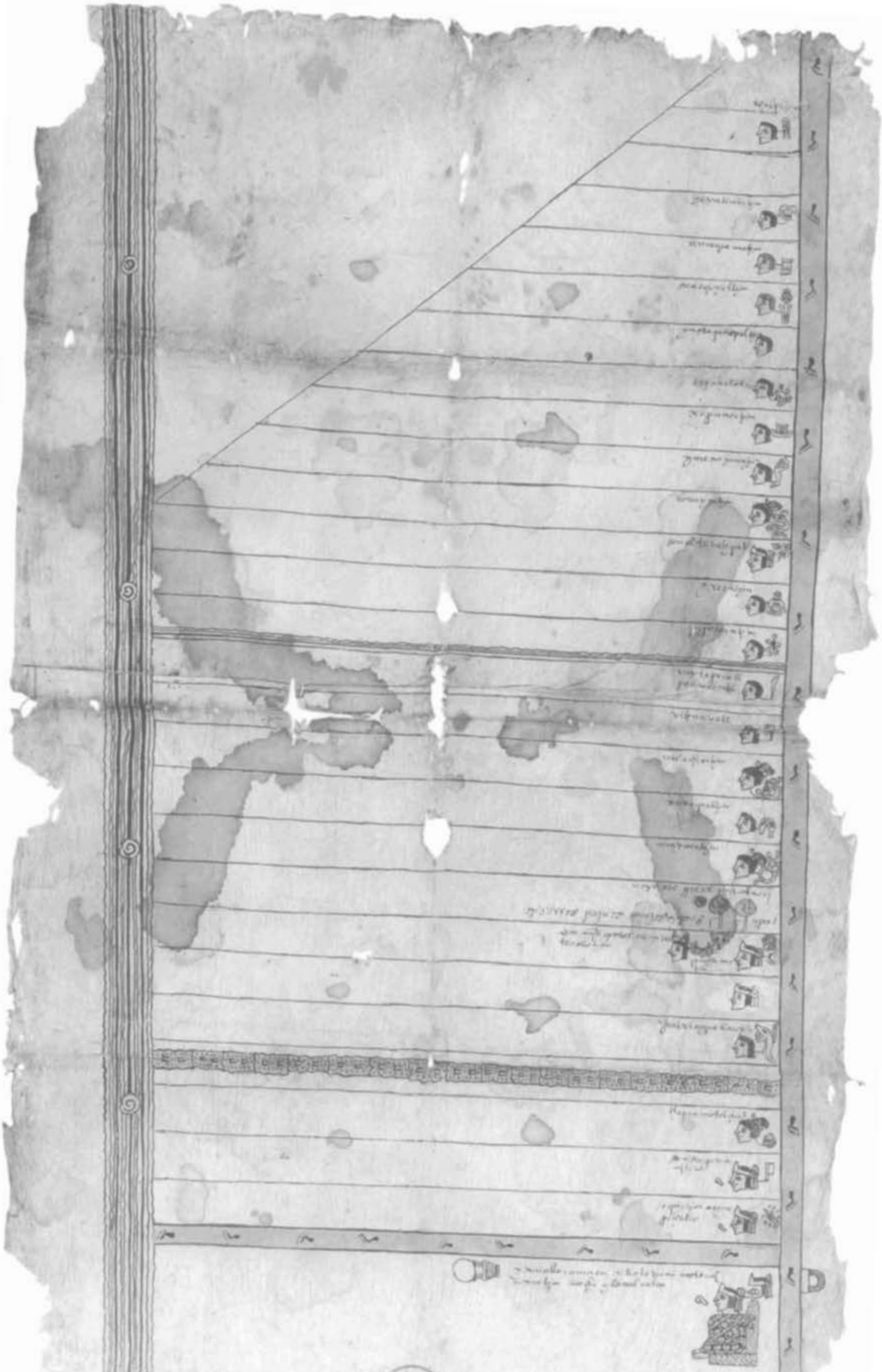
three-tiered system of landholding exists today, some maps show parts of it. The Humboldt Fragment 2, a large map on native paper painted sometime after the conquest, shows strips of lands in some location in the Valley of Mexico (fig. 5.33). Each is marked with names in both hieroglyphs and the Latin alphabet. These people include members of the Culhua-Mexica royal house, among them the ruler Motecuhzoma Xocoyotzin (Montezuma II) (r. 1502–20), who witnessed the arrival of the Spaniards and the unraveling of his empire.[105] These august men—clearly not the tillers of the soil—were likely named on these lands because the products derived from the land were delivered to them as tribute.

The *calpolli* heads, the local leaders who controlled most of the populace, also maintained detailed maps, al-

chan, 26 (note 22). For more on the nature of *calpolli,* see Lockhart, *Nahuas after the Conquest,* 16–20 (note 49).

105. See Eduard Seler, "The Mexican Picture Writings of Alexander von Humboldt in the Royal Library at Berlin," *Smithsonian Institution, Bureau of American Ethnology Bulletin* 28 (1904): 123–229.

(*Facing page*)
FIG. 5.33. HUMBOLDT FRAGMENT 2. This postconquest territorial map painted on *amatl* paper documents the ownership of some unknown acreage, probably in the Valley of Mexico. The lands shown fall between a canal, the vertical band punctured by circular eddies at left, and a parallel road marked with footprints at right. A smaller canal runs horizontally through the middle of the map, and another road crosses its bottom. Apart from a triangular portion at top left, the lands are divided into narrow horizontal strips. The keepers or owners of these fields are shown by the heads at the right, each distinguished by name in both alphabetic and hieroglyphic form. The lands at the bottom are the biggest and best. They are shown held by the high Aztec nobility, beginning with the emperor Motecuhzoma Xocoyotzin, who appears seated in the bottom right corner. Directly above him are the rulers who controlled towns within the valley; their rank and importance seem to decrease farther up the map. Today the map is bereft of reasons that led to its creation, but it may have been among the many *pinturas* (pictures) that native Mesoamericans brought before Spanish officials.
Size of the original: 76 × 45 cm. Photograph courtesy of the Staatsbibliothek zu Berlin–Preussischer Kulturbesitz (MS. Amer. 1, fol. 1).



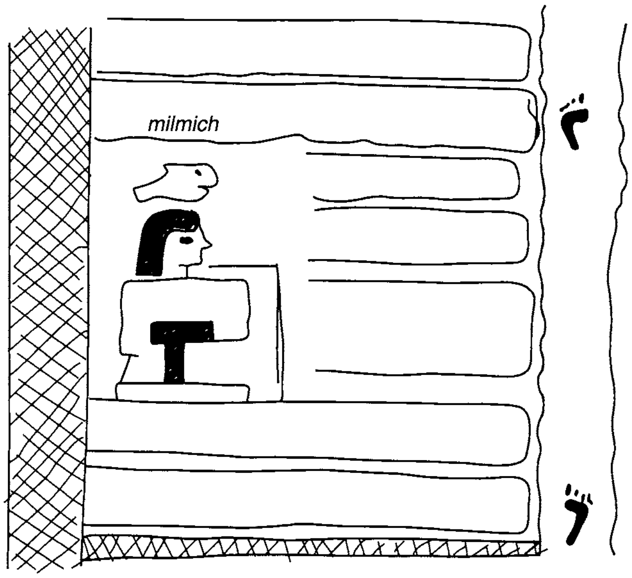


FIG. 5.34. DRAWING AFTER THE PLANO EN PAPEL DE MAGUEY. This sketch shows one of the over three hundred house plots of the map. The plot comprises seven raised beds (*chinampas*) for agriculture. At center left, a house pictograph is seen in profile. In the map all the houses are depicted this way, but in reality their shape and appearance would have varied to suit the needs of the residents. Above the house pictograph in this plot, a male head stands for the occupant; he is named with a hieroglyph of a fish, transliterated in the alphabetic gloss as *milmich*. In Nahuatl the name means "field of fish." The crosshatched vertical band to the left of the plot represents a canal, and a narrower ditch runs along the bottom of the plot. A road, marked with conventional footprints, runs at right.

lowing them to keep track of their districts, to assign lands, and to collect appropriate amounts of tribute.[106] The Plano en papel de maguey, figure 5.3, seems to be a postconquest copy of such a *calpolli* map. Painted on a large sheet of *amatl* paper, its name, "plan on maguey-fiber paper," is somewhat misleading.[107] Nonetheless, the map fits the descriptions of *calpolli* maps by being a scrupulous large-scale map showing more than three hundred houses and their adjoining fields as well as naming each of the residents with hieroglyphic names (fig. 5.34). Scholars believe that the Plano en papel de maguey represents a suburban region to the north of Tenochtitlan. But unfortunately the map omits mention of location and offers no measurements that would supply scale, for these would allow us to figure the density of Tenochtitlan's population and the size of local landholdings.[108]

The same Spaniards who commented on the use of *calpolli* maps also noted that they were constantly updated and revised by the people who held them.[109] Since such maps were later accepted as legal evidence by Spanish authorities (or the natives they appointed to adjudicate in their stead), early maps like the Plano en papel de maguey could be used in courts of law. Many native maps have survived pressed between the papers documenting court cases. It seems that the original content of the Plano–householders and the measure of their lands–was amended some years after the map was painted so that it could be presented as evidence in a court case. A list of rulers of Tenochtitlan from 1427 to 1562 was added to the upper right corner, and other spots on the map were revised by pasting European paper onto the original fig bark paper.[110] All these changes seem to have been made to this cadastral map to prove that in pre-Hispanic wars of conquest, waged about 1430, the Culhua-Mexicas of Tenochtitlan seized this land. Members of the losing side, after coming under Spanish rule, used the map to try to regain their former dominion over these properties.[111] They lost again. Thus maps originally designed for *calpolli* leaders may have been transformed into a document directed at a Spanish judge. Many native maps led such a double life.[112]

Property Plans: Maps of Individual Properties

Many maps documenting individual properties–house lots, orchards, gardens–have survived from the early colonial period, especially from the Valley of Mexico. These likely grew out of two sets of pre-Hispanic models–

106. Zorita, *Life and Labor,* 110 (note 15). *Calpolli* leaders also made use of cadastral registers. These registers listed individual plots of land, like separate pieces of a jigsaw puzzle, without putting them together in a map format; see H. R. Harvey, "Aspects of Land Tenure in Ancient Mexico," in *Explorations in Ethnohistory: Indians of Central Mexico in the Sixteenth Century,* ed. H. R. Harvey and Hanns J. Prem (Albuquerque: University of New Mexico Press, 1984), 83–102; Williams, "Mexican Pictorial Cadastral Registers," 103–25 (note 58); and Hanns J. Prem, ed., *Matrícula de Huexotzinco* (Graz: Akademische Druck- u. Verlagsanstalt, 1974). On the use of hieroglyphs to identify soil types, see Barbara J. Williams, "Aztec Soil Glyphs and Contemporary Nahua Soil Classification," in *The Indians of Mexico in Pre-Columbian and Modern Times,* International Colloquium, Leiden, 1981 (Leiden: Rutgers B.V., 1982), 206–22.

107. Robertson, *Mexican Manuscript Painting,* 77 (note 30), following Lenz, "Las fibras y las plantas" (note 39). This map is studied by Edward E. Calnek, "The Localization of the Sixteenth-Century Map Called the Maguey Plan," *American Antiquity* 38 (1973): 190–95, and Manuel Toussaint, Federico Gómez de Orozco, and Justino Fernández, *Planos de la Ciudad de México, siglos XVI y XVII: Estudio histórico, urbanístico y bibliográfico* (Mexico City, 1938).

108. This location of the map is argued in detail by Calnek, "Maguey Plan."

109. Zorita, *Life and Labor,* 110 (note 15).

110. Robertson, *Mexican Manuscript Painting,* 81–83 (note 30), and Calnek, "Maguey Plan" (note 107).

111. Following Calnek, "Maguey Plan." See also Toussaint, Gómez de Orozco, and Fernández, *Planos de la Ciudad México,* 55–84 (note 107).

112. See, for example, Mary Elizabeth Smith, "Las glosas del Códice Colombino/The Glosses of the Codex Colombino," published with the facsimile reproduction *Códice Colombino* (Mexico City: Sociedad Mexicana de Antropología, 1966).

the *calpolli* maps discussed above and other written documents drawn up to present to judges in disputes.[113] These older pre-Hispanic forms were channeled into colonial-era property maps, made at a time when Spanish officials championed claims of individual ownership, often at the expense of the communal holdings that were the mainstay of pre-Hispanic life. Many of these postconquest property maps were made to be legal documents, specifically drawn up for litigation and property transfers, and it is in these contexts that they are known to us today. For instance, the 1576 map of the properties of Don Miguel Damian is typical (fig. 5.35).[114] It seems to have been entered in litigation between the Damian family and Pedronilla Francisca, a native of the valley town of Xochimilco. The bottom shows Don Miguel with his wife Doña Ana and another relative, perhaps his sister or a daughter by another woman, and above are Don Miguel and Doña Ana's four children. Above and to the left is a plan of his two house compounds and enclosed orchards. To the right are seven fields, each named with hieroglyphic place-names. All properties are parceled out among Don Miguel's heirs, the ones pictured below being marked with their names. No preconquest examples assure us that such property maps were part of the repertory of native mapping before the conquest. Even so, such property maps quickly gained prominence as native peoples, especially the Aztecs, adapted to the demands of Spanish colonial law and government by using maps as proof of possession.

Maps of Urban Centers

Mesoamericans may have mapped their great cities, including the ceremonial centers–those sacred landscapes they built with mountainous pyramids and forested with sculpture. Two schematic maps of the great city of Cholula are found in the Historia tolteca-chichimeca, and two indigenous maps survive of Tenochtitlan, the largest Mesoamerican urban center.[115] One, from the Codex Mendoza, was described above (fig. 5.6). Another map, showing only the central temple precinct of Tenochtitlan (figs. 5.36 and 5.37), appears in a sixteenth-century manuscript book, the Primeros memoriales, written and painted by Aztec scribes working under the direction of the Franciscan Bernardino de Sahagún (1499–1590).[116] The map shows the walled precinct, with the massive twin temples at its center (also seen in the Cortés map of Tenochtitlan of 1524, fig. 5.7), along with other temples, palaces, and deity figures.

Not only is this map a rare example of a Mesoamerican urban-center map, it also prefigured a great archaeological discovery. During the Spanish occupation and reconstruction of Tenochtitlan in the 1520s, this ceremonial core was razed; this map is the only known native sixteenth-century map to show how the precinct was laid out and what it contained. Since the map was first published in the mid-nineteenth century, scholars have debated its merits, but recent excavations have proved it corresponds faithfully to areas of the precinct that have been uncovered.[117]

Was this map one of many? Or was it a unique example, created at Sahagún's behest for inclusion in his Primeros memoriales? Although we have other depictions of the twin temples and plans of palace complexes, this map is quite singular in what it shows.[118] Sahagún, who knew of the rich European tradition of city plans with their emblematic architectural renderings, may have prompted his artists to make him an equivalent work for his book. The result is hardly derivative of a European example, but the awkwardness of its design and execution and the idiosyncrasies of the deities portrayed suggest that this map was not the final phase of a well-articulated tradition but a colonial Aztec innovation.

Maps for Trading and War

To the Aztecs, trading and war were interlocking–indeed, inseparable–means toward their imperial goal of conquest and expansion. Key players were the *pochteca*, the long-distance Aztec traders, whose ranks included military spies. From their capital in Tenochtitlan, the Culhua-Mexicas would send the *pochteca* to regions outside their

113. For the pre-Hispanic legal system of one part of the valley, see Jerome A. Offner, *Law and Politics in Aztec Texcoco* (Cambridge: Cambridge University Press, 1983).

114. The map and litigation are discussed in Glass and Robertson, "Census," 238–39 (note 36); on the genre see Lockhart, *Nahuas after the Conquest,* 353–57 (note 49).

115. Renderings of individual palace complexes in the Valley of Mexico do survive, as in the Mapa Quinantzin, p. 2, Codex Mendoza, fol. 69r, and Historia tolteca-chichimeca, fols. 26v–27r. Other renderings of architecture are discussed in *Las representaciones de arquitectura en la arqueología de América,* vol. 1, ed. Daniel Schávelzon (Mexico City: Universidad Nacional Autónoma de México, 1982–). Petroglyphs, probably dating to the classic period (A.D. 250–900), from the Maya site of Planchón de las Figuras show an unidentified cluster of pyramids, perhaps a map of a ceremonial complex. Stephen Houston, "Classic Maya Depictions of the Built Environment," paper presented at Dumbarton Oaks, 9 October 1994.

116. The manuscript is painted on sheets of European paper. It has been separated into two parts, one at the Biblioteca del Palacio Real, Madrid, and the other at the Real Academia de la Historia, Madrid. Folio 269r, which contains the map, is at the Palacio Real. Bernardino de Sahagún, *Primeros memoriales,* facsimile ed. (Norman: University of Oklahoma Press, 1993).

117. Elizabeth Hill Boone, "Templo Mayor Research, 1521–1978," in *The Aztec Templo Mayor,* ed. Elizabeth Hill Boone (Washington, D.C.: Dumbarton Oaks, 1987), 5–69.

118. Miguel León-Portilla, "The Ethnohistorical Record for the Huey Teocalli of Tenochtitlan," in *The Aztec Templo Mayor,* ed. Elizabeth Hill Boone (Washington, D.C.: Dumbarton Oaks, 1987), 71–95, esp. 85–87.

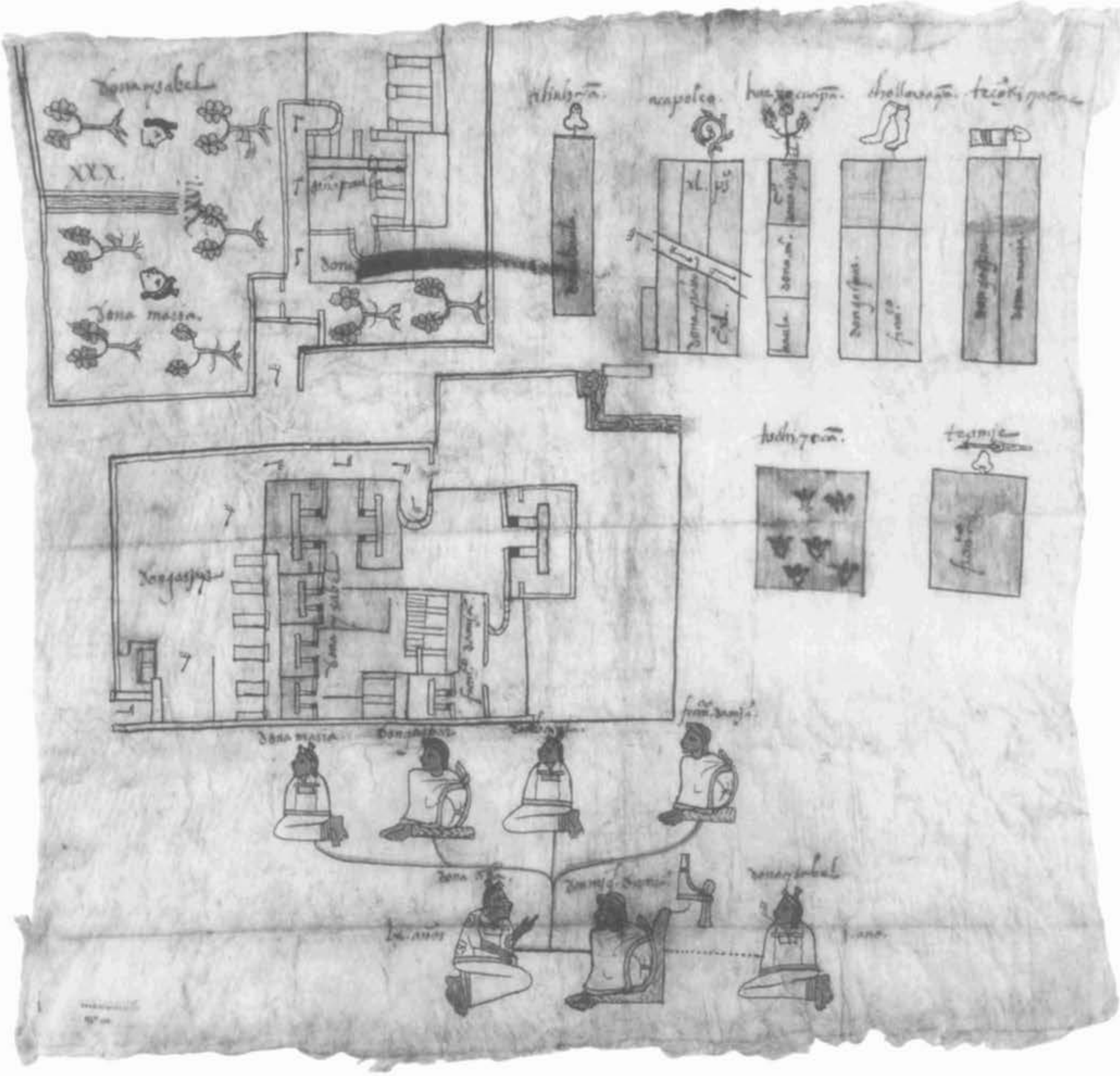


FIG. 5.35. MAP OF DON MIGUEL DAMIAN'S PROPERTIES. This small map registers the properties of Don Miguel Damian, a Nahua elite pictured seated at the center bottom of the sheet of native paper. A lawsuit of 1576 between Nahuatl speakers occasioned the map, and such legal battles often inspired the production of maps. Don Miguel's family is clustered around him, arranged to show genealogical relationships. The top part of the map comprises layouts of his two house lots (at left) and seven fields (at right). The fields are named hieroglyphically and alphabetically, and they and the house lots are parceled out among Don Miguel's heirs. These properties were probably scattered across a landscape that is not identified on the map: although the map is quite specific about the names, layout, and proportions of each of the nine properties pictured, it does not show their spatial relation to each other. The viewer was expected to know their whereabouts, either through the text that once accompanied the map or through prior knowledge of Xochimilco, where the map was made. This particular map is also silent about the dimensions of houses and fields, but other coeval maps denote both lineal and area measurements precisely, using indigenous systems of whole units and fractions.
Size of the original: 38.5 × 39.3 cm. Photograph courtesy of the Newberry Library, Chicago (Ayer MS. 1900).

control, probing with the delicate tendrils of trade. Unsuspecting towns would welcome the *pochteca* into their markets; only after they left would the residents hear the tramp of Aztec battalions advancing from the horizon.[119]

119. On the role of the *pochteca*, see Ross Hassig, *Aztec Warfare: Im-*

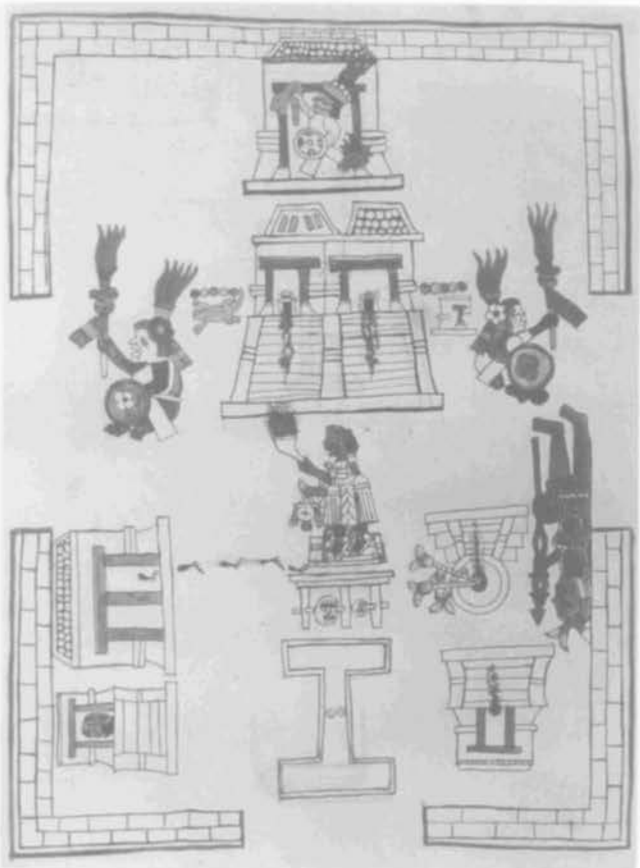


FIG. 5.36. ONE FOLIO OF THE PRIMEROS MEMORIALES. This map shows the walled central temple precinct of Tenochtitlan, the Culhua-Mexica capital. It was here that the rituals of heart sacrifice and bloodletting that so appalled the Spanish took place on an imperial scale. The map marks these sanguinary practices by showing many of the temples spattered with blood. Architecturally, the map's distinguishing feature is the central twin temples, the left side dedicated to Tlaloc, a rain-agriculture deity, and the right to Huitzilopochtli, the Culhua-Mexica patron deity.
Size of the original: 31 × 22 cm. Copyright © Patrimonio Nacional, Biblioteca del Palacio Real, Madrid (Códice Matriense, II-3280, fol. 269r).

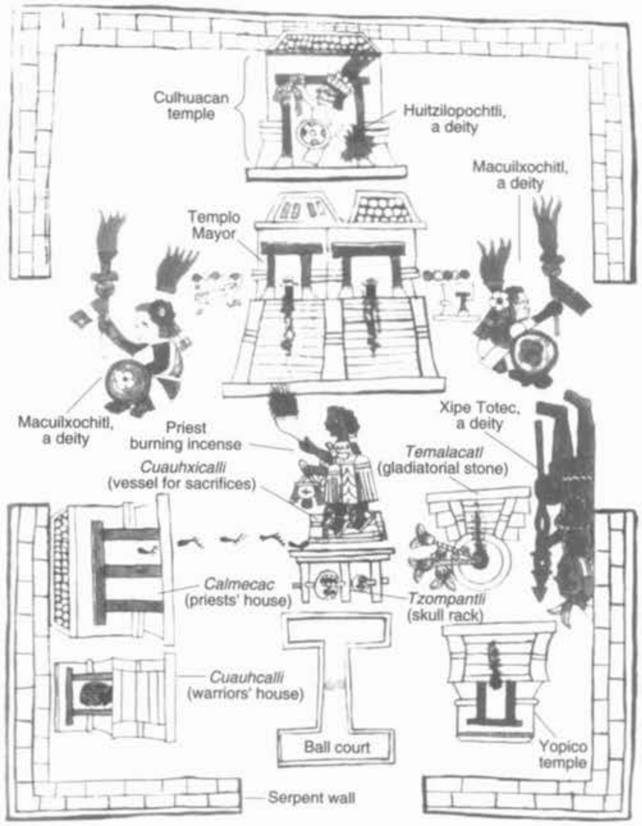


FIG. 5.37. FOLIO OF THE PRIMEROS MEMORIALES WITH GLOSSES. Compare figure 5.36. In addition to the central twin temples, notable buildings shown within the precinct confines include the *tzompantli,* or skull rack, seen upside-down in the lower half, where the skulls of sacrificial victims were displayed. Below this is an I-shaped structure that represents a ball court, used for ritual play. The facing page of the manuscript (not shown here) gives a list of the buildings included, and that is the source for the buildings identified here. This is the only known map of the precinct; recent excavations have shown this map to be very accurate in portraying both the content of the precinct and the placement of its structures.

Two related, perhaps even interchangeable, kinds of maps were instrumental in the Aztec bid for power: maps the *pochteca* used to reach outlying provinces, and maps they brought home to help military leaders plan an attack of conquest. No original examples of these maps exist, so their appearance remains speculative. But the postcontact Codex Florentine (ca. 1575), an encyclopedia of Aztec life that grew out of the Primeros memoriales, describes and illustrates the maps Aztec military leaders might have used. The drawing in figure 5.38 shows an Aztec military spy in the upper center, traveling to a town. Later the strategic information he has collected is conveyed by a map. The picture of the spy map shows it to be a kind of urban plan. From what we know of Mesoamerican warfare, this picture makes sense: the main temple precinct was the heart of a town's resistance; its downfall meant capitulation.

But this picture of the spy map raises as many questions as it answers. The artist was probably illustrating the textual account of such a map rather than drawing on firsthand knowledge. The artist's understanding may have been flawed, for the spy is portrayed as a warrior rather than a merchant, as would be more likely. And because the artist was trying to give a quick impression of the map rather than a faithful reproduction, the map we see is cropped and condensed.

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perial Expansion and Political Control (Norman: University of Oklahoma Press, 1988), esp. 48–52. Sahagún, *Florentine Codex,* 10:3–20 (bk. 9, chaps. 2–5) (note 7).

FIG. 5.38. AZTEC MILITARY MAP FROM THE CODEX FLORENTINE. This picture of a war map was made ca. 1570 to illustrate the Codex Florentine, an encyclopedic account of pre-Hispanic Aztec life written in both Spanish and Nahuatl and lavishly illustrated. This picture accompanies a passage about military spies, and it offers one of the few accounts of how maps were made and used in pre-Hispanic times. Spies supplied information to Nahua military commanders about the towns and peoples outside their domain, and they would travel among the ranks of the *pochteca,* the long-distance merchants. This illustration comprises two sequential parts in a single frame. On the right half, the military spy explores a foreign town, shown in the upper corner as a group of five houses portrayed frontally. Cutting through the surrounding landscape, the main roads into the town are marked by footprints. Presumably, the spy draws a map and returns to Tenochtitlan with it. The subsequent scene appears on the left half. In it, a warrior is seated at the center bottom. He speaks with two military commanders, the *tlacochcalcatl* and the *tlacatecatl* (seated at center and bottom left), to report the findings by means of the map, which he points to.
Size of the original: ca. 9 × 12 cm. Photograph courtesy of the Biblioteca Medicea Laurenziana, Florence (Med. Palat. 219, c. 283 v., bk. 8, chap. 17). By permission of the Ministero per i Beni Culturali e Ambientali.

Accounts of the maps used in planning military attacks add flesh to the skeletal map portrayed in the Codex Florentine. In addition to the main temple precinct, such maps laid out in detail the various overland routes to a town, probably showing, through hieroglyphic placenames, the position of neighboring towns as well. The Spanish conquistador Hernán Cortés describes using such a map during the devastating internecine war he helped ignite after his troops entered the Valley of Mexico in 1519. Chalco, a town in the southern valley, had allied itself with the Spaniards as it rebelled against Tenochtitlan, which lay about thirty kilometers to the north (see fig. 5.17). When the Culhua-Mexicas of Tenochtitlan moved to suppress the Chalca revolt and expel the Spaniards, the Chalcas appealed to Cortés for reinforcements using a map to illustrate the position and routes of their enemies. Cortés describes the map that accompanied the Chalca plea as "a large white cloth [that] showed the symbols for all the towns which were to attack them and the routes they were to follow."[120]

The map the Chalcas gave Cortés was probably similar in function and appearance to the one the Culhua-Mexicas themselves had given him some months before during their initial and unsuccessful attempt to appease the Spanish intruders. Cortés had been cautiously welcomed into the court of Motecuhzoma Xocoyotzin. Once he was in the palace, Cortés boldly demanded a map of the eastern shore of Motecuhzoma's domain. This map was duly made, and Cortés reported that it had "all the coast painted on it," including the rivers that ran to the sea.[121] The purpose of this map was to aid Cortés's soldiers in exploring the Gulf Coast, especially to determine how ships sailing from Cuba could travel inland. To create such a map for Cortés, Motecuhzoma's artists probably used native maps of similar function: the maps made for the tandem forces of *pochteca* and army that enabled them to explore and attack.

The Aztec war map and trading map were probably interchangeable. In other regions of Mesoamerica, however, merchants' maps of long-distance routes may have had fewer bellicose uses. As with those of their Aztec counterparts, knowledge of merchants' maps comes to us mainly through Spanish sources, particularly the letters of Cortés and the writings of his foot soldier Bernal Díaz del Castillo. During his odyssey in 1524–26 into what is now Honduras, Cortés mentions being supplied with native maps that must have been kin to the maps made by long-distance traders.[122] The first map given to Cortés on this trek was composed by noble emissaries from Tabasco and Xicalango, and Cortés reported that this native map showed "the whole country."[123] Later in the journey, the Chontal Maya lord of the province of Acalan sketched a map for Cortés.[124] Although none of these maps survive

120. Cortés, *Letters,* 192 (note 14).

121. Cortés, *Letters,* 94. Some scholars have argued that it was this itinerary map that gave rise to the 1524 map of Tenochtitlan. However, a close reading of the passage suggests that the itinerary map supplied by Motecuhzoma showed a coastal profile and was the inspiration for another map, a sketch of the Gulf Coast that was printed adjacent to the Tenochtitlan map. See Mundy, "Aztec Capital" (note 35).

122. Cortés, *Letters,* 339–40, 344.

123. Thompson argues that this map was made by the Chontal Maya inhabitants of the region (*Dresden Codex,* 9 [note 5]). However, Xicalango was a Nahuatl-speaking town and had Aztec troops stationed in it. Any map from Xicalango could have reflected Aztec, not Maya, mapping traditions. The Aztec presence is described by Nancy M. Farriss, *Maya Society under Colonial Rule: The Collective Enterprise of Survival* (Princeton: Princeton University Press, 1984), 21.

124. Cortés, *Letters,* 365. Cortés's account of Maya maps is also men-

today, they seem to have been simple itinerary maps, like those traders would use, whose bare graphic descriptions would have been elaborated by spoken accounts that traders would share with each other. The dependence of these maps on oral tradition was readily understood by Cortés, who took them from his Mesoamerican hosts but still relied heavily on local guides. Whether through cross-cultural misunderstanding or perhaps willful miscommunication, the Maya maps and guides were of limited use to the Spanish conquistadores: time and again, Cortés and his men got lost.[125]

COSMOGRAPHICAL MAPS

Mesoamericans shared a view of the cosmos that cut across linguistic and geographic barriers. Their template of the horizontal and vertical cosmos was described above. Although representations of its many facets may appear dissimilar, they are all parts of the same whole, a cosmic scene diagrammed in figure 5.39. Surviving cosmographical maps usually represent either the vertical strata or the horizontal layout of the cosmos.

The audience for these maps can be construed from their contexts. Many cosmographical maps showing the three tiers of the earth took the form of carved public monuments that were set facing large plazas or in front of pyramids. These kinds of comographical maps would have been quickly identified by Mesoamerican viewers, their content transparently legible. Cosmographical maps found in painted manuscripts were different (see table 5.3). They presented a much more complex and nuanced version of cosmographical layers and layout, meant to be seen and interpreted only by the initiated elites. We know that a priestly caste existed among the Aztecs, and cosmographical manuscript maps would have been kept in the libraries of these men.

The maps of the horizontal design of the cosmos emphasize the associations between the four quarters of the world, assigned to the cardinal directions, and calendrical time. The Codex Fejérváry-Mayer contains perhaps the most famous map of the Mesoamerican cosmos (fig. 5.40). On it, we see a compact and elegant statement of a Mesoamerican worldview; not surprisingly, given the Mesoamerican interest in spatializing time, it situates the layout of space within a calendrical almanac. Although the codex was probably not an Aztec work (it may have been a Mixtec creation), we understand it best through the sources of the Aztecs of central Mexico, whose cosmology was well documented in the sixteenth century.[126] The Codex Fejérváry-Mayer shows us the surface of the earth in the shape of a Maltese cross. The artist uses a peculiarly Mesoamerican radial perspective whereby vertical objects are laid out horizontally on the page, all pressed outward from a central point. For example, a

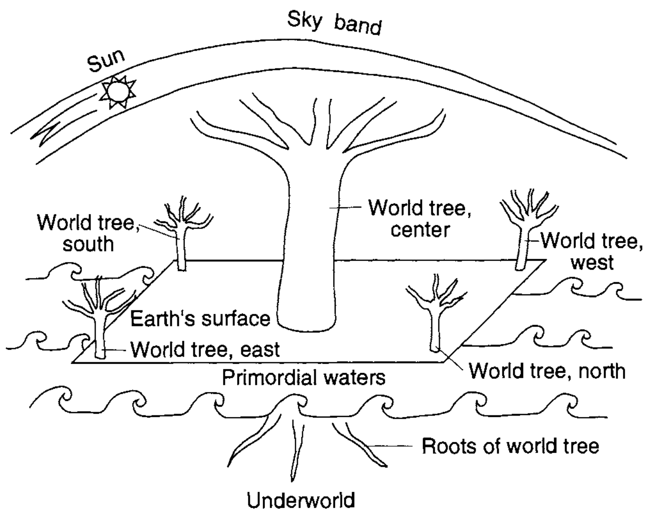


FIG. 5.39. DIAGRAM OF THE MESOAMERICAN COSMOS. The cosmos was conceived with a similar layout throughout Mesoamerica. The surface of the earth falls into four quadrants, corresponding to the cardinal directions. East is primary, since the sun rises from this direction. The principal vertical axis of the cosmos is the world tree, which separates the earth from the skies. World trees grow at both the center and the four corners of the earth. The sky is usually represented as a band, but some Mesoamericans understood it to comprise thirteen layers, the lowest of which was the earth. The earth floats on primordial waters, which form the surface of the Underworld. The Underworld is striated into layers, as are the skies.

Mesoamerican artist would portray a circle of standing dancers as if they were spokes of a wheel.

In the codex, four trees stand within the branches of the cross, representing those at the four corners of the world, which kept the skies from crashing down on the

tioned by his biographer and secretary, Gómara, and by the conquistador Bernal Díaz del Castillo, who went along with Cortés to Honduras. Francisco López de Gómara, *Cortés: The Life of the Conqueror by His Secretary,* ed. and trans. Lesley Byrd Simpson (Berkeley: University of California Press, 1964), 345; and Díaz del Castillo, *True History,* 5:12, 14, and 24–25 (note 14).

125. Cortés, *Letters,* 354–55.

126. For a concise summary of Aztec religion, see H. B. Nicholson, "Religion in Pre-Hispanic Central Mexico," in *Handbook of Middle American Indians,* vol. 10, ed. Gordon F. Ekholm and Ignacio Bernal (Austin: University of Texas Press, 1971), 395–446. This page of the Codex Fejérváry-Mayer is closely analyzed by Eduard Seler, *Codex Fejérváry-Mayer: An Old Mexican Picture Manuscript in the Liverpool Free Public Museums* (London, 1901–2), as well as in Eduard Seler, *Comentarios al Códice Borgia,* 3 vols., trans. Mariana Frenk (Mexico City: Fondo de Cultura Económica, 1963), the Spanish edition of his *Codex Borgia: Eine altmexikanische Bilderschrift der Bibliothek der Congregatio de Propaganda Fide,* 3 vols. (Berlin, 1904–9) (the third volume of each edition contains a facsimile of the Codex Borgia). My interpretation follows Seler's. See also Miguel León-Portilla, *Tonalámatl de los pochtecas (Códice mesoamericano "Fejérváry-Mayer")* (Mexico City: Celanese Mexicana, 1985), and Aveni, *Skywatchers,* 156–58 (note 57).

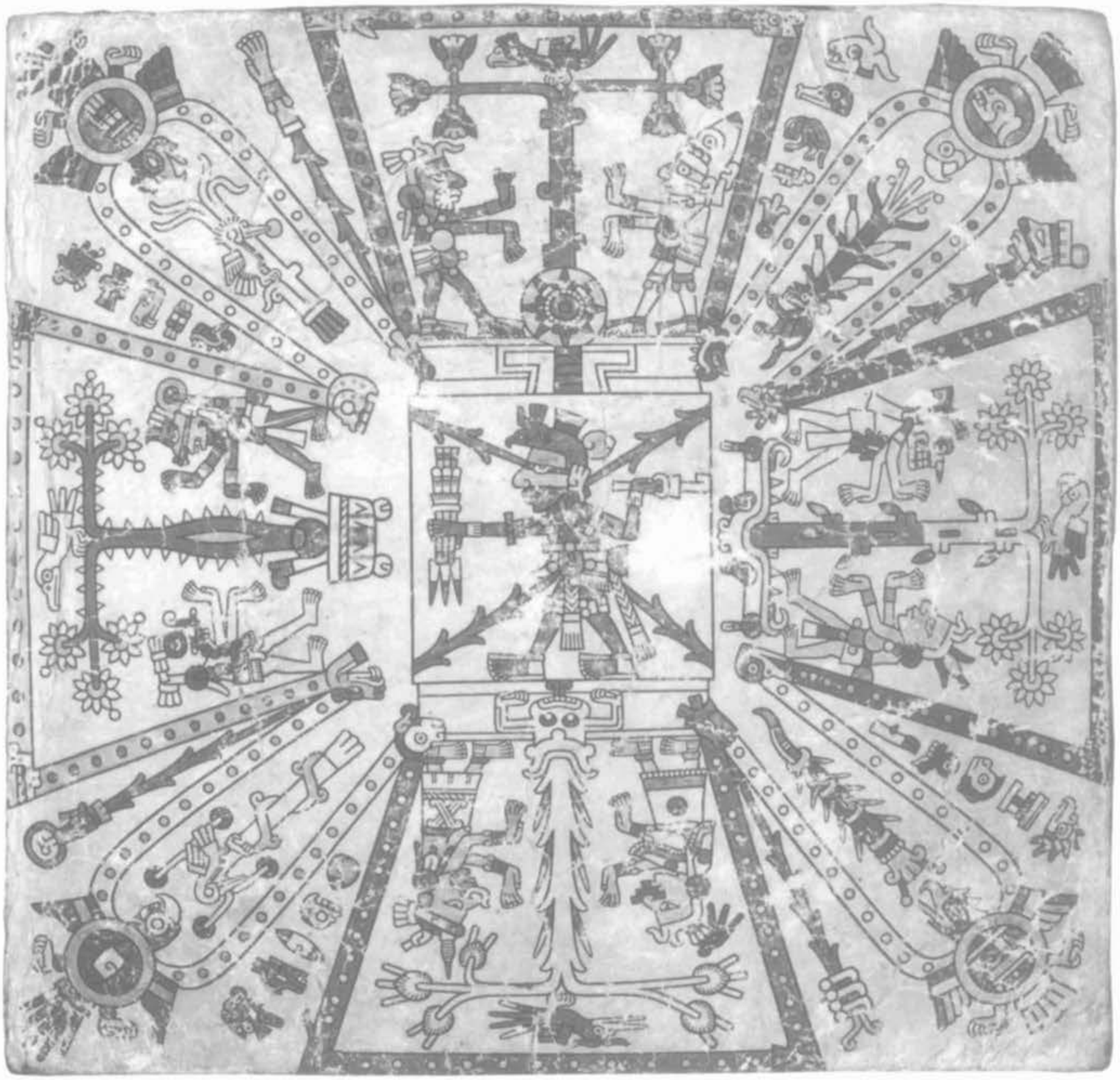


FIG. 5.40. MAP OF THE COSMOS IN THE CODEX FEJÉRVÁRY-MAYER, CA. 1400–1521. This pre-Columbian screenfold manuscript on hide shows a map of the Mesoamerican cosmos, stretching out along four axes toward the four world trees that hold up the corners of the sky. The whole is set within a calendrical day count that takes the shape of a Maltese cross, a Mesoamerican symbol of completion. See also figures 5.41–5.44.
Size of the original: ca. 16.5 × 17.5 cm. Photograph courtesy of the Board of Trustees, National Museums and Galleries on Merseyside, Liverpool Museum (M12014, p. 1).

earth.[127] At the foot of the tree at the top, the sun rises above a temple platform: this is east, which the Aztecs called *tonalquizayampa*, or "place of dawn" (fig. 5.41*a*). The quadrant to the left represents the north, *mictlampa*, "land of the dead," realm of self-sacrifice and death, and is marked by a bowl holding a lump of rubber or resin for incense, a thorn, and a sharpened bone awl to pierce flesh and let blood. To the west was called *cihuatlampa*, "woman's land"; the Aztecs believed that here resided the souls of women who had died in childbirth. At the root

127. "Historia de los Mexicanos por sus pinturas," in *Nueva colección de documentos para la historia de México*, ed. Joaquín García Icazbalceta, vol. 3 (Mexico City, 1891), 228–63, esp. 234.

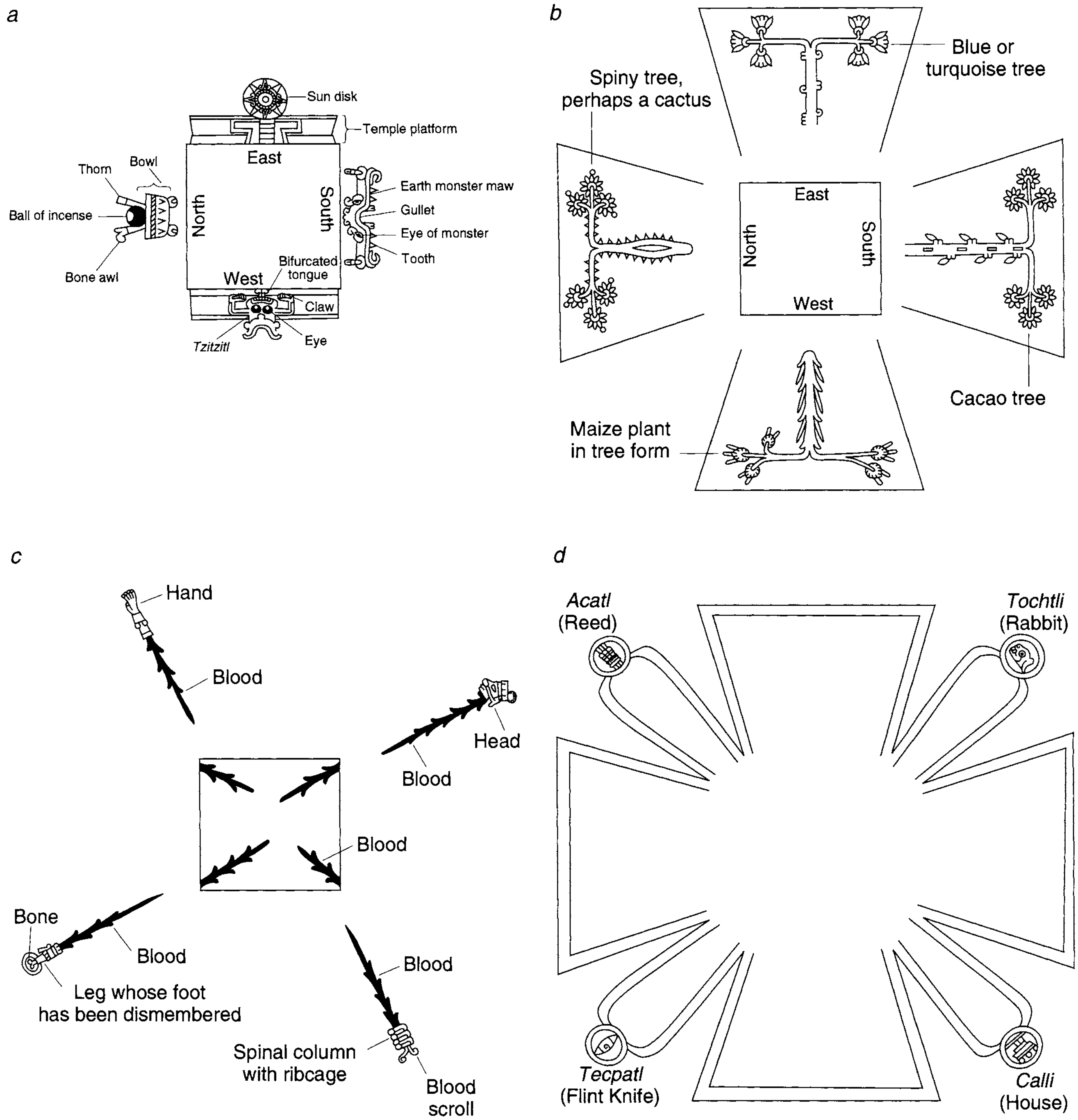


FIG. 5.41. EXPLANATORY DIAGRAMS OF THE CODEX FEJÉRVÁRY-MAYER. (*a*) The center; (*b*) the four world trees; (*c*) the body of Tezcatlipoca, the creator god (his dismembered parts–head, spine, foot, and hand–are seen in the interstices of the four quadrants); and (*d*) circular cartouches of year signs set on the framing Maltese cross.

of the western world tree is a crouching *tzitzitl,* a demon of the dusk, lying in wait for the souls of the unwitting. The southern (*huitztlampa,* "thorny land") world tree rises from the open maw of the earth monster, a frightening yet fecund creature whose reptilian skin covers some plebeian hill symbols in other manuscripts (see figs. 5.9 and 5.12).[128] Each of the world trees on the Codex Fejérváry-Mayer is rendered with distinct attributes (fig. 5.41*b*). To the east grows the blue or turquoise tree; to the west, a maize plant in tree form; to the north, a spiny plant that is likely a cactus; to the south, a tree with pods

128. Sahagún, *Florentine Codex,* 8:21 (bk. 7, chap. 7) and passim (note 7).

on its trunk that are probably cacao pods.[129] These trees roughly correspond to the biogeography of central Mexico: fertile crop lands to the west, deserts to the north, and tropical lowlands to the southeast. The most important direction was the east where, as pictured in the codex, the turquoise tree gave rise to the Turquoise Prince, the name the Aztecs gave to the sun.[130]

Flanking the world trees are four pairs of deities, and an additional deity reigns over the center. Other manuscripts describe these nine gods as the nine lords of the night, showing them presiding over cycles of nine nights. In the Codex Fejérváry-Mayer they are associated with the four cardinal directions and the center. The deities presiding over the western quadrant (*cihuatlampa,* "woman's land") of this diagram are female, wearing skirts instead of the loincloths of men.

The expansive and mythic space of the map collapses at the center; this fifth direction shows the intimacy of a human hearth, symbolized in the central figure of Xiuhtecuhtli, "Fire Lord," an ancient pan-Mesoamerican deity whose ubiquitous shrine was the household hearth.[131] Linking Xiuhtecuhtli, the god of fire, back to the larger cosmos were four streams of blood. As presented in the Codex Fejérváry-Mayer, these currents of blood flow into the center from the body of Tezcatlipoca, the creator god. His dismembered body parts–head, spine, leg, and hand–are seen in the interstices of the four quadrants (fig. 5.41*c*).[132] These streams of blood would remind Mesoamerican viewers of their blood debt to their deities, who had created humans through their own self-sacrifice. These deities demanded blood sacrifice–often from birds or humans–in return.

Although this cosmic diagram of the Codex Fejérváry-Mayer informs us about the shape and Atlantean supports of the earth, its primary function is to integrate the cardinal directions and calendrical time. Around the edges of the flowerlike Maltese cross is the ritual 260-day calendar, counted by meshing twenty day names with numbers one to thirteen. The count of the Codex Fejérváry-Mayer begins in the east, with the first day of the calendar, 1 Crocodile, whose small reptilian head can be glimpsed to the right of the sun and temple platform. The succeeding twelve days, 2 to 13, are ticked off by dots above the crocodile. And then, in the upper corner, the next day, 1 Ocelot, is figured. The count is continued counterclockwise, with every first day of this thirteen-day "week" pictured until the cycle reaches the beginning date of 1 Crocodile again. Thus, as expressed in the Codex Fejérváry-Mayer the cosmos is encapsulated by the perpetual cycle of the passage of days, each oriented toward one of the four cardinal directions.

Years were also associated with directions. At the four corners of the Maltese cross, the four names the Aztecs used for years–Calli (House), Tochtli (Rabbit), Tecpatl (Flint Knife), and Acatl (Reed)–are displayed in circular cartouches (fig. 5.41*d*). This diagram confirms what Aztec written and pictorial sources tell us: that years named Acatl were associated with the east, Tochtli with the south, Calli with the west, and Tecpatl with the north.[133] These directions and years are in turn linked to colors (table 5.4). This close association of space and time may strike the modern viewer as odd or even impenetrable. We may more easily grasp an analogous association of space and time as presented in cartographic histories, where space–in the form of community territory–also dovetails with time, manifest as episodes of human history.

The Codex Madrid is one of the four surviving pre-Hispanic manuscripts made by the Mayas. Two pages of this screenfold are an almanac that is close kin to the frontispiece of the Codex Fejérváry-Mayer (fig. 5.42).[134] Like the Codex Fejérváry-Mayer, the Codex Madrid uses the 260-day calendar composed of named days and counters to create a frame in the rough shape of a Maltese cross. Four sets of hieroglyphs, each at the upper center of one of the quadrants, mark the four directions, making this a picture of the quadripartite division of the world's surface. Unlike the Codex Fejérváry-Mayer, this codex shows west at the top of the pages. Although they lack the Atlantean trees of the Codex Fejérváry-Mayer that stand at the edges of the world, having only one at the center, these pages of the Codex Madrid share with that work an emphasis on the directionality of the calendar days.

A host of examples on ceramics show the simple layout of the cosmic layers. Often the iconography used to show

129. Aveni, *Skywatchers,* 157 (note 57).

130. Sahagún, *Florentine Codex,* 8:1–2 (bk. 7, chap. 1) (note 7).

131. For an analysis of Culhua-Mexica ritual practice, including the multiple roles of Xiuhtecuhtli, see Inga Clendinnen, *Aztecs: An Interpretation* (Cambridge: Cambridge University Press, 1991).

132. Tezcatlipoca's dismemberment may have been reenacted in the Aztec festival of Toxcatl, when a deity impersonator of Tezcatlipoca was sacrificed by heart extraction. Diego Durán, *"Book of the Gods and Rites" and "The Ancient Calendar,"* ed. and trans. Fernando Horcasitas and Doris Heyden (Norman: University of Oklahoma Press, 1971), 107. Most of the elements of the first page of the Codex Fejérváry-Mayer–the world trees and birds, the calendrical counts, the nine lords of the night–are also found on the pages of other members of the Borgia group, such as in the Codex Borgia, pp. 49–52, and Codex Vaticanus 3773, pp. 17–23 and passim. However, only in the Codex Fejérváry-Mayer are they all arranged on the page to correlate to their orientation in space.

133. Durán, *"Book of the Gods,"* 388–93.

134. The similarities between the Madrid and the Fejérváry-Mayer codices were first pointed out by Cyrus Thomas, "Notes on Certain Maya and Mexican Manuscripts," in *Third Annual Report of the Bureau of Ethnology (1881–1882)* (Washington, D.C.: United States Government Printing Office, 1884), 3–65, and discussed by Seler at length in his *Codex Fejérváry-Mayer* (note 126), and again by Ernst Wilhelm Förstemann, *Commentar zur Madrider Mayahandschrift (Codex Tro-Cortesianus)* (Danzig: L. Saunier, 1902), 136.

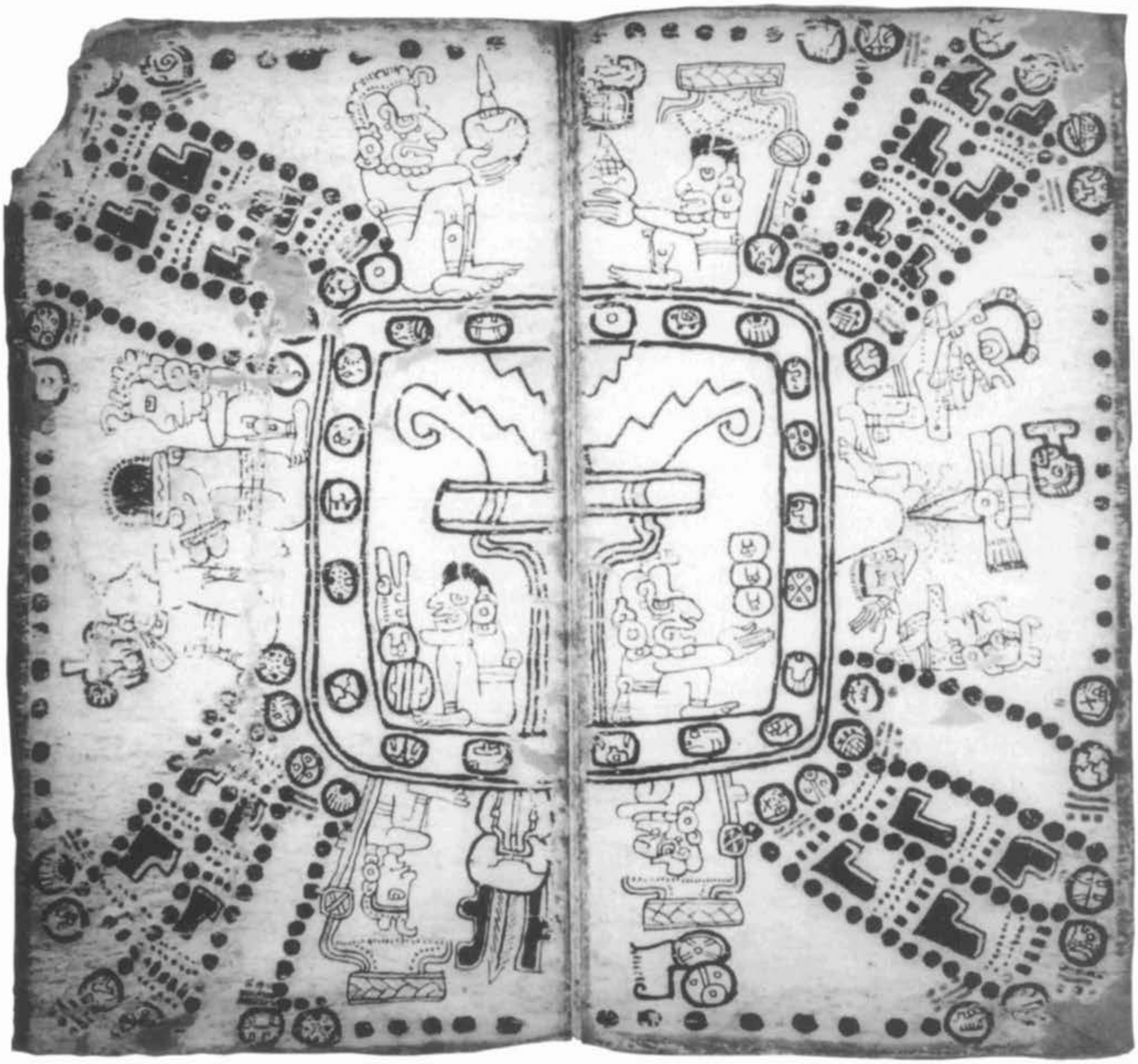


FIG. 5.42. MAYA COSMOGRAPHICAL MAP IN THE CODEX MADRID. These two folios show a Maya cosmographical map akin to that in the central Mexican Codex Fejérváry-Mayer. In this version, the stylized world tree grows from the center of the map, flanked by two deities who are probably the ancestral couple. Each of the quadrants contains a pair of deities engaged in ritual activities; the couple on the right, or northern quadrant, oversee a heart sacrifice of a victim stretched out over a stone. The hieroglyphs that sit at the top center of each quadrant spell, clockwise from the top, west, north, east, and south, marking orientation. Just like the Codex Fejérváry-Mayer, the Codex Madrid anchors the world directions to a 260-day calendar. Beginning at the lower left corner of the inner square is a day count, with every first and thirteenth day named hieroglyphically and the others signaled by black dots serving as counters. This day count creates the framing Maltese cross.
Size of the original: ca. 22.6 × 24.4 cm. Photograph courtesy of the Museo de América, Madrid (fols. 75–76).

the stratified cosmos was far from simple. One Maya tripod plate from the late classic period (A.D. 600–900), for instance, shows the heavens, embodied by the celestial monster, arching along the upper half of the rim (figs. 5.43 and 5.44).[135] The lower half is dominated by the maw of the Underworld monster, and in the plate's center rises the world tree, growing out of the head of Chac Xib Chac, a Maya deity. In typical Maya fashion, this lay-

135. Analyzed and illustrated in Schele and Miller, *Blood of Kings,* 310–12, pl. 122 (note 54). For more examples from Maya ceramics, see Dorie Reents-Budet, *Painting the Maya Universe: Royal Ceramics of the Classic Period* (Durham: Duke University Press, 1994).

out of the cosmos is shown in ornate splendor, with parts of the cosmos symbolized by their deified personifications.

However, in some regions the tripartite cosmos coexisted with a cosmos as layered as a mille-feuille, with at least twenty-one tiers. This layered cosmos appears in the Codex Ríos, a post-Hispanic book produced for European patrons (fig. 5.45).[136] Folios 1v and 2r show the vertical arrangement of the cosmos, slicing through its twenty-one strata like an archaeologist's core sample.[137] The twelve layers of the sky and one of the earth were ruled over by thirteen deities, not all pictured on these two pages but known from other sources. They also presided over a never-ending cycle of thirteen days.[138] Their nocturnal counterparts were the nine lords of the night, pictured on the cosmographical map in the Codex Fejérváry-Mayer. These night deities ruled over the nine regions of the Underworld (which included the earth) through which souls had to pass before reaching a zone of stasis at the bottom. For this reason the Mayas of the classic period (A.D. 250–900) typically buried their rulers in pyramids composed of nine layers, as at Copan (i.e., structure 16), Palenque, and Tikal, to symbolize the nine layers of the dead rulers' Underworld journey.[139]

The conception of the cosmos as divided vertically into layers and horizontally into quadrants, held together by the world tree, was very ancient and is found among works made by the Olmecs. For example, a small square tablet of mottled greenstone, no larger than a cigarette case, dating to 900–500 B.C., is incised with a simple cosmogram. Its four corners are marked with right-angle incisions, as if to emphasize their directions. A mountain rises at its center; at its summit is a world tree. At its base are the three stones of the household hearth, which prefigure by two thousand years the figure of Xiuhtecuhtli, the god of the hearth, found in the cosmogram of the Codex Fejérváry-Mayer.[140] In the wake of the Olmecs, other societies commemorated in sculpture the cosmic model they inherited. Izapa stela 5 dates from 300 B.C.–A.D. 1 (fig. 5.2). At the central axis of the stela stands the world tree; above it is an abstracted sky band, and below it are the primordial waters, shown with a wave pattern.[141] Cosmographic maps, like the Izapa stela, presented the cosmos as immutable and ordered, standing in sharp contrast to the chaotic and hazard-ridden world of humans. Their permanence in an ever-changing world made them images of great force.

Because of their power, cosmographical maps were often used by rulers who cast themselves on a cosmographical stage rather than a terrestrial and mundane one. Mesoamerican rulers were believed to be the semidivine mediators between humans on earth and the deities inhabiting the Upperworld and Underworld.[142] Rulers perpetuated this understanding by commissioning public works that show them as fulcrums of the cosmic order, in life and in death. Thus cosmographical maps often say as much about human affairs as about the shape of the cosmos. In the Maya city of Río Azul, a Maya lord of about A.D 450 was treated as an *axis mundi* in his tomb. The four walls of the tomb were vividly painted with hieroglyphs marking the four directions and associated phenomena: the east was linked to the sun and the south to Venus, and at the center, where the world tree would stand, lay the dead king.[143]

The connection between the dead lord and the world tree is made explicit in the seventh-century sarcophagus lid of Lord Pacal (r. 615–83), a Maya ruler of the city of Palenque, a sculptured counterpart to the Río Azul paintings. This bas-relief limestone panel, set above Pacal's body, lay hidden in its crypt within the nine-layered Temple of the Inscriptions until archaeologists broke its thirteen-hundred-year-old seal in 1952. The lid shows Pacal as the linchpin of a cosmic map (fig. 5.46).[144]

136. The Codex Ríos was an Italian copy of an earlier book, now lost, that was composed by Nahuatl-speaking artists and that reproduces within it pre-Hispanic screenfolds. See Stacey Simons, *The Codex Ríos*, Vanderbilt University Publications in Anthropology, forthcoming.

137. The model presented in the Codex Ríos may not have been the standard one. A different version of the nine Underworld layers was described by Sahagún, *Florentine Codex*, 4:43–44 (bk. 3, appendix, chap. 1) (note 7). These versions and others are collated, compared, and discussed in Nicholson, "Religion" (note 126).

138. This thirteen-layered heaven may be a variation on an earlier nine-layered one. See Nicholson, "Religion."

139. On Copan, see Miller, "Main Acropolis," 165–66 (note 16); on Palenque, see Alberto Ruz Lhuillier, *El Templo de las Inscripciones, Palenque* (Mexico City: Instituto Nacional de Antropología e Historia, 1973); and on Tikal, see Aubrey S. Trik, "The Splendid Tomb of Temple I at Tikal, Guatemala," *Expedition* 6, no. 1 (1963): 2–18, and Michael D. Coe, "The Funerary Temple among the Classic Maya," *Southwestern Journal of Anthropology* 12 (1956): 387–94.

140. The catalog entry for the piece in *The Olmec World: Ritual and Rulership* (Princeton: Art Museum, Princeton University, 1995), 234, discusses the correlation of the cosmic model with the architecture of the Olmec site of La Venta, and Schele, "Olmec Mountain" (note 16), discusses further elaborations of cosmograms in Olmec art and architecture. See also Frank Kent Reilly, "Visions to Another World: Art, Shamanism, and Political Power in Middle Formative Mesoamerica" (Ph.D. diss., University of Texas at Austin, 1994).

141. V. Garth Norman, *Izapa Sculpture*, 2 pts., Papers of the New World Archaeological Foundation 30 (Provo: New World Archaeological Foundation, 1973–76), pt. 2, 165–236. Norman compares this world tree with others from Mesoamerica (pt. 2, 65–67).

142. For a fuller explanation of the role of Maya kings, see Schele and Miller, *Blood of Kings* (note 54). For the Aztecs, see Richard F. Townsend, *State and Cosmos in the Art of Tenochtitlan*, Studies in Pre-Columbian Art and Archaeology 20 (Washington, D.C.: Dumbarton Oaks, 1979). Susan D. Gillespie, "Power, Pathways, and Appropriations in Mesoamerican Art," in *Imagery and Creativity: Ethnoaesthetics and Art Worlds in the Americas*, ed. Dorothea S. Whitten and Norman E. Whitten (Tucson: University of Arizona Press, 1993), 67–107.

143. Ian Graham, "Looters Rob Graves and History," *National Geographic* 169 (1986): 452–60, esp. 456, and Freidel, Schele, and Parker, *Maya Cosmos*, 72, 418–19 (note 56).

144. On the sarcophagus lid, see Schele and Miller, *Blood of Kings*, 282–85, and 306 n. 2 (note 54); Linda Schele and David A. Freidel, *A Forest of Kings: The Untold Story of the Ancient Maya* (New York:

FIG. 5.43. MAYA TRIPOD PLATE. While many known cosmographical maps appear in manuscripts or on sculpture, they are also found on ceramics. The goal of the iconography on this elegant plate is to render the layout of the cosmos, and it accomplishes this through visual analogies and metaphors. Its fine drawing was likely derived from manuscript painting; this "codex style" plate may have shared its subject matter, as well as style, with the codices of its era.
Diameter of the original: ca. 31 cm. By permission of Barbara and Justin Kerr, New York.

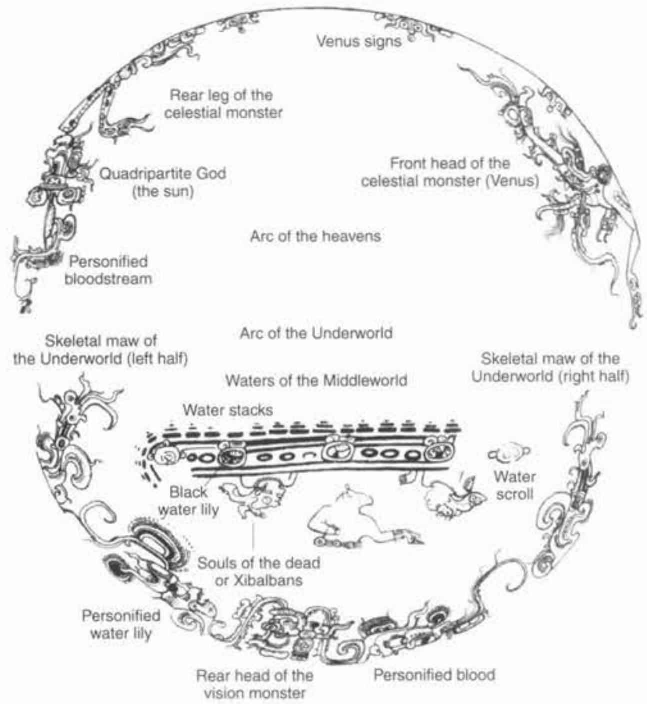


FIG. 5.44. DRAWING OF MAYA TRIPOD PLATE (FIG. 5.43). The upper rim of the plate is lined with the elongated body of the celestial monster, which embodied the sky, while the lower rim shows the maw of the Underworld. The wide black circles and lines running horizontally along the lower third of the plate represent waters on the earth's surface. The hieroglyphic text of the plate further describes the celestial events that are pictured taking place within this cosmographical map: the rising of Venus as evening star.
After Linda Schele and Mary Ellen Miller, *The Blood of Kings: Dynasty and Ritual in Maya Art* (New York: George Braziller, 1986), pl. 122c (p. 310).

Pacal–with Xibalba, or the Underworld, below and the heavens above–is at the center of the cosmic levels. A monument with an emphasis similar to that of Pacal's sarcophagus lid was made eight centuries later to commemorate the brief reign of the Culhua-Mexica ruler Tizoc, who headed the Aztec empire from 1481 to 1486. This disk of stone (fig. 5.47), set like a wheel on its side, shows Culhua-Mexica warriors repeatedly taking captives along the circular band. Most prominent among the warriors is the one named as Tizoc (far left in drawing, fig. 5.48), whose costumed figure stands like a pillar to keep the sky band above him from collapsing onto the earthly crocodile below his feet.[145]

These sculptured examples–a few among many–show us the antiquity of the cosmographical map and its long association with rulers.[146] Many cosmographical maps were large public monuments–Izapa stela 5 was set up facing a large open plaza[147]–and thus their iconography was simple and writ large, with heavens above and Underworld below. Manuscripts and elite painted ceramics, on the other hand, were meant for close and careful scrutiny and therefore could articulate an understanding of the cosmos that was more complex, meant for the very few. Such is the case for the Maya tripod plate and the sarcophagus lid of Pacal. For us such complex images resist facile interpretation.

Just as rulers used cosmographical maps to situate themselves in the cosmos, one city did as well. We have compared the Codex Mendoza map of Tenochtitlan (fig. 5.6) with a coeval European map, but this Culhua-Mexica map calls out to be compared with the cosmic map of the Codex Fejérváry-Mayer (fig. 5.40). The map of Tenochtitlan declares its affiliation with cosmographical maps by its mimicry of forms. Out from its center

William Morrow, 1990), 225–26, 231, and passim; and Freidel, Schele, and Parker, *Maya Cosmos,* 77–79.

145. Charles R. Wicke, "Once More around the Tizoc Stone: A Reconsideration," in *Actas del XLI Congreso Internacional de Americanistas (1974),* 3 vols. (Mexico City: Instituto Nacional de Antropología e Historia, 1975), 2:209–22, and Townsend, *State and Cosmos,* 43–49 (note 142).

146. See Schele, "Olmec Mountain" (note 16).

147. Gareth W. Lowe, Thomas A. Lee, and Eduardo Martínez Espinosa, *Izapa: An Introduction to the Ruins and Monuments,* Papers of the New World Archaeological Foundation, no. 31 (Provo: New World Archaeological Foundation, 1976), 158–77.

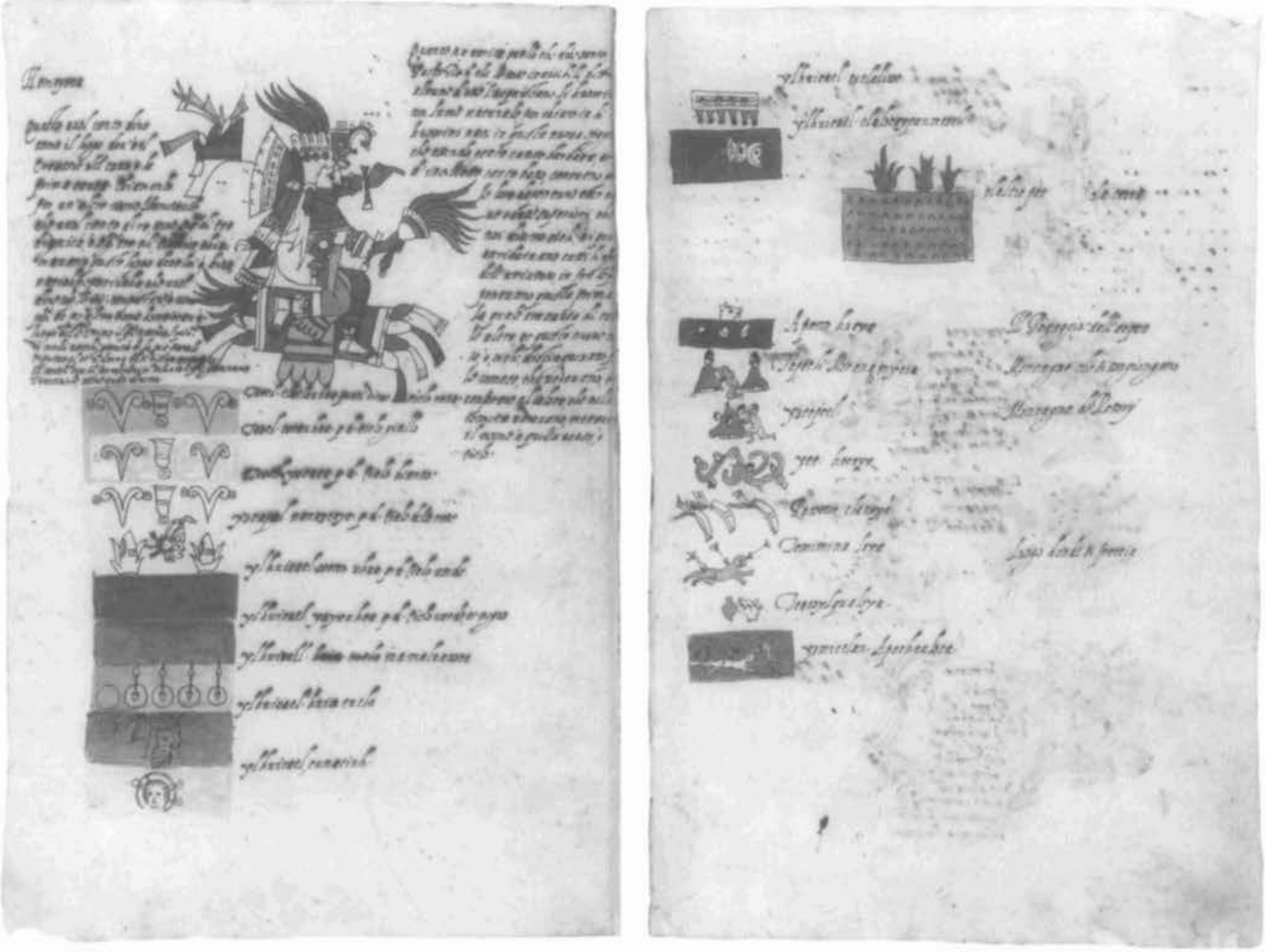


FIG. 5.45. COSMOGRAPHICAL MAP FROM THE CODEX RÍOS. This map, from a colonial book (paint and ink on European paper), shows the cosmographical layers: thirteen of sky and nine of Underworld (the earth is counted as both a sky and an Underworld level). In the middle of the cosmos, seen in the upper center of the second page, the cultivated earth (*tlalticpac*) yields food plants. Above the earth on folio 2r and at the bottom of folio 1v, eleven additional layers of the heavens are shown, many of them different colors; at the top layer is a creator deity, Ometeotl. The eight additional layers of the Underworld are pictured below the earth, each with a small picture of the elements encountered there. The Codex Ríos gives the names of these celestial and Underworld layers in Nahuatl and Italian as (13) Hometeule (Ometeotl); (12) Teotl Tlatlauhea, Red Sky; (11) Teotl Cocauhea, Yellow Sky; (10) Teotl Yztaca, White Sky; (9) Yztapal Nanazcaya, Sky of the Roses; (8) Ylhuicatl Xoxouhca, Green Sky; (7) Ylhuicatl Yayauhea, Green and Black Sky; (6) Ylhuicatl Mamaluacoca; (5) Ylhuicatl Huix Tutla; (4) Ylhuicatl Tunatiuh; (3) Ylhuicatl Tztlalicoe; (2) Ylhuicatl Tlalocaypanmeztli; (1) Tlaltic Pac, the Earth. The layers of the Underworld are given as (1) Tlaltic Pac, the Earth; (2) Apano Huaya, the Passing of Water; (3) Tepetli Monana Mycia, the Mountains That Clash; (4) Yztepetl, the Mountains of the Knives; (5) Yee Hecaya; (6) Pacoecoe Tlacaya; (7) Temimina Loya, Place Where One Shoots Arrows at Oneself; (8) Tecoylqualoya; (9) Yzmictlan Apochcaloca. The Codex Ríos explains many Aztec religious beliefs. It is an Italian copy of a lost original that seems to have been commissioned by Catholic priests to explain aspects of native culture to Europeans. Although the schema of the cosmos pictured here is consistent with other written sources, no other such map exists, and this graphic rendering of the cosmic order may have been created at the behest of a friar.
Size of each folio: 46 × 29 cm. Photographs courtesy of the Biblioteca Apostolica Vaticana, Rome (Vat. Lat. 3738, fols. 1v–2r).

stretch four blue bands, dividing Tenochtitlan into its four quadrants; out from the center of the cosmographical map in the Codex Fejérváry-Mayer stretch four rivers of blood, dividing the cosmos into the four directions. The outermost frame of the Codex Mendoza page is a series of year dates, each within a blue rectangle; the flowerlike border of the Codex Fejérváry-Mayer map is a day count. These formal similarities were purposeful: the Aztec artist meant to show how the meshing of space and time and history within the human world echoed the cosmic order. This same pattern of modeling human space on the perceived cosmic order pervades the Quiché Maya myth, the *Popol Vuh*. In one section, for instance, the road to Xibalba, the ghastly home of the gods of death and putrefaction, shares a number of physical similarities with the road into the lowlands of the Petén, where the Itzás, enemies of the Quichés, once lived, and which to the Quichés today is still "an abode of evil." [148] These concerns for integrating human activity with cosmic order are also evident in all Mesoamerican maps, whether cosmological, terrestrial, or both.

CELESTIAL MAPS

All Mesoamerican peoples kept close track of the movements of the planets and constellations.[149] The cynosure of their firmament was Venus, believed by the Aztecs and other peoples of central Mexico to be the deity Quetzalcoatl. Mesoamerican astronomers observed Venus during its 584-day cycle as it transmuted from morning star to evening star and disappeared altogether during its superior and inferior conjunctions with the sun. They also watched the Pleiades, whose appearances often coincided with cyclical beginnings in the agricultural year. In addition, Mesoamericans planned their cities so that buildings were aligned with important celestial events; they also built structures that were meant as observatories.

We have long known of Mesoamericans' keen interest in the night sky but are only beginning to understand the nature and scope of their celestial maps. Mesoamericans had names for the constellations, just as we do, and recorded such groups of stars with "embodied maps." Just as Westerners have used the figure of twin boys to show the arrangement of the stars in the constellation Gemini, the Mayas used the figure of copulating peccaries. For the Mayas, the three stars in the belt of Orion studded the back of a turtle. These "embodied maps" could be combined into larger maps. For instance, on the painted north wall of room 2 at Bonampak, a classic Maya city, four cartouches appear above the main scene.[150] The outermost show the peccary pair on the left and a turtle on the right. In between are two crouching figures, believed to represent the planets Mars and Saturn. The main scene of this Bonampak mural shows a battle waged on 6 August 792. As pointed out by Schele, this line of figures roughly captures the planimetry of these four constellations and planets on that very night

FIG. 5.46. SARCOPHAGUS LID OF PACAL. Pacal, the Maya ruler of Palenque, is the central figure of his sarcophagus lid. He is seen slightly reclining, gazing upward. Cradling his body are the jaws of the Underworld; their tips touch the base of his neck and his upraised knee. Since these jaws mark the entrance to Xibalba, or the Underworld, we are meant to see Pacal as he leaves the middle world of human life and falls into the Underworld of the dead. A cross-shaped world tree grows out of Pacal's loins; at its top sits a celestial bird, much like the ones on the cosmographical map in the Codex Fejérváry-Mayer. The narrow top band of the lid is marked with symbols for both sun and night and thus is meant to represent the sky. By showing Pacal as the fulcrum of this world order, the Mayas meant both to honor their dead king and to reassert the central role that rulers played in the ordering of their cosmos. Size of the original: 372 × 217 cm. By permission of Merle Greene Robertson, San Francisco.

148. Tedlock, *Popol Vuh*, 116, 354 (note 59); the connection of Xibalba with the home of the Itzá is supplied by Delia Goetz and Sylvanus Griswold Morley, from the translation by Adrián Recinos, *Popol Vuh: The Sacred Book of the Ancient Quiché Maya* (Norman: University of Oklahoma Press, 1950), 114 n. 6.

149. Aveni, *Skywatchers* (note 57); Anthony F. Aveni, ed., *Archaeoastronomy in Pre-Columbian America* (Austin: University of Texas Press, 1975); and Anthony F. Aveni, ed., *Native American Astronomy* (Austin: University of Texas Press, 1977).

150. Mary Ellen Miller, *The Murals of Bonampak* (Princeton: Princeton University Press, 1986), 30–38, and Freidel, Schele, and Parker, *Maya Cosmos*, 59–122 (note 56) (these authors identify thirteen Maya constellations–a Maya zodiac–in the Paris Codex).

FIG. 5.47. THE TIZOC STONE. This large drum-shaped stone was carved for the Culhua-Mexica ruler Tizoc to commemorate his conquests and those of previous rulers. It shows both how prevalent cosmographical maps were and the way ruling elites used cosmic iconography for their own political ends.
Size of the original: 90 cm high, 270 cm in diameter. Photograph courtesy of the Instituto Nacional de Antropología e Historia, Museo Nacional de Antropología, Mexico City.

and thus is a somewhat abbreviated map of part of the night sky.[151]

The Aztecs may have made similar maps of the night sky, but only a fragmentary record of their ideas of the constellations survives. The Primeros memoriales, the book compiled by Sahagún and his Aztec informants, pictures constellations on pages that deal with indigenous astrology (fig. 5.49).[152] Other depictions of what seem to be constellations also appear on the edges of the pre-Columbian Aztec Calendar Stone.[153]

The constellation maps seem austere when compared with the orchestral intricacy of celestial mapping that we see in the Codex Borgia, one of the pre-Columbian manuscripts from central Mexico. The Codex Borgia is one of

151. Freidel, Schele, and Parker, *Maya Cosmos,* 79–82.

152. Sahagún, *Primeros memoriales* (Códice Matritense del Palacio Real del Madrid) (note 116). The constellations are also discussed in Sahagún, *Florentine Codex,* 8:11–15 and 60–71 (bk. 7, chaps. 3–4, and bk. 7, appendix, chaps. 3–4) (note 7).

153. Aveni, *Skywatchers,* 32–34 (note 57).

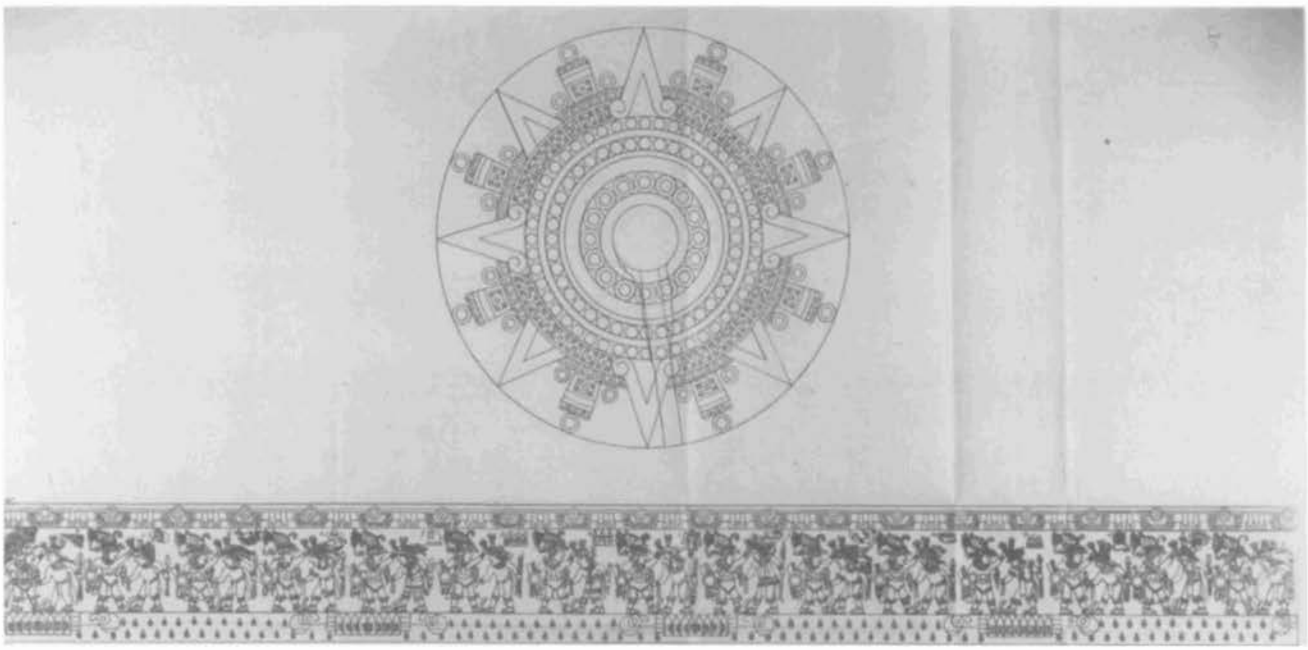
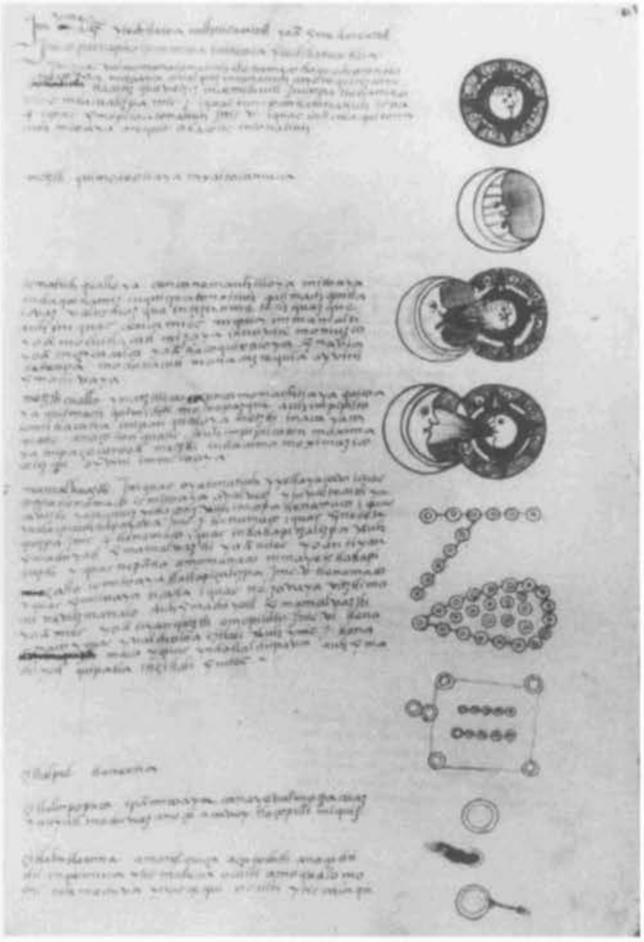


FIG. 5.48. DRAWING OF THE TIZOC STONE. On the top of the stone, a radiant solar disk is incised, and a narrow band representing the sky lines the top edge of the side frieze. Beneath this sky band, fifteen Culhua-Mexica warriors are shown, dressed in elaborate battle costume, each one grasping a hank of his captive enemy's hair. The principal warrior is hieroglyphically named as Tizoc, and he stands with his feet on the earth monster, whose four open mouths punctuate the lower register. The feathers of Tizoc's headdress seem to support the upper sky band. This composition puts Tizoc in the place of the world tree, keeping earth and sky apart. This powerful image of Tizoc–as conquering hero and *axis mundi*–was pure propaganda. A weak ruler and an ineffectual warrior, he lasted only five years on the throne and was probably assassinated by rivals.
From Manuel Orozco y Berra, "El cuauhxicalli de Tizoc," *Anales del Museo Nacional de México* 1 (1877): 3–38, esp. fig. 20. Photograph courtesy of Special Collections and Rare Books, Wilson Library, University of Minnesota, Minneapolis.



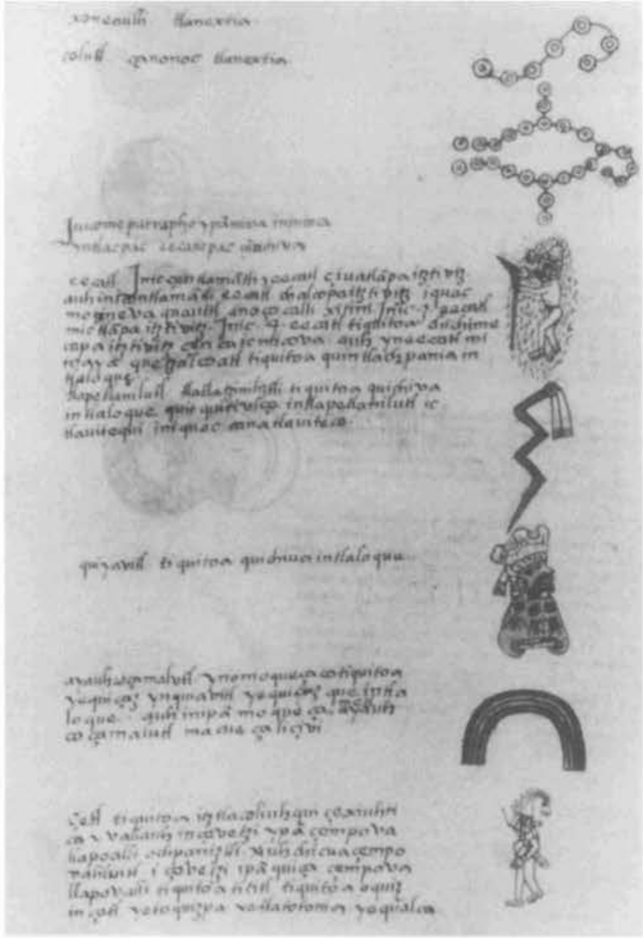


FIG. 5.49. CONSTELLATIONS OF THE PRIMEROS MEMORIALES. A few pages of this postconquest book deal with indigenous astrology; the eight figures shown here (the last six on the recto and first two on the verso) are accompanied by a Nahuatl text that describes them. The first, T-shaped constellation is Mamalhuaztli (the Drill), below it is Tiyanquiztli (the Marketplace), and below that is Citlaltlachtli (Starry Ball Court). The three circular figures below these constellations are Citlapol (Venus), a Citlalinpopuca (a smoking star or comet), and Citlalintlamina (a shooting star). The final two constellations, on the verso page, are described as Xonecuilli (Staff) and Colutl (Scorpion). Some of these constellations can be anchored to modern ones: Tiyanquiztli is certainly the Pleiades; Colutl is Scorpio; and Mamalhuaztli may be the Sword of Orion. The Aztecs may have combined pictures of different constellations like these into maps of the night sky as did the Mayas.
Size of each folio: ca. 43 × 23 cm. Copyright © Patrimonio Nacional, Biblioteca del Palacio Real, Madrid (Códice Matriense, fols. 282r–v).

the most beautiful of the extant pre-Hispanic codices; dense with calendrical and divinatory imagery, it is certainly one of the most complex. Eighteen of its pages (29–46) map the first part of a complete cycle of Venus (plate 10).[154] They track Venus as it moved from being the morning star into its period of superior conjunction (when it was invisible, blocked by the sun), then into its appearance as evening star.[155] When Venus rises in the night sky, descends below the horizon, and then rises again, the Codex Borgia pictures it as moving through various celestial levels, like those of the Codex Ríos.

The celestial travels of Venus are shown metaphorically. Although modern scholars cannot yet interpret the meanings of all the figures and activities on these eighteen pages of the Codex Borgia, we understand some of the basic metaphors used. Venus is pictured as a variety of deities, among them Quetzalcoatl, the wind god Ehecatl-

154. See Seler, *Comentarios al Códice Borgia,* 2:9–61 (note 126). Karl A. Taube discusses one of the scenes on these Codex Borgia pages in "The Teotihuacan Cave of Origin: The Iconography and Architecture of Emergence Mythology in Mesoamerica and the American Southwest," *Res* 12 (1986): 51–82.

155. I adhere to the interpretation offered by Susan Milbrath, who argues convincingly that the Codex Borgia depicts the morning star–superior conjunction–evening star part of the Venus cycle. She parts company with Eduard Seler, who interprets these pages as the superior conjunction–evening star–inferior conjuction–morning star: Susan Milbrath, "A Seasonal Calendar with Venus Periods in Codex Borgia," in *The Imagination of Matter: Religion and Ecology in Mesoamerican Traditions,* ed. David Carrasco (Oxford: British Archaeological Reports, 1989), 103–27.

Quetzalcoatl, the monstrous canine Xolotl, and Tlahuizcalpantecuhtli or "Dawn Lord." When Venus was visible, Mesoamericans held that it was traveling through the sky of the Upperworld. When it was invisible, they believed it was traveling through the sky of the Underworld, or the sky of the nighttime sun.

As with the Codex Fejérváry-Mayer, the eighteen pages of the Codex Borgia are as much maps as they are calendars. In the schema offered by Susan Milbrath, each of these eighteen pages covers one twenty-day period, the Mesoamerican month, using a tableau to show the Venus events of that month. The first ten pages (29–38) represent two hundred days when Venus is visible as morning star. In them, Quetzalcoatl is pictured in regions of the upper sky. On page 39, Quetzalcoatl plunges into the horizon, shown as the gaping maw of an earth monster, to enter the Underworld. This represents Venus's disappearance from the morning sky as it passes below the horizon, in superior conjunction with the sun. The next four pages show Quetzalcoatl passing through four Underworld layers during the planet's period of invisibility. On page 44 Venus, resplendent in a suit of hummingbird feathers, rises like a phoenix to become the evening star.[156]

The various stations Venus passes through are meant to be understood as the discrete levels of the sky, analogous to the cosmographical map in the Codex Ríos (fig. 5.45). Venus is like an elevator moving through a multistory building, and to show these as horizontal levels, the artist of the Codex Borgia took the unusual step of reorienting this part of the screenfold manuscript. It is read not right to left but up to down. Thus the bottom of page 29 is above the top of page 30, and the whole set of pages can be stretched out into a long vertical column. Most of the pages are framed by a border figure, and Venus is sometimes seen diving through the upper border into the page, or crashing though the lower border out of the page, as it moves through one layer to the next. In short, pages 29–46 of the Codex Borgia are an intricate itinerary map of the travels of Venus through the skies.

But in other codices the movements of Venus and its transformations were recorded in tables, not with maps. Of the four surviving Maya manuscripts, three–the Dresden, the Grolier, and the Paris–include elaborate tables of astrological phenomena, the Dresden Codex being most notable for its extensive tables of the movements of Venus. Many pages of the Dresden Codex, for example, show us dates and auguries associated with Venus, as well as numerical tables that mark periods in its 584-day cycle.[157] Although this tabular accounting allowed Mesoamerican astronomers to closely track Venus, it cannot be considered cartographic. Nonetheless, the intricacy of a map like that of the Codex Borgia makes it probable that a rich tradition of maps that were both celestial and cosmographical did once exist.

Continuations of Native Mapping after the Conquest

The Spanish conquest hit native Mesoamericans with cataclysmic force, bringing an end to a culturally and politically autonomous Mesoamerica. In the space of a few years, millions of indigenous Americans were forced to reshape their social, political, and religious systems to accommodate Spanish colonial rule. Indigenous cartography was also refashioned. Among all the changes that took place in the lives of Mesoamerican peoples after the conquest, five central ones had a measurable effect on cartography. Three had a great impact on the content of maps, and two affected their format and appearance. The great demographic collapse Mesoamerica suffered during the sixteenth century altered the historical component of its cartographic history. The religious conversion to Catholicism effectively put an end to cosmographical mapping. In contrast, the introduction of a new kind of judicial system enlivened terrestrial mapping, particularly boundary maps. Both the advent of alphabetic literacy and the introduction of new modes of representation dramatically changed the visible way Mesoamericans mapped their world.

Demographic Collapse and the Writing of History

Perhaps only a tenth of all Mesoamericans survived the wars of conquest and the ravaging epidemics of 1520–21, 1545–48, and 1576–81, as well as others in the intervening years.[158] We can only imagine the shattering effect such a holocaust had on the Mesoamerican psyche: within a mere two generations Mesoamericans not only had been defeated and enslaved, they were–inexplicably from their perspective–dying.

We cannot gauge to what degree indigenous cartographic production decreased following the conquest, since the surviving maps date mostly from the postconquest period. But a decrease in the numbers of maps was inevitable, given the wide-scale demographic collapse. Not only was the production of maps affected, so was the subject matter of cartographic histories, the mainstay of the tradition. Cartographic histories would often picture genealogies and activities of ruling elites, but the 1580 map of Amoltepec (fig. 5.25) shows only the current rulers of this Mixtec town sitting within their palace. By

156. Pages 45 and 46 are likewise devoted to Venus as evening star. Milbrath, "Seasonal Calendar."

157. Aveni describes the content of these pages in *Skywatchers*, 173–99 (note 57). Thompson, *Dresden Codex*, 62–71 (covers Dresden 24, 46–50) (note 5).

158. On the number of epidemics, see Gerhard, *Historical Geography*, 23 (note 2).

1555 Amoltepec had been almost depopulated by disease and migration.[159] The effect of Amoltepec's depopulation seems to present itself on the map: only the contemporary rulers–not the full spectrum of their ancestors–are shown in the center. Among the Mixtecs, the once great lineages were in tatters, and across Mesoamerica the voice of indigenous history fell silent.

RELIGIOUS CONVERSION AND COSMOGRAPHICAL MAPS

In the wake of the Spanish conquerors came Catholic friars, whose mendicant orders had been given the special papal privilege of converting Amerindians. Living in native communities and learning native languages, the friars had daily access to postconquest Mesoamericans and exerted the greatest influence on their lives. They tried to reshape native ideologies to meet Catholic criteria; to this end they zealously burned books and manuscripts and smashed stone statues and tablets. Among the artifacts lost would have been native maps of the cosmos like the one in the Codex Fejérváry-Mayer or the Tizoc Stone; the mendicants found intolerable the images of "pagan" gods and "demonic" ritual they saw in them. Manuscripts devoted to religious matters survived only because of their value as curiosities in the eyes of European collectors; most surviving cosmographical maps, housed within ritual-calendrical manuscripts, are found today in Europe and bear the names of their European collectors (like the Codex Fejérváry-Mayer and the Codex Borgia). Sculpture was either buried or recut to be used in new building projects; the Tizoc Stone was unearthed in 1791, only to face being cut into paving stones before it was rescued.[160]

The friars banned and burned native religious books, but then sponsored books that would explain native belief and practice to Europeans. Thus they encouraged the making of some new cosmographical maps and in doing so may have actually fostered a map unknown before the conquest, like that in the Codex Ríos. But on the whole, drained of the vivifying anima of ritual practice, native religious manuscripts ceased to be made, and with them manuscript maps of the native cosmos. Cosmographical maps on other media, like ceramics or stone, were also censored and eventually disappeared.

JUDICIAL SYSTEMS AND TERRITORIAL MAPS

Although some avenues of Mesoamerican cartographic expression closed as a result of the conquest, others opened up. Friars may have suppressed the production and use of cosmographical maps, but they, and Spanish administrators, were concerned about falling population and the shrinking labor pool. They attempted some protection of native resources by encouraging Mesoamericans to make terrestrial maps in the first half-century after the conquest. They advocated the use of maps in courts to prove possession, and sixteenth-century documents are full of references to native individuals or communities presenting *pinturas* (almost certainly maps) to the courts. For instance, the Maya map of Maní was probably made at the behest of Spanish adjudicators who wanted to put an end to the innumerable boundary squabbles among these Mayas.[161] The first viceroy of Mexico, Antonio de Mendoza (r. 1535–50), saw that maps were added to the numerous textual documents required in the land grant (*merced*) process, by which the viceroy would allocate lands to inhabitants, usually colonists, to farm or raise livestock. Doubtless Mendoza added the map clause to give native communities an opportunity to prove or disprove the availability of land (figs. 5.50 and 5.51).[162] In addition, when native communities sought protection against encroachment on their territories, they often presented maps as evidence on their side in Spanish-run courts.

Once Mesoamerican territorial maps were accepted in Spanish adjudications, their content shifted; the new Spanish audience and their demands may have unknowingly driven a wedge between the two parts of the once seamless cartographic history. For instance, we saw how with a cartographic history like that of the Lienzo of Zacatepec 1 (fig. 5.13), a community's rights to territory rested on both its possession of territory and the historical claims of its ruling line. But to Spanish officials and adjudicators, possession was nine-tenths of the law. Thus later Mesoamerican artists were likely to emphasize boundaries–to which the Spanish granted full recognition–and deemphasize genealogy. In the 1580 map from the Mixtec town of Amoltepec (fig. 5.25), the emphasis falls on the clearly expressed boundary symbols rather than the lineage of the ruling elite. And the map of Atlatlahuacan (fig. 5.50), an indigenous map made specifically for the viceregal court, shows little more than settlements and boundaries.

It is difficult to measure how successful maps proved in protecting indigenous lands from encroachment, usually by Spaniards, since so many court records that contain maps are incomplete. Moreover, even if a native community could prove its ownership in court, this was no guarantee that the colonial government was able (or willing) to protect these rights on the ground.

159. Gerhard, *Historical Geography*, 277.

160. Marshall Howard Saville, *Tizoc: Great Lord of the Aztecs, 1481–1486*, Contributions from the Museum of the American Indian, Heye Foundation, vol. 7, no. 4 (New York: Museum of the American Indian, Heye Foundation, 1929), 44–45.

161. Roys, *Indian Background*, 178 (note 8); Riese, *Indianische Landrechte*, 175–77 (note 75).

162. *Mercedes* maps are discussed in Mundy, *Mapping of New Spain*, 180–211 (note 81).

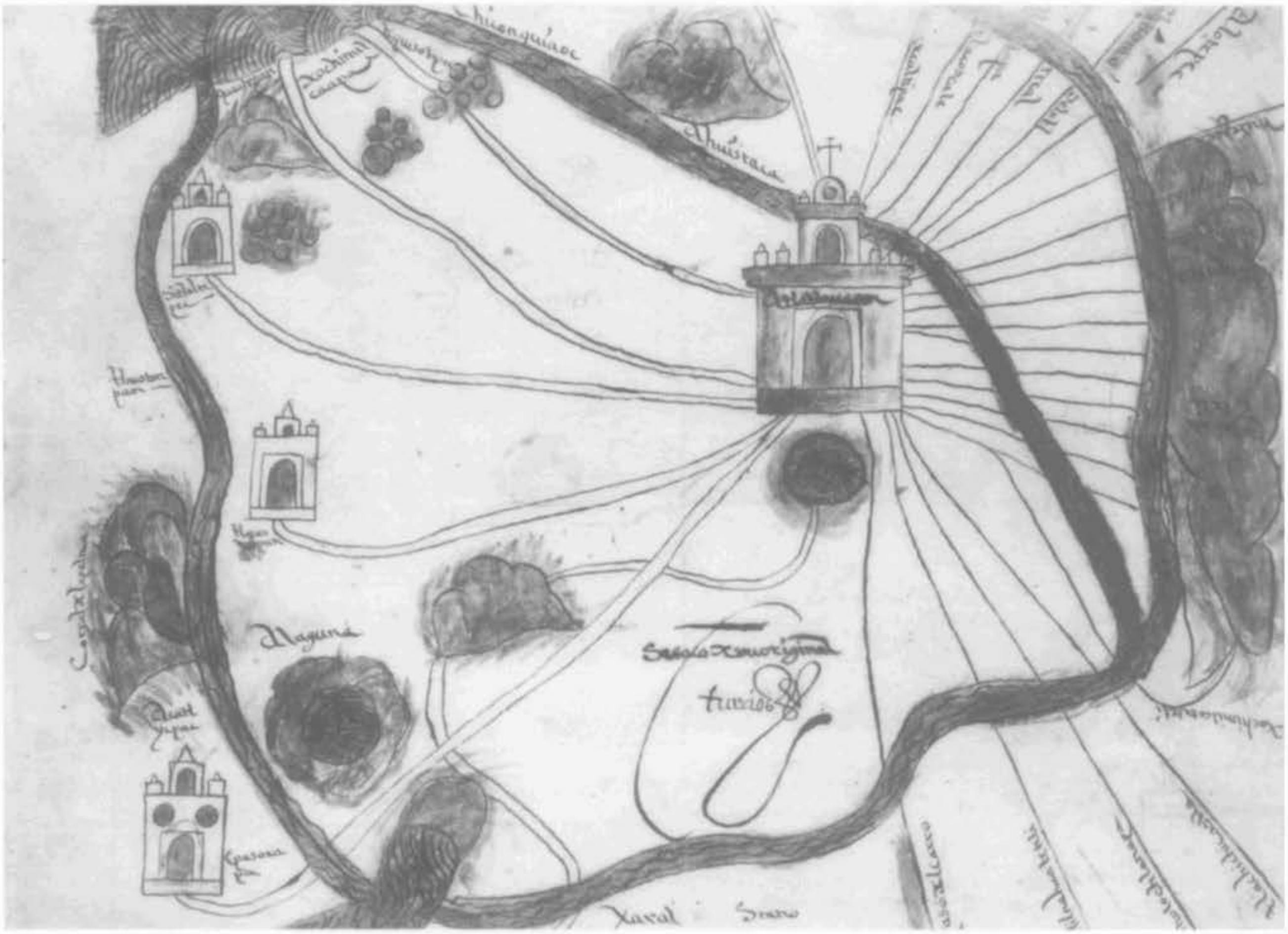


FIG. 5.50. BOUNDARY MAP OF ATLATLAHUACAN, MORELOS. This manuscript map was used to establish and protect the boundaries of the community of Atlatlahuacan in 1539, during the viceroyalty of Antonio de Mendoza. At its center sits the church of Atlatlahuacan, symbolizing the town. Radiating out from the right of the church are single lines, each leading to a boundary of the community. The double lines emanating from the left side of the church symbolize roads, three of them leading to dependencies of Atlatlahuacan, shown by smaller churches. The upper left corner is dominated by hills, and a system of rivers, shown by thick dark bands, loops through the region. The gloss in the center of the map proclaims it to be a copy, and perhaps the original was an indigenous-style boundary map that would have contained the same information but conveyed it through hieroglyphic place-names and symbols rather than alphabetic script. This map and related documents were used as late as 1853 to establish Atlatlahuacan's claim to surrounding lands.
Size of the original: 25 × 34 cm. Photograph courtesy of the Archivo General de la Nación, Mexico City (Ramo Tierras, vol. 11, pt. 1a, exp. 2; Mapoteca no. 546).

VISUAL CHANGES: ALPHABETIC WRITING AND CARTOGRAPHIC CONVENTIONS

In the material record of Mesoamerican cartography, the Spanish conquest presents us with one inescapable fact: the look of maps changed. A preconquest fifteenth-century map, like the one in the Codex Nuttall (fig. 5.26), bears little resemblance to an early seventeenth-century map from the same region. By the end of the sixteenth century, few maps carried on native convention. One reason is that Mesoamericans gradually converted their hieroglyphs into alphabetic writing. The latter was in some respects a more efficient way of communicating, but most important, it was understood by the Spanish ruling classes. For native maps to have any effect in Spanish-run spheres, such as the courts, they had to be legible to Spaniards. Native elites were quick to learn to write alphabetically. They were initially taught by mendicant friars who in the decades after the conquest taught the children of elites to write and read Spanish, their mother tongues, and sometimes Latin; thus some elites, only a generation or so after the conquest, were both alphabetically literate and bi- or trilingual.

Alphabetic literacy brought with it whole new systems for recording information. Instead of writing words and ideas hieroglyphically and pictorially, Mesoamerican elites could write them alphabetically. Thus the hiero-

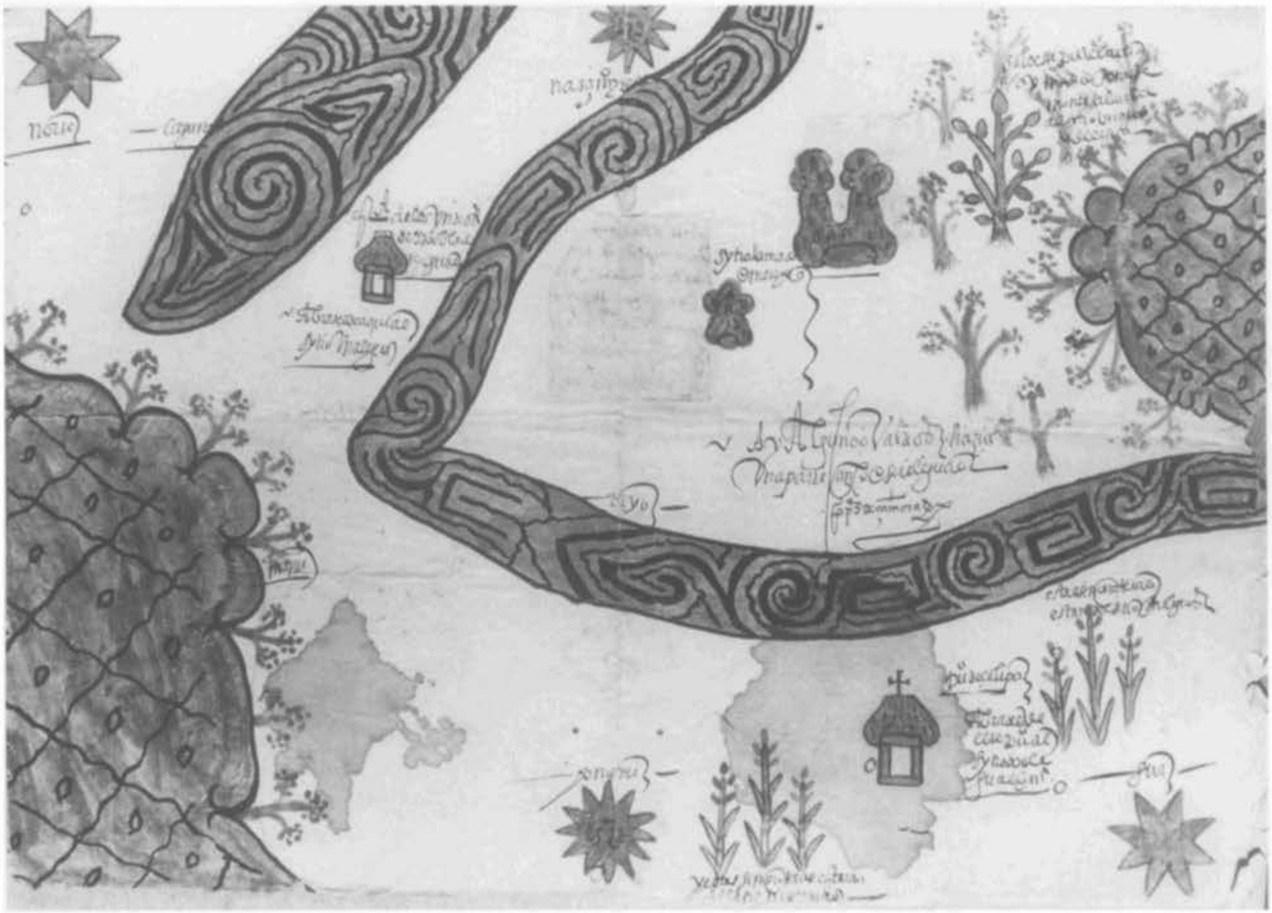


FIG. 5.51. LAND GRANT MAP OF ZOLIPA, VERACRUZ. Made in 1573, this manuscript map shows the dramatic changes and surprising continuities of native mapping in the early colonial period. The native artist continues to weave pre-Hispanic imagery. The domed shape at right is a hill symbol, marked with curlicue protrusions indicating its rockiness. Its surface is scored with a pattern of diamonds and dots representing the skin of the earth monster. The river likewise is filled in with swirls and eddies typical in pre-Hispanic painting. Yet much about the map distinguishes it from pre-Hispanic counterparts. For instance, the hill symbol bristles with naturalistic depictions of plants derived from European images. Most important, the context of this map was unknown before the Spanish conquest. It was made as part of a land grant, and thus its most important information was aimed at a Spanish audience and written in alphabetic glosses. The map is meant to show that the land requested lay at a required distance from indigenous villages and lands; these crucial bits of information are marked with alphabetically written words. For example, the three plants at the bottom represent a field and are labeled "these fields lie three leagues from the [requested] site." This legend, like the others, was written by a scribe writing in Spanish, not the indigenous mapmaker, who in essence had to cede control of the meaning of this map.
Size of the original: 31 × 40 cm. Photograph courtesy of the Archivo General de la Nación, Mexico City (Ramo Tierras, vol. 2672, exp. 18, f. 13; Mapoteca no. 1535).

glyphic place-names that grace the 1580 map from Amoltepec were fast becoming anachronistic by the close of the sixteenth century. Rates of change varied from region to region, often depending on the degree of Spanish presence in an area. Native maps came to depend on alphabetic writing, not hieroglyphs, to convey names. For example, the mid-sixteenth-century map from Atlatlahuacan, Morelos, seems to have been derived from a native-style boundary map like the ones described above, where the place-names of boundaries were arranged at the edge of the map. In this postconquest version, made in an area with a strong mendicant and Spanish presence, the boundaries, set on the raylike lines that radiate from the central church, are all named with alphabetic script, not hieroglyphs.

This new kind of literacy made native maps more intelligible to Spaniards at the expense of the native community. Alphabetic literacy was in the hands of a very few Mesoamerican elites; and as maps depended more and more on script to convey meaning, they moved further from the grasp and intelligibility of most of the communities that once made them.

As important in changing the look of maps were new modes of representation that friars and Spaniards introduced. Simply put, Europeans in the New World favored visual mimesis over the more conceptual renderings that

Mesoamericans once used–the contrast we saw in comparing the Nuremberg map of Tenochtitlan with that in the Codex Mendoza. Under the pressure of Spanish expectation, Mesoamerican cartographic symbols were recast. No longer was the landscape represented through a scrim of hieroglyphic toponyms and abstract signs. In a map made by an indigenous artist about 1555, we see the painter trying to reconcile indigenous and European modes of representation (fig. 5.5). The map is found in the Codex Kingsborough, a book painted in the town of Tepetlaoztoc in the Valley of Mexico detailing the legal complaints of its residents against their Spanish overlord.[163] It is a beautifully rendered map, showing the area around Tepetlaoztoc, near the place where the Codex Xolotl was painted. Many of the *tepetl* (hill) pictographs in the Kingsborough map have no toponymic function; instead they blend together to create the impression of a range of hills as it appears to the eye. In the map of 1573 from Zolipa, Veracruz, a toponymic hill pictograph sprouts grass and plants (fig. 5.51). However, since indigenous ideology was embedded in symbols like the hill pictograph, some of the indigenous vocabulary on maps may have been resistant to change in the face of new European imagery, which lacked such deep meaning.

Nowhere is the trajectory of indigenous mapping better seen than in the Mapa de Santa Cruz, which shows the confluence of new visual habits, alphabetic writing, and religious instruction, as well as the sundering of traditional history from cartography (plate 11).[164] The map was made by an indigenous artist about the mid-sixteenth century, and it pictures the Valley of Mexico, with Tenochtitlan–Mexico City at its center, covering roughly the same region as the Cortés map of 1524 (fig. 5.7). Its artist certainly had great exposure to European pictorial conventions, including the Cortés map, and was probably trained by Franciscan friars in the monastery at Tlatelolco, the town directly adjacent to Tenochtitlan. Tlatelolco's monastery was a center for instruction in painting, and on this map it appears larger than any other building complex. No longer is Tenochtitlan a formalized set of symbols, as in the Codex Mendoza. Instead, the city and surrounding valley are presented as if glimpsed by a viewer from an oblique viewpoint, high to the west of the valley; this same type of perspective was common to European city plans. Hieroglyphic place-names do appear–over thirty-two can be identified–but they are not the frame giving shape to the map. They are minute, practically lost within a landscape of trees and undulant hills. The artist may have realized that hieroglyphs would appeal to only part of his audience, for most of these toponyms are also transliterated into the Latin alphabet. For many years the map was attributed to Alonso de Santa Cruz (d. 1567), a prominent Spanish cartographer under Charles V (r. 1517–56) and Philip II (r. 1556–98). However, the artist is now thought to be an indigenous native of the valley, since the hieroglyphic place-names could have been known only by a native.

History is absent on the Mapa de Santa Cruz. Or perhaps the traditional Mesoamerican history of genealogy and conquest has been replaced by another kind of history. This landscape is filled with horseback riders, cargo carriers, and fishermen that, at first glance, could be inspired by the genre figures that graced the famous European city maps published by Georg Braun and Frans Hogenberg. However, the figures on the Mapa de Santa Cruz are historically specific, revealing the conditions of native life in New Spain of the 1550s. Although many residents peacefully fish and net birds, others strain under heavy loads on their backs, cowering under the upraised whips and staffs of overseeing Spaniards.

RATES OF CHANGE: THE RELACIONES GEOGRÁFICAS

The changes outlined above happened at different paces throughout the country. Native maps changed first in and around the Valley of Mexico, where the largest Spanish population was drawn to settle in their new capital built on the ruins of Tenochtitlan. Here native maps reflected changes in the surrounding world, as Aztecs and other indigenous residents were converted to Catholicism and gathered together in planned communities. Native artists were quick to adopt pictures of churches as symbols for settlements, and they often emphasized the gridiron layout that colonists branded on their towns.

Outside the valley, changes in native mapping were slower for two reasons. First, the indigenous population had less profound contact with European settlers and less exposure to their mapping traditions. Second, indigenous maps probably were used in indigenous contexts–meant to be seen by community members rather than presented to Spanish judges.

The changes and continuities of the native mapping traditions after the Conquest are metered in the maps of the Relaciones geográficas, a group of maps that can be considered a horizon marker. These maps were painted in response to a printed questionnaire sent out at the end of the 1570s by the government of Philip II. Between 1579 and 1584, the questionnaire elicited responses from all parts of Mesoamerica, as local officials–both Spanish and

163. Francisco del Paso y Troncoso, ed., *Códice Kingsborough: Memorial de los Indios de Tepetlaoztoc . . .*, facsimile ed. (Madrid: Fototipia de Hauser y Menet, 1912).

164. Albert B. Elsasser, ed., *The Alonso de Santa Cruz Map of Mexico City and Environs, Dating from 1550* (Berkeley, Calif.: Lowie Museum of Anthropology, 1974), and Sigvald Linné, *El Valle y la Ciudad de México en 1550* (Stockholm: Statens Etnografiska Museum, 1948).

indigenous–in cities, towns, and villages wrote describing and picturing the world around them. From the *gobierno* of New Spain, the colonial jurisdiction covering much of Mesoamerica, sixty-nine maps are known today, most painted by indigenous artists. This corpus of maps is unique and is most valuable for showing the differing rates of change in native mapping.[165]

One of the maps is the Mapa de Teozacoalco, discussed above (fig. 5.23), whose circular form and genealogical emphasis tie it to an enduring Mixtec mapping and manuscript tradition. Even though Teozacoalco was a small and almost wholly indigenous town, remote from Spanish spheres of influence, its Mixtec artist had come in contact with European imagery and adapted it to his map. Towns are marked by Christian churches set in a colorful landscape probably derived from European prints, since nothing similar exists within the native tradition. Another map from the corpus shows similar changes (fig. 5.52). It was made in Tetliztaca, to the northeast of the Valley of Mexico in the modern state of Hidalgo.[166] The artist, who had probably been trained to write and paint in a nearby Franciscan monastery, appealed to both his local native audience and to the faraway Spanish one with a mix of European and native symbols and conventions.

The maps of the Relaciones geográficas may be the last great florescence of indigenous cartography. As the sixteenth century neared its end, the initial generosity Spanish colonists had shown toward indigenous forms of expression–among them territorial maps–wore thin. The close of the century was a time of pessimism for colonists: the native population (and the labor force) had reached its nadir, the once expansive colonial economy was beginning to plateau, and the millennial project of conversion had foundered. Whereas Viceroy Mendoza, in the late 1530s and 1540s, had embraced native maps as a means of indigenous redress, sixty years later one of his successors complained bitterly about the Pandora's box the Spaniards had opened when they allowed Amerindians legal voice. The marqués de Montesclaros (r. 1603–7) wrote in 1607 that even if he were to grant Spaniards lands as far away as Florida, natives in Mexico City would contest these grants as if the land abutted the walls of their houses.[167] It comes as no surprise that by Montesclaros's time, documents written in Spanish prevailed over native pictorials. Native leaders quickly felt the changing winds and, for example, tried to cement their hold on community lands by having them recorded in a written viceregal *merced* (land grant).[168] Over the course of the centuries, native communities were afflicted with periodic attempts by the Spanish colonial regimes to "regularize" titles to the land, or to standardize the documents needed for proof of possession. As a result, many native works, especially maps, were converted into alphabetic documents, written in Spanish and stamped with official seals.[169]

CONTINUATIONS TODAY

Despite the arid legacy of conquest, the main branch of Mesoamerican cartography still flowers today: cartographic histories have had an enduring presence in Mesoamerica, especially outside the Valley of Mexico.[170] Some communities have held on to cartographic histories painted in the sixteenth century, and they are still read and reinterpreted. Over the centuries, the legal currency of these *mapas* and *lienzos* (as they are frequently called) as proof of territorial possession has been devalued by Spanish-language documents; nonetheless, many communities have carefully kept them. They cannot be dislodged. If the endurance of *lienzos* and *mapas* cannot be explained solely by their role as legal documents, what does explain their continued presence? They appear to have an important ideological role beyond their value as land documents. Since many include a historical narrative that is kept alive through an oral tradition, these *lienzos* and *mapas* state collective identity by recording the ties between members of the community: a common history and a common territory. Their importance is continually reaffirmed by community ceremony, when the maps–usually in the care of community leaders–are put on display.

While some towns have *lienzos* or *mapas* dating back

165. The maps from New Spain (excluding the Yucatan) and Guatemala are published in *Relaciones geográficas del siglo XVI,* 10 vols., ed. René Acuña (Mexico City: Universidad Nacional Autónoma de México, Instituto de Investigaciones Antropológicas, 1982–88), and have been cataloged by Robertson, "Pinturas (Maps) of the Relaciones Geográficas" (note 81). They are studied in depth in Mundy, *Mapping of New Spain* (note 81).

166. The map is cataloged by Robertson, "Pinturas (Maps) of the Relaciones Geográficas," 273 (no. 67).

167. *Instrucciones que los vireyes de Nueva España dejaron a sus sucesores,* 2 vols. (Mexico City: Imprenta de Ignacio Escalante, 1873), 1:94.

168. Gibson, *Aztecs under Spanish Rule,* 265 (note 61).

169. Maps painted by natives under Spanish rule have allowed new insight into the colonial moment. See Serge Gruzinski, "Colonial Indian Maps in Sixteenth-Century Mexico," *Res* 13 (1987): 46–61, and Walter D. Mignolo, "Colonial Situations, Geographical Discourses and Territorial Representations: Toward a Diatopical Understanding of Colonial Semiosis," *Dispositio* 14 (1989): 93–140.

170. For a description of the colonial *lienzos* and reproductions, see Marion Oettinger, *Lienzos coloniales: Una exposición de pinturas de terrenos comunales de México (siglos XVII–XIX)* (Mexico City: Universidad Nacional Autónoma de México, Instituto de Investigaciones Antropológicas, 1983). For an account of *lienzos* from Mazatec speakers in Oaxaca, see Howard Francis Cline, "Colonial Mazatec Lienzos and Communities," in *Ancient Oaxaca: Discoveries in Mexican Archeology and History,* ed. John Paddock (Stanford: Stanford University Press, 1966), 270–97.

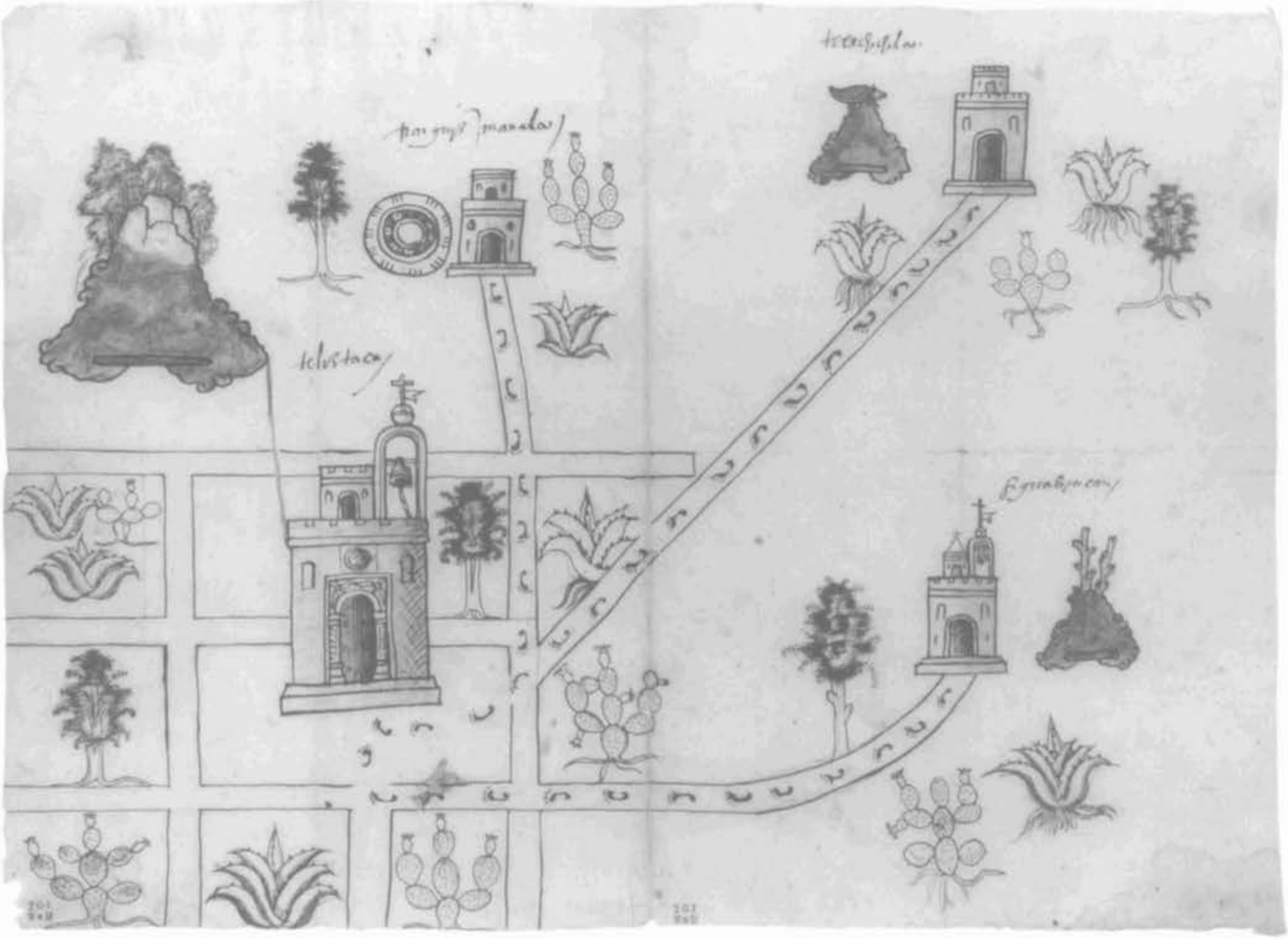


FIG. 5.52. RELACIÓN GEOGRÁFICA MAP OF TETLIZTACA, 1580. This elegant manuscript map on European paper was painted in response to a request from the Spanish king, and it combines both indigenous and European elements. Four stylized churches mark the main settlements, the largest being that of Tetliztaca at the lower left. Each village is named twice, with alphabetic script and a hieroglyphic place-name. Tetliztaca means "Place of the White Rocks," and its place-name appears above and to the left of the town, a hill glyph with a white craggy top. Above and to the right, Tianguismanalco, "Place of the Market," is shown with the disk-shaped symbol for market. Tepechichilco, "Red Hill," is shown with a red chile on a hill. Cihuayuca, "Place of Womanhood," is shown as a hill symbol with shoots of palm, *zoyatl,* perhaps meant as a homophone for *cihuatl.* The main roadways are marked with neat footprints, following native convention, and they all head from the subordinate towns to Tetliztaca. Most of the trees and plants are shown with their roots as well as trunks, stems, and leaves, also attributable to native convention. The grid that orders Tetliztaca is certainly an imported element, imposed on native towns as they were moved and reordered by mendicant friars in the great sixteenth-century programs of conversion.
Size of the original: 31 × 43.5 cm. Photograph courtesy of the Nettie Lee Benson Latin American Collection, University of Texas, Austin (JGI xxv-12).

to the sixteenth century, other towns have copied and updated their *lienzos* over the course of the centuries, and in doing this they have shifted their content to reflect current ideas about territory and history. The Lienzo of Petlacala–from a remote Nahuatl-speaking town in the modern state of Guerrero–is known today from the most recent of a series of copies, this one done in the 1950s (plate 12).[171] It combines a narrative of a migration of the town founders around its borders, written alphabetically in Nahuatl, parallel to the one the Culhua-Mexicas recorded in hieroglyphs and pictures in the Mapa de Sigüenza and the Codex Boturini (figs. 5.29 and 5.31). Also in this border is a map of the community boundaries much like the frame of boundary pictographs in the His-

171. The Lienzo of Petlacala is one of the few *lienzos* whose modern use is documented. For a longer analysis and description, see Marion Oettinger and Fernando Horcasitas, *The Lienzo of Petlacala: A Pictorial Document from Guerrero, Mexico,* Transactions of the American Philosophical Society, n.s. 72, pt. 7 (Philadelphia: American Philosophical Society, 1982). A group of *lienzos* from the neighboring region of Tlapa are the subject of a study by Joaquín Galarza, *Lienzos de Chiepetlan: Manuscrits pictographiques et manuscrits en caractères latins de San Miquel Chiepetlan, Guerrero, Mexique* (Mexico City: Mission Archéologique et Ethnologique Française au Mexique, 1972).

toria tolteca-chichimeca (fig. 5.15). The Petlacala boundaries, however, are named not with hieroglyphs but in alphabetic script and reflect the extent of Petlacala's territory in 1807. In the center of the Petlacala *lienzo,* the town's founders receive their rights to territory directly from the hand of the Spanish king Charles V. Clearly, this event never transpired. It is illustrated with a visual anachronism, because the king of Spain at the time of conquest is dressed in eighteenth-century clothing, probably reflecting the fashions at the time of one of the *lienzo*'s new editions. Although the king may be anachronistic, however, the *lienzo* is not, for it is still read by community leaders, reinterpreted, and celebrated within the community–Petlacala's link with the pre-Hispanic past is yet unbroken.

Conclusion

From the definition used in these volumes, it is clear that Mesoamericans made maps as we understand them. It is also clear that both explicitly and implicitly, Mesoamericans understood their role as mapmakers. Their maps suggest that our definition is somewhat inadequate; it does not express a key criterion of the Mesoamerican map, which is the union of space and time, whether the unceasing march of days or the cycles of human history.

The integrity of Mesoamerican mapping was ruptured by the Spanish conquest, and Spanish colonization led the development of cartography in the New World onto a new path, channeling it closer to European norms. But Mesoamerican cartography was not wholly uprooted. The dual European and Amerindian legacy of Mexico and Central America means that the descendants of Mesoamericans make survey-based, topographical maps of every square foot of their countries at the same time as they make cartographic histories drawn from preconquest antecedents. The combination results in a present-day cartographic tradition of remarkable richness and diversity.

APPENDIX 5.1 CENSUS OF IMPORTANT MESOAMERICAN MAPS (GROUPED BY MAP TYPE)

Name and Where Held	Place Represented	Provenance and Date	Dimensions (cm) (h × w)
CARTOGRAPHIC HISTORIES			
1. Codex Nuttall, pp. 19, 22, 36; British Museum, Museum of Mankind, London (Add. MS. 39671)	Tilantongo-Mitlantongo region (p. 19), Tilantongo region (p. 22), Apoala Valley (p. 36)	Mixteca Alta; pre-1520	Screenfold of 47 leaves, each ca. 19 × 25.5
2. Codex Xolotl, p. 1; Bibliothèque Nationale, Paris (1–10)	Valley of Mexico and environs	Texcoco, Valley of Mexico; ca. 1542	ca. 42 × 48
3. Historia tolteca-chichimeca, Mapa Pintado, fols. 30v–31r, 32v–33r, 35v–36r; Bibliothèque Nationale, Paris (46-58)	Mapa Pintado: boundaries of the lands of the Totomihuacan and Cuauhtinchan: Totomihuaca and its territories (fols. 30v–31r); Cuauhtinchan and its territories (fols. 32v– 33r); founding of Cuauhtinchan (fols. 35v–36r)	Cuauhtinchan, Puebla, ca. 1547–60	52 leaves, each 30 × 22
4. Lienzo of Zacatepec 1; Museo Nacional de Antropología, Mexico City (35-63)	Zacatepec and environs	Zacatepec, Oaxaca; ca. 1540–60	325 × 225
5. Lienzo of Zacatepec 2 (1893 copy); original unknown, copy in Municipal Archive of Zacatepec	Zacatepec and environs	Zacatepec, Oaxaca; 1893 tracing of a late 16th-century original	300 × 245
6. Map of Maní (copy of 1596); Latin American Library, Tulane University, New Orleans	Maní, Yucatan, and environs	Maní, Yucatan; 1596 copy of 1557 original	Size of original unknown
7. Mapa de Metlatoyuca; British Museum, Museum of Mankind, London (Add. MS. 30,088)	Metlatoyuca? and environs	Metlatoyuca, Puebla? Coixtlahuaca, Oaxaca? 16th century	180 × 105
8. Relación geográfica map of Teozacoalco; Nettie Lee Benson Latin American Collection, University of Texas at Austin	Teozacoalco, Oaxaca, and environs	Teozacoalco, Oaxaca; 1580	142 × 177
9. Relación geográfica map of Amoltepec; Nettie Lee Benson Latin American Collection, University of Texas at Austin	Amoltepec, Oaxaca, and environs	Amoltepec, Oaxaca; 1580	86 × 92
10. Mapa de Sigüenza; Museo Nacional de Antropología, Mexico City (35-14)	Valley of Mexico and unidentified regions	Valley of Mexico; late 16th- or early 17th-century copy	54.5 × 77.5
11. Codex Boturini; Museo Nacional de Antropología, Mexico City (35-38)	Valley of Mexico and unidentified environs	Valley of Mexico; early 16th century	screenfold of 21½ leaves, 19.8 × 549

Language	Medium	Purpose and Description	Published Accounts
Mixtec	Painted gesso on hide	Manuscript tells histories of Mixtec ruling elites into the 12th century; map pages relate to larger historical narrative	Nuttall, *Codex Nuttall*
Nahuatl	Painted *amatl* paper	History of the Acolhua conquerer Xolotl and his family	Dibble, *Códice Xolotl*
Nahuatl	Ink and paint on European paper	History of the Nahua groups that migrated to Cuauhtinchan; covers from 12th through mid-16th century. The Mapa Pintado is bound with the Historia tolteca-chichimeca but seems to predate the rest of the manuscript and be the source, in part, for the boundary maps found on fols. 30v–31r, 32v–33r, and 35v– 36r.	Kirchhoff, Odena Güema, and Reyes García, *Historia tolteca-chichimeca*
Mixtec	Ink on cloth	Boundary map of the territory belonging to Zacatepec; includes genealogy of its ruling family	Smith, *Picture Writing,* 264–90
Mixtec	Ink on cloth	Boundary map of the territories of Zacatepec, a later and more Europeanized version of Lienzo of Zacatepec 1	Smith, *Picture Writing,* 298–306
Maya	Ink on European paper	Accompanied a land treaty negotiated between leaders of Maní and their neighbors	Roys, *Indian Background*
Nahuatl? Otomí? Totonac? Tepehua? Chocho?	Ink on cloth	Map of rivers, roads, and temples shows genealogical relationships between the seventy-nine people pictured	Guzmán, "Art of Map-Making"
Mixtec	Ink and pigment on 23 sheets of European paper	Large circular boundary map painted in response to a questionnaire from the Spanish government	Caso, "Mapa de Teozacoalco"
Mixtec	Ink and pigment on 6 sheets of European paper	Circular boundary map painted in response to a questionnaire from the Spanish government	Mundy, *Mapping of New Spain,* pl. 6 and fig. 51 (p. 133); *Relaciones geográficas del siglo XVI,* vol. 3, *Antequera,* facing 150
Nahuatl	Ink and pigment on *amatl* paper	Chronicles the peregrination of the Culhua-Mexicas into the Valley of Mexico and the founding of Tenochtitlan in 1325	Glass, *Catálogo de la colección de códices,* 54–55; Ruiz Naufal et al., *El territorio mexicano*
Nahuatl	Ink on *amatl* paper	Itinerary map of the Culhua-Mexicas' peregrination from the mythical Aztlan into the Valley of Mexico. Does not correlate closely with Mapa de Sigüenza	*Antigüedades de México,* 2:7–29

APPENDIX 5.1 (*continued*)

Name and Where Held	Place Represented	Provenance and Date	Dimensions (cm) (h × w)
CARTOGRAPHIC HISTORIES (*cont.*)			
12. Codex Kingsborough, fol. 209r; British Museum, Museum of Mankind (Add. MS. 13964)	Tepetlaoztoc and environs	Tepetlaoztoc, Valley of Mexico; ca. 1555	29.8 × 21.5
CUAUHTINCHAN GROUP (see Yoneda, *Mapas de Cuauhtinchan,* and Reyes García, *Cuauhtinchan del siglo XII al XVI*)			
13. Mapa de Cuauhtinchan 1; Bibliothèque Nationale, Paris (375)	Cuauhtinchan and environs	Cuauhtinchan, Puebla; 16th century	113 × 167
14. Mapa de Cuauhtinchan 2; private collection	Left half: migration route to and from mythical Chicomoztoc to Cholula, Puebla; right half: Cuauhtinchan-Tecali-Tepeaca region	Cuauhtinchan, Puebla; 16th century	109 × 204
15. Mapa de Cuauhtinchan 3; Museo Nacional de Antropología, Mexico (35-70)	Cholula-Cuauhtinchan, Puebla region	Cuauhtinchan, Puebla; 16th century	92 × 112
16. Mapa de Cuauhtinchan 4; Museo Nacional de Antropología, Mexico (35-31)	Region of Puebla and Tlaxcala comprising Tlaxcala, Puebla, Tepeaca, and Tecamachalco	Cuauhtinchan, Puebla; ca. 1563	113 × 158
COIXTLAHUACA GROUP (see Caso, *Reyes y reinos de la Mixteca,* 1:118–36)			
17. Lienzo of Ihuitlan; Brooklyn Museum, New York	Ihuitlan (Plumas), Oaxaca, and environs	Ihuitlan (Plumas), Oaxaca; 16th century	244 × 152
18. Lienzo of Tlapiltepec (aka Lienzo Antonio de León); Royal Ontario Museum, Toronto	Tlapiltepec, Coixtlahuaca Valley, Oaxaca; Tehuacán, Puebla	Tlapiltepec, Oaxaca; 16th century	432 × 165
19. Lienzo of Coixtlahuaca 1 (aka Codex Ixtlan); Museo Nacional de Antropología, Mexico (35-113)	Coixtlahuaca and environs	Coixtlahuaca, Oaxaca; 16th century	425 × 300
20. Lienzo of Coixtlahuaca 2 (aka Seler 2); Museum für Völkerkunde, Berlin	Coixtlahuaca region	Coixtlahuaca region; 16th century	375 × 425
21. Lienzo of Tequixtepec 1; Tequixtepec, Oaxaca	Tequixtepec, Oaxaca, and Coixtlahuaca region	Tequixtepec, Oaxaca; 16th century	305 × 248
22. Lienzo of Tequixtepec 2; Tequixtepec, Oaxaca	Tequixtepec, Oaxaca, and Coixtlahuaca region	Tequixtepec, Oaxaca; 16th century	285 × 70
23. Codex Meixueiro (aka Lienzo A, known only through tracing by Nicolás León); copy at Tulane University, Latin American Library	Coixtlahuaca region	Coixtlahuaca region; original probably 16th century	Original unknown; copy: 380 × 360
24. Lienzo of Tulancingo 1; Municipal Archive, Tulancingo	Tulancingo and environs	Tulancingo; 16th century	ca. 115 × 145

Language	Medium	Purpose and Description	Published Accounts
Nahuatl	Ink and pigment on European paper	Made as part of a complaint by Tepetlaoztoc residents against their Spanish overlord; the map oscillates between Mesoamerican and European conventions	Paso y Troncoso, *Códice Kingsborough*
Nahuatl	Ink and pigment on native paper	Shows conquests of Chichimec groups coming into Cuauhtinchan region	Yoneda, *Mapas de Cuauhtinchan*
Nahuatl	Ink and pigment on native paper	Shows the migration of some Nahuatl speakers into the Puebla region; left half shows migrations to and from mythical point of origin, Chicomoztoc	Yoneda, *Mapas de Cuauhtinchan*
Nahuatl	Ink and pigment on *amatl* paper	Shows migrations between Huexotzinco and Tepeaca	Yoneda, *Mapas de Cuauhtinchan*
Nahuatl	Ink and pigment on *amatl* paper	Shows gridiron town plans; most Europeanized of the Cuauhtinchan group	Yoneda, *Mapas de Cuauhtinchan*
Nahuatl on map; Ihuitlan was Chocho speaking	Ink and pigment on cloth	Shows genealogies of ruling lines from Ihuitlan and other sites pictured on map, including ones also covered in other *lienzos* of the Coixtlahuaca group	Caso, *Lienzos mixtecos,* 237–74
Nahuatl glosses on *lienzo;* Chocho-Popoloca region	Ink on cloth	*Lienzo* shows migrations from the mythical Chicomoztoc into Coixtlahuaca Valley; genealogies of ruling lines are shown	Caso, *Lienzos mixtecos,* 237–74
Chocho-Popoloca	Ink on cloth		*Codex Ixtlan,* and Glass and Robertson, "Census," fig. 30
Chocho-Popoloca	Ink on cloth	Probably the earliest *lienzo* in the Coixtlahuaca group	Unpublished
Chocho-Popoloca	Ink and pigment on cloth	Shows boundary markers along frame and contains genealogies of ruling lineages; bottom section of *lienzo* shows founding couple at cave, possibly Chicomoztoc, and their descendants	Parmenter, *Four Lienzos,* 45–63
Chocho-Popoloca	Ink and pigment on cloth	Content mostly genealogical	Parmenter, *Four Lienzos,* 45–63
Chocho-Popoloca	Unknown	Boundary map, with glyph of Coixtlahuaca in the center, scenes of battles and confrontations mix with ruler genealogies	*Codex Meixuero,* and Glass and Robertson, "Census," fig. 44
Chocho	Ink and pigment on cloth	Shows the territories of Tulancingo, limned with boundary markers, as well as a list, perhaps genealogical, of ten ruling couples; Rincón-Mautner also publishes another later *lienzo* of 1753, largely European style, which he calls Lienzo of Tulancingo 2	Rincón-Mautner, "History of San Miguel Tulancingo"

APPENDIX 5.1 (*continued*)

Name and Where Held	Place Represented	Provenance and Date	Dimensions (cm) (h × w)
COIXTLAHUACA GROUP (*cont.*)			
25. Lienzo de Santa María Natívitas; Santa María Natívitas	Santa María Natívitas, Oaxaca, and environs	Santa María Natívitas; 16th century	173 × 175
CADASTRAL MAPS			
26. Plano en papel de maguey; Museo Nacional de Antropología, Mexico City (35-3)	Part of Valley of Mexico settlements, possibly Azcapotzalco region	Valley of Mexico, possibly Azcapotzalco region; 16th century	238 × 168
27. Humboldt Fragment 2; Staatsbibliothek zu Berlin–Preussischer Kulturbesitz (MS. Amer. 1)	Unknown fields in the Valley of Mexico	Valley of Mexico; after 1565	68 × 40
CITY MAPS			
28. Codex Mendoza, fol. 2r; Bodleian Library, Oxford (MS. Arch, Seld. A. 1, fol. 2r)	Tenochtitlan	Tenochtitlan; ca. 1541	32.7 × 22.9
29. Primeros memoriales, fol. 269r; Palacio Real, Madrid (Códice Matriense, MS. 3280)	Central temple precinct of Tenochtitlan	Tepeapulco, Hidalgo; ca. 1558–61	21.5 × 45
30. Historia tolteca-chichimeca, fols. 9v–10r, 26v–27r; Bibliothèque Nationale, Paris (46-58)	Fols. 9v– 10r: Cholula and composite parts; fols. 26v– 27r: temples within the ceremonial precinct of Cholula	Cuauhtinchan, Puebla; ca. 1547–60	52 leaves, each 30 × 22
MAPS FOR WAR			
31. Florentine Codex, bk. 8, chap. 17; Biblioteca Medicea Laurenziana, Florence (Palat. Col. 218–20)	Unknown	Tlaltelolco and Tenochtitlan; ca. 1570	ca. 9 × 12
PROPERTY MAPS			
32. Don Miguel Damian's properties; Newberry Library, Chicago (Ayer Collection, 1270)	Fields and houses in Xochimilco region	Xochimilco, Valley of Mexico; 1576	38.5 × 39.3
33. Oztoticpac lands map; Library of Congress, Washington, D.C.	Fields and property in Texcoco region	Texcoco, Mexico; ca. 1540	75 × 84
COSMOGRAPHICAL MANUSCRIPT MAPS			
34. Codex Fejérváry-Mayer, p. 2; Merseyside County Museum, Liverpool (12014 Mayer)		Unknown; ca. 1400–1520	Screenfold of 23 leaves, each page between 16.2 × 17.2 and 17.5 × 17.5
35. Aubin MS. no. 20; Bibliothèque Nationale, Paris (20)		Mixtec region; pre-1520	51 × 91
36. Codex Borgia, pp. 29–46; Biblioteca Apostolica Vaticana, Rome		Unknown; pre-1520	Screenfold of 39 leaves, each 27 × 26.5

Language	Medium	Purpose and Description	Published Accounts
Chocho-Popoluca	Ink on cloth	Boundary map of Santa María Natívitas showing genealogies of ruling families	Dahlgren de Jordán, *La Mixteca,* 366–70, and Glass, "Survey," fig. 48
Nahuatl	Ink and pigment on *amatl* paper	Allowed ward leaders to keep track of occupants of land plots; later amended with list of Tenochtitlan's leaders to be used in a lawsuit	Díaz del Castillo, *Conquest of New Spain,* 3:3–25 and maps
Nahuatl	Ink on *amatl* paper	Shows long rectangular fields with the glyphic names of their owners, among whom is Motecuhzoma Xocoyotzin, the Aztec ruler at contact	Seler, "Picture Writings of Alexander von Humboldt"
Nahuatl	Ink and pigment on European paper	Shows the Culhua-Mexica capital at its founding in 1325 and events of subsequent years	Berdan and Anawalt, *Codex Mendoza*
Nahuatl	Ink and pigment on European paper	The only known map of the central ceremonial precinct of the Culhua-Mexicas, site razed in the wars of Spanish conquest	Sahagún, *Primeros memoriales*
Nahuatl	Ink and paint on European paper	History of the Nahua groups that migrated to Cuauhtinchan; covers 12th to mid-16th century	Kirchhoff, Odena Güema, and Reyes García, *Historia tolteca-chichimeca*
Nahuatl, Spanish, and some Latin	Ink and pigment on European paper	Rare colonial depiction of how maps were used in pre-Hispanic times; shows a map being used to plan an attack by Aztec warriors	Sahagún, *Códice Florentino*
Nahuatl	On native paper	Accompanied a lawsuit over lands in Xochimilco; shows individual plots belonging to Don Miguel without reference to their overall spatial arrangements	Glass and Robertson, "Census," 79
Nahuatl	Ink and pigment on native paper	Maps some properties and orchards whose ownership was disputed after death of Don Carlos Chichimectecotl, a Texcoco noble, executed by Inquisition in 1539	Cline, "Oztoticpac Lands Map"
	Black ink and colored pigment on sized hide	Shows layout of four world trees surrounded by day count of 260 days in shape of Maltese cross	*Codex Fejérváry-Mayer*
Mixtec	Black ink and colored pigments on sized hide	Four place signs surrounding a circular cartouche relate both to the four cardinal directions and to four places within the Mixtec region	Lehmann, "Las cinco mujeres del oeste muertas"
Unknown	Black ink and colored pigments on sized hide	Shows the cosmic layers during part of the Venus cycle	*Codex Borgia*

APPENDIX 5.1 *(continued)*

Name and Where Held	Place Represented	Provenance and Date	Dimensions (cm) (h × w)
COSMOGRAPHICAL MANUSCRIPT MAPS *(cont.)*			
37. Codex Ríos, fols. 1v–2r; Biblioteca Apostolica Vaticana, Rome (Cod. Vat. 3738)		Rome, Italy? 1566–89	Bound book of 101 leaves, 46 × 29
38. Codex Madrid, fols. 76–77; Museo de América, Madrid		Maya region; mid- to late 15th century	Screenfold of 56 leaves, each ca. 22.6 × 12.2
COSMOGRAPHICAL MAPS IN NONMANUSCRIPT MEDIA			
39. Stela 5, Izapa; in situ Izapa, Chiapas, Mexico		Izapa, Mexico; 300 B.C.–A.D. 1	2.55 × 1.60 m
40. Maya tripod plate; private collection		Unknown; A.D. 600–800	Diameter: ca. 31
41. Sarcophagus lid of Pacal; in situ, Palenque, Mexico		Palenque; ca. A.D. 683	372 × 217
42. Tizoc Stone; Museo Nacional de Antropología, Mexico City		Tenochtitlan; ca. 1481–86	Height: 90; diameter: 270
43. Río Azul, tomb 12; in situ, Río Azul, Petén, Guatemala		Río Azul; ca. 450	n/a
CELESTIAL MAPS			
44. Primeros memoriales, fol. 282r–v; Palacio Real, Madrid (Códice Matritense, MS. 3280)		Tepeapulco, Hidalgo; ca. 1558–61	21.5 × 45
45. Calendar Stone; Museo Nacional de Antropología, Mexico City		Tenochtitlan; ca. 1502–19	Diameter: 3.5 m
46. Bonampak, room 2, north wall cartouches; in situ, Bonampak, Chiapas, Mexico		Bonampak, Mexico; ca. A.D. 792	n/a

Sources: Antigüedades de México, 4 vols. (Mexico City: Secretaría de Hacienda y Crédito Público, 1964–67); Anthony F. Aveni, *Skywatchers of Ancient Mexico* (Austin: University of Texas Press, 1980); Frances Berdan and Patricia Rieff Anawalt, eds., *The Codex Mendoza,* 4 vols. (Berkeley: University of California Press, 1992); Alfonso Caso, "El Mapa de Teozacoalco," *Cuadernos Americanos* 47, no. 5 (1949): 145–81; idem, *Los lienzos mixtecos de Ihuitlan y Antonio de León* (Mexico City: Instituto Nacional de Antropología e Historia, 1961); idem, *Reyes y reinos de la Mixteca,* 2 vols. (Mexico City: Fondo de Cultura Económica, 1977–79); Howard Francis Cline, "The Oztoticpac Lands Map of Texcoco, 1540," *Quarterly Journal of the Library of Congress*, 1966, 77–115, reprinted in *A La Carte: Selected Papers on Maps and Atlases,* comp. Walter W. Ristow (Washington, D.C.: Library of Congress, 1972), 5–33; *Codex Borgia: Biblioteca Apostolica Vaticana (Messicano Riserva 28)* (Graz: Akademische Druck- u. Verlagsanstalt, 1976); *Codex Fejérváry-Mayer: M 12014 City of Liverpool Museums* (Graz: Akademische Druck- u. Verlagsanstalt, 1971); *Codex Ixtlan,* facsimile ed., Maya Society Publications 3 (Baltimore: Johns Hopkins University Press, 1931); *Codex Meixuero,* facsimile ed., Maya Society Publications 4 (Baltimore: Johns Hopkins University Press, 1931); *Codex Tro-Cortesianus (Codex Madrid)* (Graz: Akademische Druck- u. Verlagsanstalt, 1967); Barbro Dahlgren de Jordán, *La Mixteca: Su cultura e historia prehispánicas* (Mexico City: Imprenta Universitaria, 1954); Bernal Díaz del Castillo, *The True History of the Conquest of New Spain,* 5 vols., ed. Genaro García, trans. Alfred Percival Maudslay, Hakluyt Society Publications, ser. 2, vols. 23, 24, 25, 30, and 40 (London: Hakluyt Society, 1908–16); Charles E. Dibble, ed., *Códice Xolotl,* 2d ed., 2 vols. (Mexico City: Instituto de Investigaciones Históricas, Universidad Nacional Autónoma de Mexico, 1980); John B. Glass, *Catálogo de la colección de códices* (Mexico City: Museo Nacional de Antropología and Instituto Nacional de Antropología e Historia, 1964); idem, "A Survey of Native Middle American Pictorial Manuscripts," in *Handbook of Middle American Indians,* vol. 14, ed. Howard Francis Cline (Austin: University of Texas Press, 1975), 3–80; John B. Glass with Donald Robertson, "A Census of Native Middle American Pictorial Manuscripts," in *Handbook of Middle American Indians,* vol. 14, ed. Howard Francis Cline (Austin: University of Texas Press, 1975), 81–252; Ian Graham, "Looters Rob Graves and History," *National Geographic* 169 (1986): 452–60; Eulalia Guzmán, "The Art of Map-Making among the Ancient Mexicans," *Imago Mundi* 3 (1939): 1–6; Paul Kirchhoff, Lina Odena Güema, and Luis Reyes García, eds. and trans., *Historia tolteca-chichimeca* (Mexico City: Instituto Nacional de Antropología Historia, 1976); Walter Lehmann, "Las cinco mujeres del oeste muertas en el parto y los cinco dioses del sur en la mitología mexicana," *Traducciones*

Language	Medium	Purpose and Description	Published Accounts
Italian with some Nahuatl	Colored inks on European paper	Shows the 21 layers of the cosmos; Italian copy of probably indigenous prototype, meant to explain pre-Hispanic beliefs to European friars	Pasztory, *Aztec Art,* color pls. 8 and 9
Maya	Black ink and colored pigment on sized *amatl* paper	Shows hieroglyphs for four cardinal directions within 260-day count in shape of Maltese cross	*Codex Tro-Cortesianus (Codex Madrid)*
Unknown	Stone sculpture	Early representation of cosmic levels, showing primordial sea, world tree, and sky band	Norman, *Izapa Sculpture,* pt. 2, 165–236
Maya	Painted ceramic	Shows three cosmic layers, with celestial monster representing sky above and maw of Underworld below	Schele and Miller, *Blood of Kings,* 310–12, pls. 122 and 122c
Maya	Carved limestone	Shows Pacal, ruler of Palenque, in center of cosmic layers	Schele and Miller, *Blood of Kings,* pl. 111a
Nahuatl	Stone carved in bas-relief	Meant to commemorate conquests of Aztec emperor Tizoc, this stone shows him as *axis mundi* within cosmogram	Pasztory, *Aztec Art,* pls. 90–92. Drawing and photo in Townsend, *State and Cosmos,* fig. 20
Maya	Painted wall plaster	Glyphs within tomb walls mark cardinal directions	Stuart, "Paintings of Tomb 12," and Graham, "Looters Rob Graves," 456
Nahuatl	Ink and pigment on European paper	Shows arrangement of different groups of stars into constellations	Sahagún, *Primeros memoriales*
Nahuatl	Carved bas-relief stone	Edge of circular stone has some pecked designs that seem to show certain constellations	Aveni, *Skywatchers of Ancient Mexico,* 33
Maya	Painted wall stucco or plaster	Four cartouches seem to represent arrangement of Gemini, Mars, Saturn, and Orion's Belt on night of 2 August 792	Miller, *Murals of Bonampak*

Mesoamericanistas 1 (1966): 147–75; Mary Ellen Miller, *The Murals of Bonampak* (Princeton: Princeton University Press, 1986); Barbara E. Mundy, *The Mapping of New Spain: Indigenous Cartography and the Maps of the Relaciones Geográficas* (Chicago: University of Chicago Press, 1996); V. Garth Norman, *Izapa Sculpture,* 2 pts., Papers of the New World Archaeological Foundation 30 (Provo: New World Archaeological Foundation, 1973–76); Zelia Nuttall, ed., *The Codex Nuttall: A Picture Manuscript from Ancient Mexico* (New York: Dover, 1975); Ross Parmenter, *Four Lienzos of the Coixtlahuaca Valley,* Studies in Pre-Columbian Art and Archaeology 26 (Washington, D.C.: Dumbarton Oaks, 1982); Francisco del Paso y Troncoso, ed. *Códice Kingsborough: Memorial de los Indios de Tepetlaoztoc . . . ,* facsimile ed. (Madrid: Fototipia de Hauser y Menet, 1912); Esther Pasztory, *Aztec Art* (New York: Harry N. Abrams, 1983); *Relaciones geográficas del siglo XVI,* 10 vols., ed. René Acuña (Mexico City: Universidad Nacional Autónoma de México, Instituto de Investigaciones Antropológicas, 1982–88); Luis Reyes García, *Cuauhtinchan del siglo XII al XVI: Formación y desarrollo histórico de un señorió prehispánico* (Wiesbaden: Franz Steiner, 1977); Carlos Rincón-Mautner, "A Reconstruction of the History of San Miguel Tulancingo, Coixtlahuaca, Mexico, from Indigenous Painted Sources," *Texas Notes on Precolumbian Art, Writing, and Culture,* no. 64 (1994): 1–18; Ralph Loveland Roys, *The Indian Background of Colonial Yucatan* (Washington, D.C.: Carnegie Institution, 1943); Víctor M. Ruiz Naufal et al., *El territorio mexicano,* 2 vols. and plates (Mexico City: Instituto Mexicano del Seguro Social, 1982); Bernardino de Sahagún, *Códice Florentino: El manuscrito 218–220 de la colección Palatino de la Biblioteca Medicea Laurenziana,* facsimile ed., 3 vols. (Florence: Gunti Barbéra and Archivo General de la Nación, 1979); idem, *Primeros memoriales,* facsimile ed. (Norman: University of Oklahoma Press, 1993); Linda Schele and Mary Ellen Miller, *The Blood of Kings: Dynasty and Ritual in Maya Art* (New York: George Braziller, 1986); Eduard Seler, "The Mexican Picture Writings of Alexander von Humboldt in the Royal Library at Berlin," *Smithsonian Institution, Bureau of American Ethnology Bulletin* 28 (1904): 123–229; Mary Elizabeth Smith, *Picture Writing from Ancient Southern Mexico: Mixtec Place Signs and Maps* (Norman: University of Oklahoma Press, 1973); David Stuart, "The Paintings of Tomb 12, Rio Azul," in *Rio Azul Reports 3, The 1985 Season/Proyecto Rio Azul, Informe Tres: 1985,* ed. R. E. W. Adams (San Antonio: University of Texas, 1987), 161–67; Richard Fraser Townsend, *State and Cosmos in the Art of Tenochtitlan,* Studies in Pre-Columbian Art and Archaeology 20 (Washington, D.C.: Dumbarton Oaks, 1979); and Keiko Yoneda, *Los mapas de Cuauhtinchan y la historia cartográfica prehispánica,* 2d ed. (Mexico City: Centro de Investigaciones y Estudios Superiores en Antropología Social, 1991).

APPENDIX 5.2 LANDSCAPE PAINTING IN PRE-COLUMBIAN MESOAMERICA

Site	Culture	Date	Medium	Subject
Teotihuacan[a]				
Tepantitla palace complex, lower frieze	Teotihuacan	A.D. 600–750	Painted mural	People frolicking around mountains; perhaps an afterworld paradise
Temple of Agriculture (known through copy)	Teotihuacan	A.D. 200–400	Painted mural	Offerings being made to mountains or deities
Chichén Itzá[b]				
Temple of the Warriors	Maya	ca. 12th century	Painted mural	Seacoast village, land village
Temple of the Jaguars (murals 1, 2, 3, 4, 7, 8)	Maya	ca. 12th century	Painted murals	Battle scenes, terrestrial forests, hills, villages

[a]Kathleen Berrin, ed., *Feathered Serpents and Flowering Trees: Reconstructing the Murals of Teotihuacan* (San Francisco: Fine Arts Museums of San Francisco, 1988); Kathleen Berrin and Esther Pasztory, eds., *Teotihuacan: Art from the City of the Gods,* exhibition catalog (New York: Thames and Hudson, 1993); Manuel Gamio, *La población del valle de Teotihuacán,* 2 vols. in 3 (Mexico City: Dirección de Talleres Gráficos, 1922); George Kubler, *The Art and Architecture of Ancient America: The Mexican, Maya and Andean Peoples,* 3d ed. (New York: Penguin, 1984), 65–68; Arthur G. Miller, *The Mural Painting of Teotihuacán* (Washington, D.C.: Dumbarton Oaks, 1973); Esther Pasztory, *The Murals of Tepantitla, Teotihuacan* (New York: Garland, 1976); Agustín Villagra Caleti, "Mural Painting in Central Mexico," in *Handbook of Middle American Indians,* vol. 10, ed. Gordon F. Ekholm and Ignacio Bernal (Austin: University of Texas Press, 1971), 135–56.

[b]A. Breton, "The Wall Paintings at Chichen Itza," in *Congrès International de Américanistes, XV^{e} session,* 2 vols. (Quebec, 1907), 2:165–69; idem, "The Ancient Frescos at Chichen Itza," in *Proceedings of the British Association for the Advancement of Science* (Portsmouth, 1911), section H; Marvin Cohodas, *The Great Ball Court at Chichen Itza, Yucatan, Mexico* (New York: Garland, 1978), esp. 63 and figs. 42–49; Paul Gendrop, "Las representaciones arquitectónicas en las pinturas mayas," in *Las representaciones de arquitectura en la arqueología de América,* ed. Daniel Schávelzon (Mexico City: Universidad Nacional Autónoma de México, 1982–), 1:191–210; Kubler, *Art and Architecture,* 315–19.

6 • Mapmaking in the Central Andes

WILLIAM GUSTAV GARTNER

Bruno Adler compiled astonishing accounts of spatial reckoning and ephemeral mapping by indigenous South Americans, yet he could describe only four ethnographic examples of maps, none of them from the central Andes (fig. 6.1). Adler concluded that native South Americans did not normally inscribe their remarkable spatial knowledge on permanent media.[1]

Although informal mapping (the analogical expression or performance of spatial knowledge) may well be a human universal, it has been argued that formal mapmaking (the inscription of spatial knowledge) tends to arise as a discourse function only within highly organized, bureaucratic societies. The conditions necessary for formal mapmaking include "the demands of agriculture, private property, long-distance trade, militarism, tribute relations, and other attributes of redistributive economies."[2] If this is true, then we should expect central Andean peoples to have an ancient mapmaking tradition. Native Andean peoples have practiced intensive agriculture for several millennia, including irrigation terracing and sophisticated raised fields, at a scale rarely equaled elsewhere in the premodern world.[3] Militarism has also been rampant in the Andes for millennia. Furthermore, there is evidence of regular long-distance trade in precious and staple goods between the Pacific coast, the highlands, and the Amazon dating from the late preceramic period (ca. 2500–1800 B.C.; see fig. 6.2).[4] Last, the collection and redistribution of agricultural products and other goods, as well as labor obligations for the construction of monumental architecture or for the service of elite personages, have existed since the beginning of the early horizon (ca. 900–200 B.C.).[5]

Yet the term "map" is nearly nonexistent in modern archaeological, art historical, and ethnographic analyses of ancient central Andean artifacts and art–except metaphorically–and even then it is extremely rare.[6] Perhaps such individual elements of an organized bureaucracy were not sufficiently articulated in the early through middle horizons (ca. 900 B.C.–A.D. 1000) to foster a mapmaking tradition. But in 1532 the Inkas governed about 7.5 million people over some of the most rugged terrain on earth. They controlled a road network of well over twenty-three thousand kilometers, collected and redistributed astonishing volumes of staple wealth and prestige goods, and organized labor for public works at a scale unprecedented in the New World.[7]

Were maps simply not collected by colonial administrators, even though other artifacts of the Inka bureau-

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1. Bruno F. Adler, "Karty pervobytnykh narodov" (Maps of primitive peoples), *Izvestiya Imperatorskago Obshchestva Lyubiteley Yestestvoznaniya, Antropologii i Etnografii: Trudy Geograficheskago Otdeleniya* (Proceedings of the Imperial Society of the Devotees of National Sciences, Anthropology, and Ethnography: Transactions of the Division of Geography) 119, no. 2 (1910): 171–77. Many thanks to Michelle Szabo of Madison, Wisconsin, who translated these sections of Adler from the Russian.

2. Denis Wood, "The Fine Line between Mapping and Map Making," *Cartographica* 30, no. 4 (1993): 50–60, esp. 56, and idem, "Maps and Mapmaking," *Cartographica* 30, no. 1 (1993): 1–9.

3. William M. Denevan, Kent Mathewson, and Gregory Knapp, eds., *Pre-Hispanic Agricultural Fields in the Andean Region: Proceedings, 45 Congreso Internacional de Americanistas, International Congress of Americanists, Bogotá, Colombia, 1985,* 2 vols. (Oxford: BAR, 1987), esp. William M. Denevan, "Terrace Abandonment in the Colca Valley, Peru," 1:1–43. See also R. A. Donkin, *Agricultural Terracing in the Aboriginal New World* (Tucson: University of Arizona Press, 1989), and William M. Denevan, "Aboriginal Drained-Field Cultivation in the Americas," *Science* 169 (1970): 647–54.

4. Richard L. Burger, *Chavín and the Origins of Andean Civilization* (London: Thames and Hudson, 1992), 31–33 and 53–54.

5. Michael Edward Moseley, *The Incas and Their Ancestors: The Archaeology of Peru* (New York: Thames and Hudson, 1992), 123–25 and 140–42.

6. One notable exception is William Harris Isbell, "The Prehistoric Ground Drawings of Peru," *Scientific American* 239, no. 4 (1978): 140–53, esp. 150 and 153. Isbell classifies the Nazca lines as a giant ground map that conveys significant information about the workings of Nasca society. (On Nazca/Nasca, see note 75.)

7. See William M. Denevan, ed., *The Native Population of the Americas in 1492,* 2d ed. (Madison: University of Wisconsin Press, 1992), 291; John Hyslop, *The Inka Road System* (Orlando: Academic Press, 1984); and Terence N. D'Altroy and Timothy K. Earle, "Staple Finance, Wealth Finance, and Storage in the Inka Political Economy," in *Inka Storage Systems,* ed. Terry Y. LeVine (Norman: University of Oklahoma Press, 1992), 31–61. "Inka" is a widely accepted Quechua spelling that has become common in academic writing.

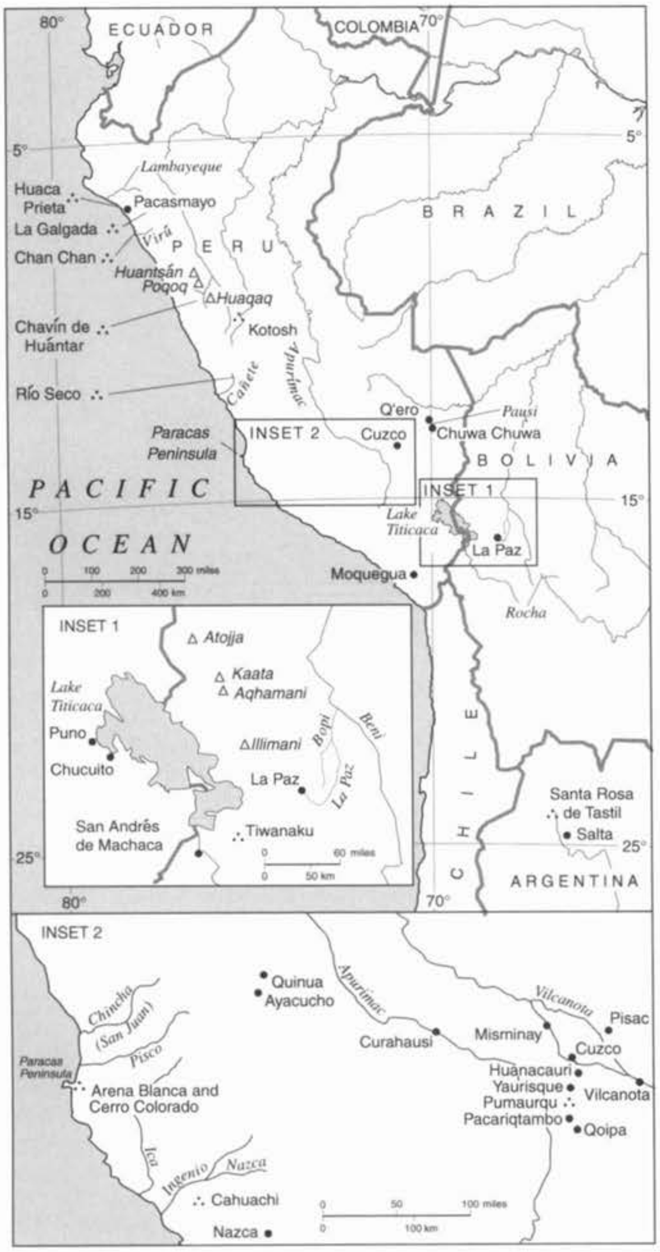

FIG. 6.1. REFERENCE MAP OF THE CENTRAL ANDEAN REGION. This map shows places and features mentioned in the text.

cracy were?[8] A subtle but pervasive academic explanation for the supposed lack of maps and other examples of Inka government is the severity of the Spanish conquest. However, although Antonio de Mendoza sponsored Juan de Betanzos's authoritative *Suma y narración de los Incas* (1551–57) and collected pictorial manuscripts while in Mexico, he did not collect them in the Andes when, toward the end of his life, he was viceroy of Peru. Likewise, the third viceroy, Andrés Hurtado de Mendoza, did not collect or commission Andean pictorial manuscripts or maps. It is far more likely, as Tom Cummins cogently argues, that Andean conceptions of space and their symboling systems were so abstract and so different from those associated with the European experience that the Spaniards simply ignored them.[9] And without Spanish recognition, the cultural reproduction of Andean symboling systems did not survive the colonial period in its entirety.

It is possible to reach a conclusion very different from Adler's about the existence of mapmaking traditions in the central Andes. However, this requires broadening the definition of "map"–as in other parts of this volume–and poses the question, How does one identify a map from a culture whose conceptions of space, geographic relations, modes of representation, and media are very different from the Western experience?

In trying to answer this question, I will demonstrate that from early horizon through Inka times (ca. 900 B.C.–A.D. 1532) Andean peoples made spatial and landscape representations that functioned as maps. Before examining the chronological development of mapmaking in the archaeological record, we need to establish Andean conceptions of space, geographic relations, and rules of representation from archaeology, ethnography, and history.

Andean Conceptions of Space and Geographic Relations: Past and Present

We will not recognize Andean maps until we attempt to see them through Andean eyes. The content and structure of any map–including Western ones–is determined not only by what is in the environment, but also by social organization, cultural convention, and human perception.[10] Important Andean precepts include the welding of people and landscape in the concept of an *ayllu;* the organization of signs and other representations into radial forms, parallel strips, and gridlike geometric structures; the cultural importance of *huacas* and *parajes;* animal-body-landscape metaphors; and the performative aspects of map reading as reflected in mapping rites. Each precept is

8. The Inkas had a special temple, Poquen Cancha or House of the Sun, that contained picture boards (*tablas*) depicting the life of each Inka ruler, details of conquered lands, and illustrations of Inka rites and fables. José de Acosta suggested that Inka paintings (*pinturas*) and *khipus* were the conduit for important historical information and substituted for writing and letters, which the Inkas lacked. However, no pre-Columbian picture boards or paintings are known to survive. See Cristóbal de Molina, *Fábulas y mitos de los Incas,* ed. Henrique Urbano and Pierre Duviols (Madrid: Historia 16, 1989), 49–50, and José de Acosta, *Historia natural y moral de las Indias,* 2 vols. (Madrid: Ramón Anglés, 1894), esp. 2:165–66.

9. Tom Cummins, "Representation in the Sixteenth Century and the Colonial Image," in *Writing without Words: Alternative Literacies in Mesoamerica and the Andes,* ed. Elizabeth Hill Boone and Walter D. Mignolo (Durham: Duke University Press, 1994), 188–219, esp. 189–91 and n. 11.

10. David Turnbull, *Maps Are Territories, Science Is an Atlas: A Portfolio of Exhibits* (Geelong, Victoria: Deakin University, 1989; reprinted Chicago: University of Chicago Press, 1993).

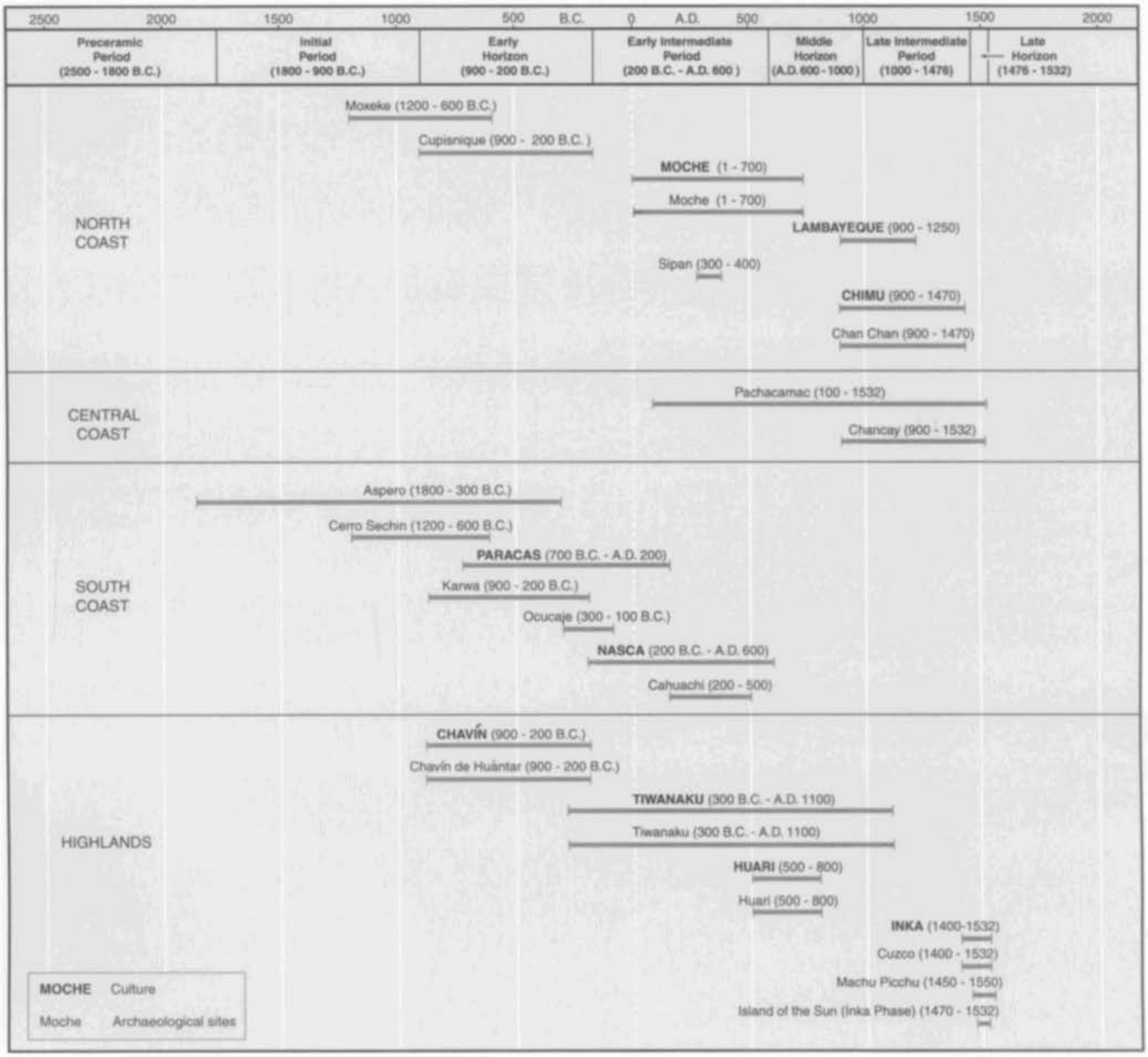

FIG. 6.2. CULTURAL CHRONOLOGY FOR THE CENTRAL ANDEAN REGION. This time line shows archaeological cultures, periods, and horizons of the central Andes.

After Richard F. Townsend, ed., *The Ancient Americas: Art from Sacred Landscapes* (Chicago: Art Institute of Chicago, 1992), 263.

grounded in social discourse, often related to the usufruct to land and water. Furthermore, these rules are grounded in two essential Andean connections between the organization of societies and nature.

The first of these connections is terrestrial and is rooted in the contrasting life zones across the Andes (fig. 6.3). The spatial organization of Andean political economies is closely tied to the specific configuration of bioclimatic life zones, since each zone has a unique set of resources and different production potential.[11] Central Andean peoples developed reciprocal relationships with other communities in different vertical and horizontal zones. Such an arrangement maximized access to various resources and production zones and minimized risk.[12] This economic

11. See Carl Troll, "The Cordilleras of the Tropical Americas: Aspects of Climatic, Phytogeographical and Agrarian Ecology," in *Geo-ecology of the Mountainous Regions of the Tropical Americas* (Bonn: Ferd Dümmlers, 1968), 15–56.

12. Most modern research concerning the spatial organization of native Andean economies and landscapes has been inspired by the works of John V. Murra. See especially his "El 'control vertical' de un máximo de pisos ecológicos en la economía de las sociedades andinas," in *Visita de la provincia de León de Huánuco en 1562: Iñigo Ortiz de Zúñiga, visitador*, 2 vols., ed. John V. Murra (Huánuco, Peru: Universidad Nacional Hermilio Valdizán, 1967–72), 2:427–76, and "An Aymara

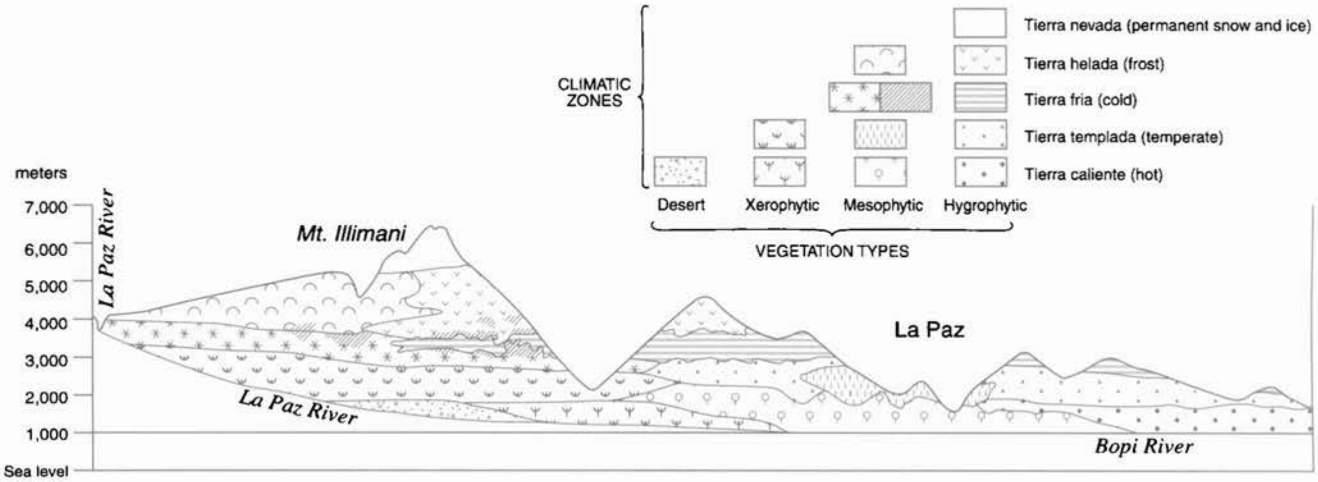

FIG. 6.3. TOPOGRAPHY AND SPACE. Topography and other factors create distinctive sets of bioclimatic life zones in the Andes. Life zones change dramatically with altitude and across east-west and north-south transects at the same elevation. The spatial organization of Andean cultural beliefs and subsistence economies reflects the differentiated landscape. This diagram shows a cross section through the Cordillera Real and the valley of the La Paz River.

After Carl Troll, "The Cordilleras of the Tropical Americas: Aspects of Climatic, Phytogeographical and Agrarian Ecology," in *Geo-ecology of the Mountainous Regions of the Tropical Americas* (Bonn: Ferd Dümmlers, 1968), 15–56, esp. 48.

organization of the landscape is termed "complementarity," which is the simultaneous control of several geographically dispersed ecological tiers by a single ethnic or sociopolitical group. The scale and form of complementarity vary according to geography and history, ranging from a single lineage's landholdings at different elevations within the same valley to the control of distant mountain valleys and lowland areas by the kings of city-states. In both cases complementarity was, and is, maintained through formalized relationships based on reciprocity, redistribution, shared labor obligations, and kinship.[13]

The second essential connection is between Andean systems of spatial reckoning and the movement of the heavenly bodies. For example, in the absence of a bright star near the celestial south pole, Quechua peoples and their ancestors organized the sky by reference to the Milky Way, called Mayu or the "celestial river," and its apparent cruciform rotations.[14] In a twenty-four-hour period, the Milky Way forms two intersecting intercardinal axes that divide the heavens into quarters (fig. 6.4). Since the plane of the Milky Way is inclined in relation to the earth's axis, the stars of one quarter will rise as those of the opposite quarter set as the earth rotates. Astronomical phenomena can be tracked with respect to these quarters, which create a systematic means for the spatial and temporal reckoning of the world and its natural and social rhythms (fig. 6.5). This principle is central to pre-Columbian spatial reckoning. The diagonal opposition mirrors the inferred marriage and residence rules for the Inka settlement of the Cuzco Valley.[15] The quartered circle is a form often replicated in the urban design of the Andean cosmopolis.[16]

AYLLU: LINKING TERRITORY TO SOCIETY

The welding of people and landscape is at the heart of the concept of an *ayllu,* the fundamental social and territorial unit of the central Andes. Precise definitions of an *ayllu* will vary with social and ecological circumstances. Furthermore, the role of the *ayllu* as a local kin group con-

Kingdom in 1567," *Ethnohistory* 15 (1968): 115–51, esp. 121–27. The terms "verticality," which stresses the altitudinal dimension of complementarity, and "archipelago," which stresses the horizontal dimension of complementarity, are often found in this older literature.

13. For a collection of essays on complementarity, see Yoshio Shozo Masuda, Izumi Shimada, and Craig Morris, eds., *Andean Ecology and Civilization: An Interdisciplinary Perspective on Andean Ecological Complementarity* (Tokyo: University of Tokyo Press, 1985).

14. The Quechua peoples of the village of Misminay, department of Cuzco, equate Mayu with the Vilcanota River and its irrigation system. In effect, their terrestrial reckoning system mirrors celestial process. Additional associations between dark cloud constellations (silhouettes against the Milky Way) of plants and animals and animal ecology on earth enhance this system. See Gary Urton, *At the Crossroads of the Earth and the Sky: An Andean Cosmology* (Austin: University of Texas Press, 1981), esp. 37–65.

15. R. Tom Zuidema, *The Ceque System of Cuzco: The Social Organization of the Capital of the Inca* (Leiden: E. J. Brill, 1964).

16. See Alan L. Kolata, *The Tiwanaku: Portrait of an Andean Civilization* (Cambridge, Mass.: Blackwell, 1993), 98–103, and John Hyslop, *Inka Settlement Planning* (Austin: University of Texas Press, 1990), 202–21.

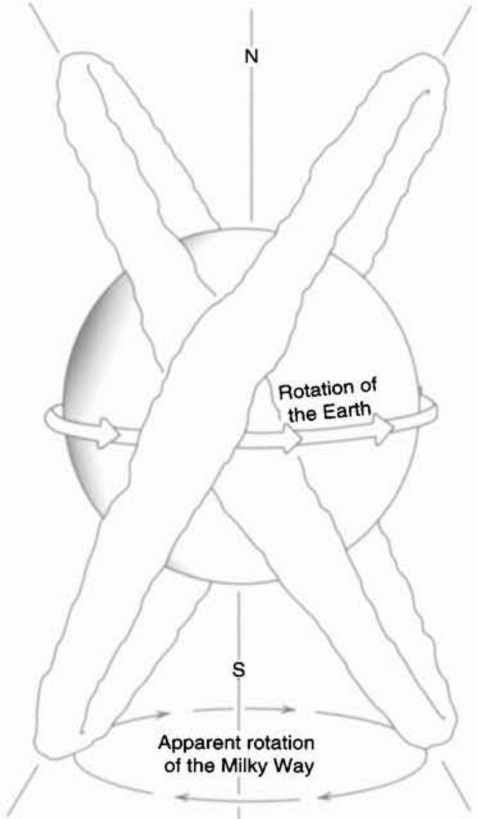

FIG. 6.4. THE QUARTERED CIRCLE AND THE APPARENT MOVEMENT OF THE MILKY WAY. The quartered circle is an image of social and spatial order in many Andean societies and is probably inspired by the apparent nightly rotation of the Milky Way. Celestial movements also mimic the organization of terrestrial space for the modern-day Quechua peoples of Misminay. The Inkas structured their spatial and social environment in a similar fashion, as evinced by the quadripartite division of Inka society into *suyus*.
After Gary Urton, *At the Crossroads of the Earth and the Sky: An Andean Cosmology* (Austin: University of Texas Press, 1981), esp. 58 (fig. 19).

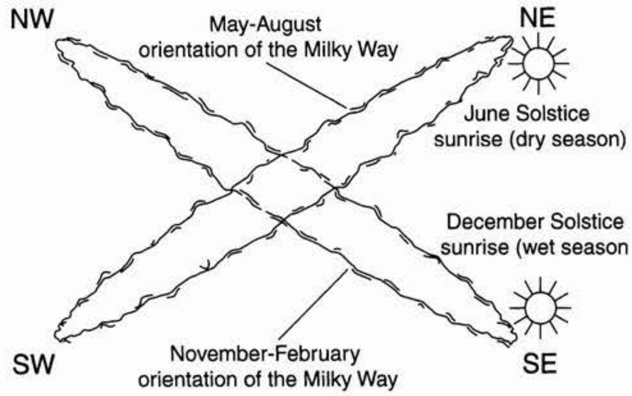

FIG. 6.5. THE MILKY WAY'S APPARENT SEASONAL ROTATION. In addition to the Milky Way's nightly rotation, over the course of a year it again divides the heavens into quarters. First appearing in the evening sky during the dry season, the Milky Way (Mayu) stretches from the northeast to the southwest. During the rainy season, its early evening orientation is from the southeast to the northwest. These seasonal rotations find correlates in terrestrial, social, and cosmological organization.
After Gary Urton, *At the Crossroads of the Earth and the Sky: An Andean Cosmology* (Austin: University of Texas Press, 1981), esp. 62 (fig. 22).

trolling territory is also historically conditioned.[17] At a minimum, *ayllus* are distinguishable sociopolitical groups whose membership is based on some combination of landholding arrangements; shared labor responsibilities for the maintenance of community infrastructure such as roads, civic-ceremonial architecture, or irrigation canals; the sponsorship of religious festivals; and some type of formalized kinship relations, perhaps reflected in marriage and residence rules or real or fictive descent from an ancestor.[18]

The size of a geographic area synonymous with an *ayllu* varies with cultural and ecological circumstances. *Ayllus* are often grouped into larger sociopolitical entities such as *suyus* and moieties.[19] A *suyu* is a part of a whole; a moiety is one of two units into which a community is divided based on unilateral descent. *Suyus* may be equated with a quadripartite division, as in Tawatinsuyu (land of the four parts), the Inkas' term for their empire.

17. Compare, for example, Frank Salomon, *Native Lords of Quito in the Age of the Incas: The Political Economy of North Andean Chiefdoms* (Cambridge: Cambridge University Press, 1986), 167–69; Steve J. Stern, *Peru's Indian Peoples and the Challenge of Spanish Conquest: Huamanga to 1640,* 2d ed. (Madison: University of Wisconsin Press, 1993), 42–43; and Karen Spalding, *Huarochirí: An Andean Society Under Inca and Spanish Rule* (Stanford: Stanford University Press, 1984), 176–79.

18. Jeanette E. Sherbondy, "Water and Power: The Role of Irrigation Districts in the Transition from Inca to Spanish Cuzco," in *Irrigation at High Altitudes: The Social Organization of Water Control Systems in the Andes,* ed. William P. Mitchell and David Guillet (Arlington, Va.: Society for Latin American Anthropology, American Anthropological Association, 1993), 69–97, esp. 72–78; Harold O. Skar, *The Warm Valley People: Duality and Land Reform among the Quechua Indians of Highland Peru,* 2d ed. (Göteborg: Göteborgs Etnografiska Museum, 1988), 166–72; Joseph William Bastien, *Mountain of the Condor: Metaphor and Ritual in an Andean Ayllu* (St. Paul, Minn.: West, 1978), xxiii–xxv and 189–92; Spalding, *Huarochirí,* 28–30; and Billie Jean Isbell, *To Defend Ourselves: Ecology and Ritual in an Andean Village* (Austin: Institute of Latin American Studies, 1978), 105–8.

19. Patricia J. Netherly, "The Management of Late Andean Irrigation Systems on the North Coast of Peru," *American Antiquity* 49 (1984): 227–54. Netherly uses the Spanish term *parcialidad* instead of the Quechua *ayllu* and suggests that *ayllu* may have been used instead of *parcialidad* during the colonial period to emphasize the kinship dimension of the social group. Generally, the *ayllu* can be considered a subgroup or component of the *parcialidad.* See also Gary Urton, "Andean Social Organization and the Maintenance of the Nazca Lines," in *The Lines of Nazca,* ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 173–206, esp. 195–96.

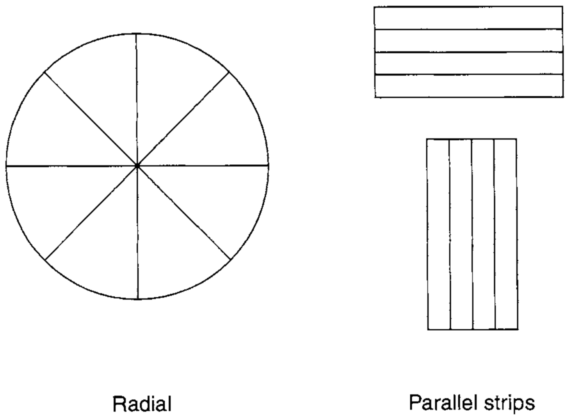

FIG. 6.6. THE GRAPHIC STRUCTURING OF ANDEAN SPATIAL THOUGHT. Two geometric structures signify social and territorial space in traditional Andean societies, as reflected in the large-scale organization of household usufruct to land and water: radial and parallel strips. They are both ultimately inspired by nature, that is, by the movement of the Milky Way and the spatial configuration of bioclimatic life zones, respectively. The organization of icons, symbols, motifs, and pictorial narratives into radial or parallel geometric structures can thus signify a geographic relation in Andean spatial thought. Grids are a conceptual subcategory of parallel strips. See, for example, figure 6.10 below.

Moieties are a dual division of society and space, and such divisions are ancient in the Andes. The late preceramic period (ca. 3000–2000 B.C.) sites of Río Seco, La Galgada, and Kotosh all have twin platform mounds, an architectural manifestation of dual social and territorial organization.[20] Principles of dual and quadripartite organization are also evident in carved gourds found at the preceramic period site of Huaca Prieta.[21]

RADIAL AND PARALLEL STRUCTURE

Two geometric structures for landholdings, radial organization and parallel strips, are forms inspired by nature and the heavens (fig. 6.6). As we have seen, the quartered circle references the apparent movement of the Milky Way. Parallel strips of landholdings mirror the verticality of Andean life zones.

Perhaps the most famous form of Andean social and territorial division is a radial one. Figure 6.7 illustrates the social and territorial organization of the community of San Andrés de Machaca, department of La Paz, Bolivia. Here *ayllu* landholdings are grouped into moieties. In the ideal form, a prominent natural or cultural feature, such as a river or road, would serve as a territorial boundary equally dividing the two moieties. Because of geographic reality the radial structure is less than perfect. Community tensions arise owing to this departure from the ideal. The existence of other community structures and the derivation of landholding from the ideal demonstrates that *ayllus* as territorial units are always part of a social discourse (fig. 6.8).[22]

Andean landholdings are also organized into parallel rectangular strips. Figure 6.9 illustrates an eighteenth-century copy of a sixteenth-century sketch map of native canals and landholdings ordered by the Spaniard Gregorio Gonzalez de Cuenca, who recorded native land and water rights as a basis for Spanish colonial administration during his inspection tour (*visita*) of north coast valleys. Each tertiary canal in figure 6.9 bears the name of the *parcialidad* or *ayllu* responsible for canal upkeep. Both field size and the area in standing crops were measured with respect to small feeder canals, as reflected in the sixteenth-century *visita* landholding entry "five ditches [canals] of maize."[23] Although *parcialidades* were organized into larger sociopolitical groups, the evidence suggests that equating canals with territory arose at the local level. However, parallel strips of landholdings may also reflect bureaucratic decisions, as exemplified by the Inka resettlement of the Cochabamba Valley (central Bolivia), where fourteen thousand Indians were grouped into *suyus* and assigned parallel strips of land that cut across the Rocha River.[24]

The notion that critical points of the irrigation or agricultural system may have a territorial function is corroborated by the early seventeenth-century native chronicler Felipe Guamán Poma de Ayala in his fifteen-hundred-page illustrated letter to the king of Spain. In his drawing of the planting season (fig. 6.10), a stone-lined spring or reservoir (*estanque*) is adjacent to a grid pattern of agricultural fields (*chakras*). The shallow ditches present dur-

20. For an example of dual organization and its role in the built landscape, see David Guillet, *Covering Ground: Communal Water Management and the State in the Peruvian Highlands* (Ann Arbor: University of Michigan Press, 1992), 18–19, 85–98, and 104–5.

21. Junius Bouton Bird, "Pre-ceramic Art from Huaca Prieta, Chicama Valley," *Ñawpa Pacha* 1 (1963): 29–34, esp. pl. II.

22. Javier Albó, "Dinámica en la estructura inter-comunitaria de Jesús de Machaca," *América Indígena* 32 (1972): 773–816, esp. 780–82 and 804. The actual pattern of land use may deviate from Andean forms because of local ecology and the social relations of production. See Karl S. Zimmerer, *Changing Fortunes: Biodiversity and Peasant Livelihood in the Peruvian Andes* (Berkeley: University of California Press, 1996), 117–26; idem, "Agricultura de barbecho sectorizada en las alturas de Paucartambo: Luchas sobre la ecología del espacio productivo durante los siglos XVI y XX," *Allpanchis*, no. 38 (1991): 189–225, esp. 213–20; and Daniel W. Gade and Mario Escobar, "Village Settlement and the Colonial Legacy in Southern Peru," *Geographical Review* 72 (1982): 430–49.

23. Netherly, "Late Andean Irrigation Systems," esp. 239 (note 19).

24. Nathan Wachtel, "The *Mitimas* of the Cochabamba Valley: The Colonization Policy of Huayna Capac," in *The Inca and Aztec States, 1400–1800: Anthropology and History*, ed. George A. Collier, Renato I. Rosaldo, and John D. Wirth (New York: Academic Press, 1982), 199–235, esp. 205–13.

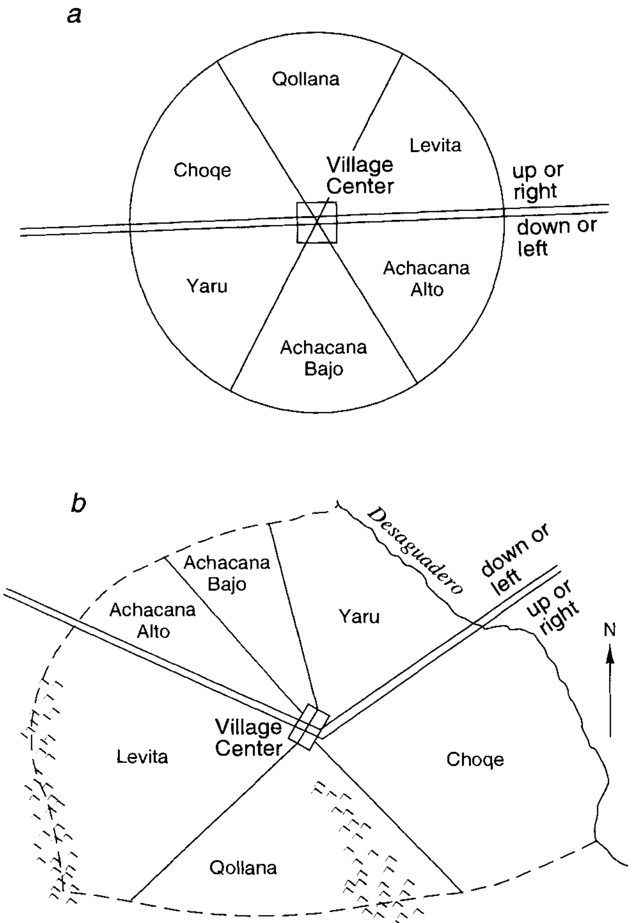

FIG. 6.7. THE RADIAL ORGANIZATION OF ANDEAN LANDSCAPES. These two maps illustrate the ideal (*a*) and the actual (*b*) pattern of wedge-shaped landholdings belonging to the *ayllus* of San Andrés de Machaca, Bolivia. *Ayllu* landholdings are grouped into two moieties, separated by the double lines that are alternatively distinguished as upper and lower or right and left. Rivers, mountains, roads, and agricultural works often form social and territorial boundaries in Andean communities.
After Javier Albó, "Dinámica en la estructura inter-comunitaria de Jesús de Machaca," *América Indígena* 32 (1972): 773–816, esp. figs. 1 and 2.

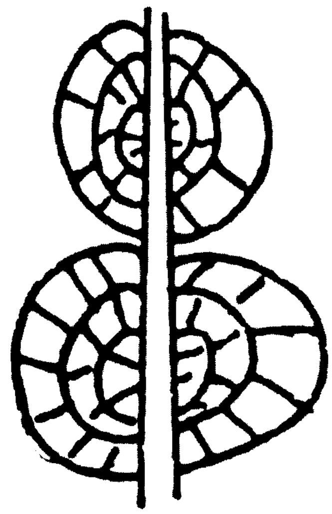

FIG. 6.8. INTERPRETATION OF Q'ERO AGRICULTURAL LANDHOLDINGS. This map of agricultural landholdings belonging to two Q'ero moieties was drawn by the anthropologist Gail P. Silverman-Proust according to Lorenzo Quispe's interpretation of a textile made by his village of Chuwa Chuwa, department of Cuzco, Peru. The double line in the center represents the Pausi River, which separates the agricultural fields of the two Q'ero moieties. The three half circles and accompanying radiating lines on either side of the river represent agricultural fields organized by elevation.
From Gail P. Silverman-Proust, "Weaving Technique and the Registration of Knowledge in the Cuzco Area of Peru," *Journal of Latin American Lore* 14 (1988): 207–41, esp. 234.

ing the growing season are obscured by crop growth in Guamán Poma's illustration of the harvest season. One function of the shallow ditches was to separate family landholdings.[25]

Modern Quechua- and Aymara-speaking peoples who inhabit the western shores of Lake Titicaca use maps in their negotiations with government officials over the control of highly productive lacustrine reed beds. Benjamin Orlove has analyzed a number of these maps, which he refers to as "state maps" and "peasant maps."[26] Although each map differs in its cultural assemblage, all the peasant maps in his sample blend Western and Andean representational precepts (fig. 6.11). The Andean community that made the map is not interested in creating a scaled representation or a temporal sequence of events. Rather, we can infer from it that the mapmakers want to show the unchanging topological relation between village territories and the Lake Titicaca reed beds. Natural and cultural features often constitute village boundaries in the Andes, and the water channels perform this function in figure 6.11. The three streams divide the landholdings of several communities into strips of contiguous territory

25. Urton, "Andean Social Organization," 201–2 (note 19). For the careful surveying associated with *chakras,* see Bernabé Cobo, *Inca Religion and Customs,* trans. and ed. Roland Hamilton (Austin: University of Texas Press, 1990), 240; idem, *History of the Inca Empire: An Account of the Indians' Customs and Their Origin, Together with a Treatise on Inca Legends, History, and Social Institutions,* trans. and ed. Roland Hamilton (Austin: University of Texas Press, 1979), 211; and Juan Polo de Ondegardo, *El mundo de los Incas,* ed. Laura González and Alicia Alonso (Madrid: Historia 16, 1990), 59–60 and 63–65. The grid or orthogonal pattern is a variation of parallel strip territorial organization. See Hyslop, *Inka Settlement Planning,* 192–202 (note 16).

26. Benjamin S. Orlove, "Mapping Reeds and Reading Maps: The Politics of Representation in Lake Titicaca," *American Ethnologist* 18 (1991): 3–38; idem, "Irresoluciun suprema y autonomía campesina: Los totorales del Lago Titicaca," *Allpanchis,* no. 37 (1991): 203–68; and idem, "The Ethnography of Maps: The Cultural and Social Contexts of Cartographic Representation in Peru," *Cartographica* 30, no. 1 (1993): 29–46.

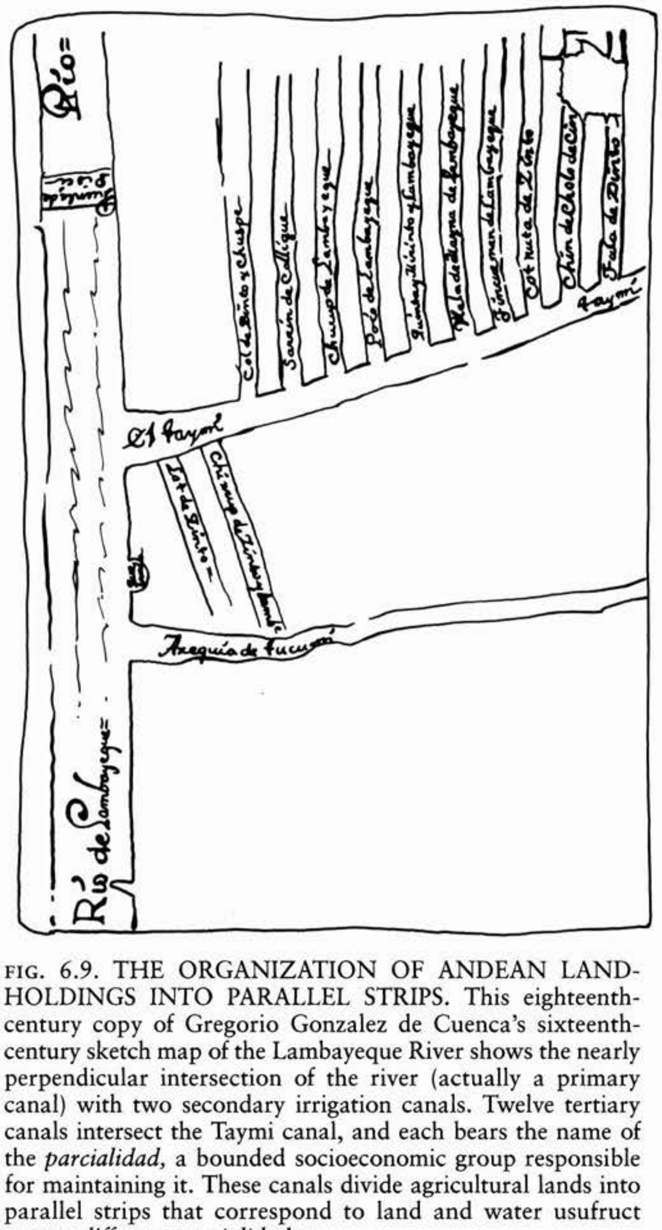

FIG. 6.9. THE ORGANIZATION OF ANDEAN LANDHOLDINGS INTO PARALLEL STRIPS. This eighteenth-century copy of Gregorio Gonzalez de Cuenca's sixteenth-century sketch map of the Lambayeque River shows the nearly perpendicular intersection of the river (actually a primary canal) with two secondary irrigation canals. Twelve tertiary canals intersect the Taymi canal, and each bears the name of the *parcialidad,* a bounded socioeconomic group responsible for maintaining it. These canals divide agricultural lands into parallel strips that correspond to land and water usufruct among different *parcialidades.*
Archivo Arzobispal Trujillo, Trujillo, Peru (Causas 66.6, 1753, ff 47). By permission of Patricia J. Netherly.

FIG. 6.10. THE ORGANIZATION OF ANDEAN LANDHOLDINGS AS A GRID. In addition to radial and strip divisions of land, grids were also employed in Andean spatial organization. A grid of shallow ditches separates Inka agricultural plots during the planting and growing seasons in this drawing by Felipe Guamán Poma de Ayala. Springs, reservoirs, ditches, and canals functioned as social and territorial boundary markers in traditional Andean society.
Size of the original: ca. 18 × 12 cm. Photograph courtesy of the Royal Library, Copenhagen (Nueva crónica y buen gobierno, fol. 1162).

perpendicular to the shore of Lake Titicaca. This nonscaled representation is, in effect, a statement of political parity and equal access to the reed resource by each community. Like the other native maps produced during the reed conflict, figure 6.11 affirms that each village controls a specific territory and that together the communities control the region.[27]

Central Andean peoples graphically represent the partitioning of society and territory on a medium not often considered by the cartographic historian–ceramics. Modern pottery from Quinua, central Peru, reflects the distribution of household landholdings and *ayllu* residence patterns in the organization of design bands and motifs (fig. 6.12). Quinua territory consists of resource zones at several elevations along an eastern slope in the central Ayacucho basin. The community is divided into two moieties based on the irrigation system, which acts as an administrative boundary between Quinua's two barrios. The arrangement of design bands on ceramics reflects the structural principles that organize the environmental and social spaces of the community. Vertical, stacked designs

27. Orlove, "Mapping Reeds," 25–27. Government representatives consider the peasant maps crude imitations of state ones, probably because the peasant maps cannot be combined to form a unified, scaled, bird's-eye view of the area.

FIG. 6.11. MAP OF THE SHORE OF LAKE TITICACA, PUNO, PERU. Modern Aymara and Quechua maps, such as this one from Lake Titicaca, often combine Western and native cartographic precepts. This map, from the files of the Peruvian National Forestry Center (CENFOR), was part of a claim made by peasant communities regarding the control of reed beds. Following Western convention, rivers and the Lake Titicaca shoreline are illustrated in plan view, water is separated from land by a line, the map is drawn on a rectangular piece of paper, and the text is in Spanish. Vernacular features include the non-north orientation (in this case west is at the top) and the depiction of individual houses in frontal perspective. Water channels that separate village territories are spaced to create parallel strips that reflect parity in political power and control of the resource based on community rights. Andean peoples consider the sequence and shape of community territories more important than linear distance.
From Benjamin S. Orlove, "The Ethnography of Maps: The Cultural and Social Contexts of Cartographic Representation in Peru," *Cartographica* 30, no. 1 (1993): 29–46, esp. fig. 6.

reflect resource zones, while designs divided by a vertical strip reflect social divisions. Other ecological, cultural, and symbolic spaces are represented in design band organization, decorative motifs, and vessel shape.[28]

THE ROLE OF SACRED *HUACAS* AND *PARAJES*

Map content obviously reflects landscape components deemed culturally important by mapmakers and map users. Two significant cultural elements in the central Andes are *huacas* and *parajes*.

Huaca is a broad term designating a sacred thing. Mountains, springs, trees, river junctions, boulders, mummies, and artifacts can all be *huacas*. The significance of *huacas* to Andean spatial representation goes well beyond the simple observation that showing a tree or boulder on a map may signify more than its physical location. Powerful *huacas*, those deemed responsible for the current order of things, had elaborate social and political institutions built around them.[29] Hydrology, political structure, religion, and territory are all intertwined in the concept of the *huaca*. When the Inkas resettled the Cuzco Valley, they reassigned the rights and duties for more than three hundred *huacas*, many of them associated with water, in order to legitimize the new world order.[30]

According to Cristóbal de Molina, among the painted boards at Poquen Cancha was a pictorial narrative of the mythical origin of the Inkas. This myth essentially states that at Tiwanaku the creator deity made clay likenesses of all indigenous peoples and decorated them according to the garments and hairstyles peculiar to each group. The creator also gave each group its languages, songs, and foods. When the creator finished shaping and painting the human lumps of clay, clay likenesses of one man and woman from each group passed underground and reemerged at the exact places and landscape features that

28. Dean E. Arnold, "Design Structure and Community Organization in Quinua, Peru," in *Structure and Cognition in Art*, ed. Dorothy Koster Washburn (Cambridge: Cambridge University Press, 1983), 56–73.

29. Frank Salomon, "Introductory Essay: The Huarochirí Manuscript," in *The Huarochirí Manuscript: A Testament of Ancient and Colonial Andean Religion*, trans. Frank Salomon and George L. Urioste (Austin: University of Texas Press, 1991), 1–38, esp. 16–19.

30. Jeanette E. Sherbondy, "Water Ideology in Inca Ethnogenesis," in *Andean Cosmologies through Time: Persistence and Emergence*, ed. Robert V. H. Dover, Katherine E. Seibold, and John H. McDowell (Bloomington: Indiana University Press, 1992), 46–66, esp. 59–60.

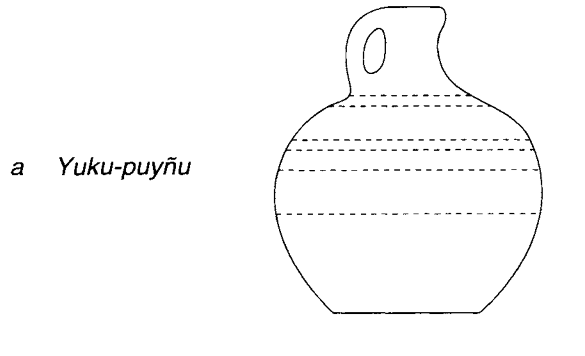

FIG. 6.12. SPATIAL ORGANIZATION AND CERAMIC DECORATIVE BANDS ON QUINUA POTTERY. The four types of pottery shown here are common utilitarian vessels used by Quinua inhabitants. The vessels encode important spatial knowledge critical to the social structures of the community. Vertically stacked design bands on vessels *a* and *b* reflect landholdings and resource zones that are organized at multiple elevations. On *c*, a single vertical strip divides the vessel and mirrors the division of the community by a primary irrigation canal. Each individual in Quinua is a member of two kin groups, and this bilateral descent may be reflected in the bilateral symmetry of particular motifs on *c* and *d*. The circle at the center of the bowl, *d*, is analogous to the village as the center of the social and ecological environment.
After Dean E. Arnold, "Design Structure and Community Organization in Quinua, Peru," in *Structure and Cognition in Art*, ed. Dorothy Koster Washburn (Cambridge: Cambridge University Press, 1983), 56–73, esp. figs. 5.5–5.8.

the creator had assigned to them. This version of the Inka origin myth outlines the welding of landscape and society that is at the heart of the *ayllu* as well as the geographic significance of *huacas* in commemorating mythohistorical beginnings and explaining the current configuration of things. "Because they issued forth from these places and began to multiply, and had the beginning of their lineage from them, they made *huacas* and places of worship in remembrance of their beginnings. Each nation wears the costume with which they dressed their *huacas* of origin. Thus, the *huacas* they use and worship are all of different forms."[31] Individual *huacas* are of cartographic significance, since they represent the place of origin for a particular Inka lineage and also identified territorial apportionments by their mythological associations and links to specific administrative districts.[32]

Oral traditions detailing the history of *huacas,* such as the Huarochirí Manuscript from central Peru, are exegeses of landscape. The cultural importance of *huacas* is such that, in the case of the Huarochirí Manuscript, modern researchers have generated maps using *huaca* names recorded four hundred years ago.[33] *Huacas* often are personified in Andean oral traditions detailing the mythicized histories of landscape formation and the founding of an *ayllu* lineage. Such ancestor *huacas* are more than cosmological signifiers or potential objects on an Andean map. They are part of a social discourse because they legitimize territorial apportionments by rights of lineage.[34] More than four millennia ago, the Chinchoros of northern Chile and the central Peruvian Palomans established the enduring Andean tradition of social formations based on the veneration of tangible common ancestors.[35]

The representation of a *huaca* on a textile produced by modern Quechua-speaking peoples from the Q'ero Valley, department of Cuzco, Peru, utilizes geographic and temporal motifs (figs. 6.13 and 6.14). The incarnation of the ancestor *huaca* Inkarri, the first Inka, is depicted along with *k'iraqey puntas* (literally "toothlike points")–a motif that represents mountain peaks that function as the natural boundary markers identifying Q'ero territory.[36] The textile map is a pictorial narrative of Inkarri's role in shaping the Q'ero landscape.

The Q'ero *pallay* maps time onto space by using shadow to represent the direction of sunlight.[37] The quartered diamond circumscribed into a rectangular frame,

31. Molina, *Fábulas y mitos,* 49–51, quotation on 51 (note 8).

32. Polo de Ondegardo, *El mundo de los Incas,* 100–103 (note 25). See also Juan de Matienzo, *Gobierno del Perú,* ed. Guillermo Lohmann Villena (Paris: Institut Français d'Études Andines, 1967), 128–31.

33. Gerald Taylor and Antonio Acosta, trans., *Ritos y tradiciones de Huarochirí: Manuscrito quechua de comienzos del siglio XVII* (Lima: Instituto de Estudios Peruanos, 1987), esp. 39.

34. Salomon, "Introductory Essay," 19–24 (note 29).

35. Moseley, *Incas and Their Ancestors,* 93–94 (note 5).

36. Gail P. Silverman-Proust, "Weaving Technique and the Registration of Knowledge in the Cuzco Area of Peru," *Journal of Latin American Lore* 14 (1988): 207–41, esp. 219–23.

37. Silverman-Proust, "Weaving Technique," 227–32. Some Andean peoples, past and present, have told time by observing shadows cast by

FIG. 6.13. Q'ERO *PALLAY* TEXTILE PORTRAYING MOUNTAINS. Quechua peoples living in the Q'ero Valley weave a two-sided cloth called a *pallay*. See figure 6.14.
From Gail P. Silverman-Proust, "Weaving Technique and the Registration of Knowledge in the Cuzco Area of Peru," *Journal of Latin American Lore* 14 (1988): 207–41, esp. fig. 19.

FIG. 6.14. EXPLANATION OF THE Q'ERO *PALLAY* (FIG. 6.13). Q'ero peoples identify a specific valley by the type of mountain peaks that enclose it. The sawtooth motif (*k'iraqey puntas*) represents the mountains that enclose the Q'ero Valley. Subtle changes in the shape and size of the motif may signify specific mountain attributes. The figure standing with arms upstretched and lowered is the incarnation of the ancestor *huaca* Inkarri, while the central axis represents a natural or cultural boundary between villages such as the Q'ero River.

called *tawa inti qocha,* is one of several *inti* motifs that indicate sunrise, sunset, the sun at the zenith (noon), or the sun at the antizenith (midnight), depending on the weaver's purpose (fig. 6.15).[38]

A textile illustrating the spatial relation of landholdings and land features is the two-color Qheswa *pallay* in figure 6.16. It is woven with the *tawa t'ika qocha* motif composed of a quartered diamond that is separated into two halves by a *sonqocha* line. Like other examples of dual spatial organization in Andean societies, the partitioning of the diamond is a general reference to the ideal division of social and territorial space. The *tawa t'ika qocha* motif is also outlined in red and white rectangles, called *órgano,* which are aligned repetitively (fig. 6.17). According to Silverman-Proust, the *órgano* weave signifies a series of square furrows that form individual agricultural plots. In short, the individual diamonds on the Qheswa *pallay* are organized into a grid representing agricultural landholdings.[39] Although the idea is speculative, the altitudinal locations of the household's agricultural fields may be signified by multicolored bands (*listas*) that border the *órgano* motif. *Listas* signify a color classification scheme for agricultural products. For example, a yellow stripe signifies yellow maize or yellow potatoes, a red stripe signifies red maize or red potatoes. Because particular crops have an optimal altitudinal life zone, the number and sequence of *listas* may symbolize the altitude of landholdings.[40]

Andean peoples often name a particular resource zone (*paraje*) after some local physical feature, such as a spring, a place where a certain plant grows, a rock outcrop, or an animal habitat. The names of these zones should not be conceptualized as clearly bounded areas. Although *parajes* denote a specific area, the locales have diffuse boundaries between them.[41] The mapping signifi-

the sun. One method is to note the change in shadow length projected onto a mountain.

38. Silverman-Proust, "Weaving Technique," 209–11. During interviews with Silverman-Proust, Quechua peoples from Q'ero produced a series of landscape drawings and celestial maps to explain the Q'ero *pallay*.

39. Silverman-Proust, "Weaving Technique," 236.

40. Gail P. Silverman-Proust, "Significado simbólico de las franjas multicolores tejidas en los wayakos de los Q'ero," *Boletín de Lima* 10, no. 57 (1988): 37–44.

41. David H. Andrews, "The Conceptualization of Space in Peru" (paper presented at the sixty-fifth annual meeting of the American An-

FIG. 6.15. Q'ERO *PALLAY* WITH *INTI* MOTIFS. This Q'ero textile incorporates four *inti* motifs that represent sunrise (*inti lloqsimushan*), sunset (*inti chinkiapushan*), sun at noon (*hatun inti*), and sun at midnight (*tawa inti qocha*), depending upon the weaver's use of different yarn color and pattern combinations. Quechua women incorporate these motifs into their textiles according to the time of day they wish to portray, represented by the amount of sunlight available and shadow used.
From Gail P. Silverman-Proust, "Weaving Technique and the Registration of Knowledge in the Cuzco Area of Peru," *Journal of Latin American Lore* 14 (1988): 207–41, esp. fig. 1.

FIG. 6.16. QHESWA *PALLAY* TEXTILE FROM PISAC, PERU. The Qheswa *pallay* is a textile that represents spatial concepts. This textile may signify the location of agricultural landholdings in the Pisac Valley. See figure 6.17.
From Gail P. Silverman-Proust, "Weaving Technique and the Registration of Knowledge in the Cuzco Area of Peru," *Journal of Latin American Lore* 14 (1988): 207–41, esp. fig. 2.

cance of *parajes* is that the representation of a single feature on a map may in fact be interpreted by Andeans as standing for a larger area. An example of the concept of *parajes* is the multicolored *listas* of figure 6.16, on which the color signifies a particular crop and its altitudinal growing zone.[42]

LANDSCAPE METAPHORS

Several art historians and anthropologists have noted the importance of metaphor in the art of pre-Columbian Andean societies like the Nasca.[43] The body-landscape metaphor was certainly used in Inka times.[44] Modern-day ethnographers have also noted the central Andean use of animal-landscape and human body-landscape metaphors in wayfinding and during mapping rites.

The greater Kaata community, in the department of La Paz, Bolivia, consists of Aymara and Quechua speakers who have personalized the landscape in terms of the human body. For example, the highland Roop and Green Lakes are the left and right eyes, mountain slopes are the chest (*kinre*), and the Huruku and Ayllu Rivers are the left and right legs. Individual communities are known by

thropological Association, Pittsburgh, 19 November 1966). Cobo, *Inca Religion and Customs,* 183 (note 25), notes that all Andean toponyms are compound signifiers of some attribute unique to the location. For a specific example, see Karl S. Zimmerer, "Transforming Colquepata Wetlands: Landscapes of Knowledge and Practice in Andean Agriculture," in *Irrigation at High Altitudes: The Social Organization of Water Control Systems in the Andes,* ed. William P. Mitchell and David Guillet (Arlington, Va.: Society for Latin American Anthropology, American Anthropological Association, 1993), 115–40, esp. 122–23.

42. Silverman-Proust, "Significado simbólico," 41–42 (note 40).

43. For example, George Kubler, *The Art and Architecture of Ancient America: The Mexican, Maya, and Andean Peoples* (Baltimore: Penguin Books, 1962), 289–92, and Catherine J. Allen, "The Nasca Creatures: Some Problems of Iconography," *Anthropology* 5, no. 1 (1981): 43–70, esp. 44–46.

44. Constance Classen, *Inca Cosmology and the Human Body* (Salt Lake City: University of Utah Press, 1993).

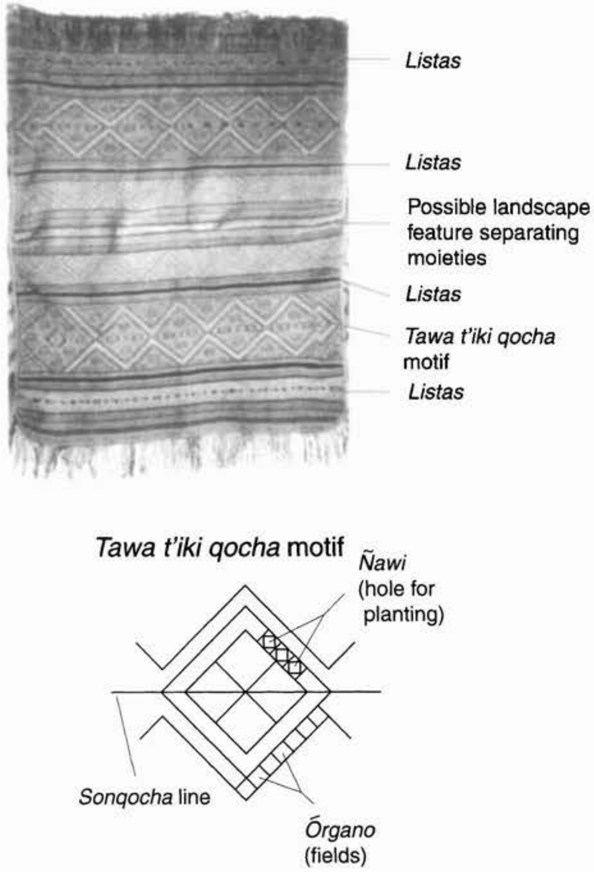

FIG. 6.17. EXPLANATION OF THE QHESWA *PALLAY* (FIG. 6.16). A set of central horizontal bands likely represents a landscape feature, such as a road or river, separating the landholdings of two *ayllus* or moieties, and the *tawa t'ika qocha* motif encodes additional geographic information. Silverman-Proust identifies the alternating colored rectangles with a dot in the middle as a *ñawi* motif, which means "hole for planting," and identifies the alternating red and white rectangles as *órgano* or agricultural fields. The altitude of the fields is referenced by the *listas* that frame the diamond-shaped *tawa t'ika qocha* motif. Silverman-Proust notes that the number and color of *listas* that frame the motif vary with the location of textile production.

FIG. 6.18. LANDHOLDING AMULET FROM THE DEPARTMENT OF LA PAZ, BOLIVIA. This amulet depicts a specific village plaza with a realistic rendering of various buildings and a church (identifiable by an inscribed cross on the exterior wall). Seven llamas appear on each side of the village square, probably representing the livestock held by the *ayllus* composing the two village moieties. This type of amulet is usually used in animal increase rites. A magician constructs a ceremonial *mesa* (tabletop shrine)–literally an ephemeral map representing the larger valley and an imagined spirit world–from the carved stone amulet and other ritual items, then directs spiritual forces to the locale signified by the amulet and the livestock it is associated with.
From Harry Tschopik, "The Aymara of Chucuito, Peru," *Anthropological Papers of the American Museum of Natural History* 44 (1951): 137–308, esp. 237 (fig. 5).

their position within the metaphorical mountain body and are often assigned ritual tasks according to their locations.[45]

MAPPING RITES AND EPHEMERAL MAPS

Various central Andean rituals, which may be called "mapping rites," require an ephemeral map of a specific landscape in order to achieve their goal. There are two general types of mapping rites. One is associated with religious mapping, which uses ephemeral maps to locate or influence preterhuman and extramundane forces or direct them to a locale. Participants in a religious mapping rite arrange amulets representing landscape features and landholdings with respect to an object that acts as a portal to the spirit world–often a *huaca*. The *mesa* (an arrangement of power objects) is often laid out on a portable tabletop or a blanket.[46] The second type of mapping rite outlines the apportionment of territory and social responsibilities within a community.

Aymara "magicians" of Chucuito, Peru, use amulets to represent the livestock holdings of a particular community during animal increase rituals and other fertility rites (for a similar Bolivian example, see fig. 6.18). Only the magician may own a stone amulet representing a social unit and its worldly possessions, since the artifact influences and directs the patron spirits of the household. The magician arranges amulets and other artifacts representing a single household's corral and animals on a sacred cloth and then identifies and locates the nature spirits responsible for pastoral or agricultural fertility and directs their blessings toward the family's landholdings.[47]

45. Bastien, *Mountain of the Condor,* 43–50 (note 18).

46. Table shrines (*mesas*) are widely used throughout the New World in shamanistic rituals. See Douglas Sharon, "Distribution of the *Mesa* in Latin America," *Journal of Latin American Lore* 2 (1976): 71–95, and Stephen C. Jett, "Cairn Trail Shrines in Middle and South America," *Conference of Latin Americanist Geographers Yearbook* 20 (1994): 1–8.

47. Harry Tschopik, "The Aymara of Chucuito, Peru," *Anthropo-*

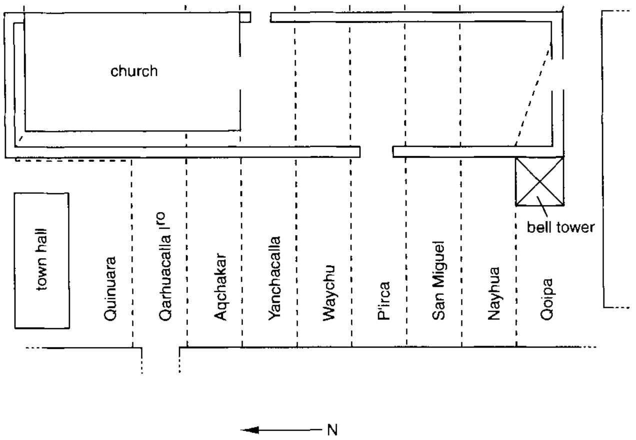

FIG. 6.19. *CHHIUTAS* IN THE PACARIQTAMBO CHURCHYARD AND PLAZA. During religious festivals at Pacariqtambo, Peru, *ayllu* representatives ritually "clean" assigned *chhiutas,* rectangular strips of ground in the churchyard and plaza representing usufruct over parcels of land. The ritual cleaning of *chhiutas* symbolizes the commitment of each *ayllu* to maintaining village infrastructure. A topologic sequence for the *chhiutas* is implied by the grouping of strips by *ayllu* and moiety. The sequence is anchored by the southernmost strip, which is the responsibility of Qoipa, a small village to the south of Pacariqtambo.
After Gary Urton, "Andean Social Organization and the Maintenance of the Nazca Lines," in *The Lines of Nazca,* ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 173–206, esp. 180 (fig. IV.5).

Although a general cosmographic symbolism permeates all religious mapping rites, many such rites reference a specific landscape. For example, the aforementioned Kaata community also constructs a specific *mesa* representing Mount Kaata during the Feast of the Dead, and on that *mesa* it symbolizes Mount Aqhamani during a lineage rite.[48]

The Quechua-speaking village of Pacariqtambo, in the Paruro region of Cuzco, has ten *ayllus,* each belonging to one of two moieties. Every *ayllu* is responsible for sponsoring a religious festival between the harvest and planting seasons and for pledging labor to maintain community infrastructure. The main event during one of these festivals is the procession of the honored saint through the churchyard and plaza. Villagers inscribe nine parallel strips of territory, called *chhiutas,* on the churchyard and plaza (fig. 6.19). Eight *chhiutas* are swept and maintained by the four oldest *ayllus* from each moiety. The ninth *chhiuta* is maintained by a neighboring village, Qoipa, a short distance south of Pacariqtambo. The Qoipa *chhiuta* is on the south end of the plaza, suggesting that the *chhiutas* are locationally sequenced according to the contiguous landholdings of each *ayllu. Chhiutas* have flexible boundaries and configurations that must be renegotiated before each religious festival and that reflect the changing landholdings and social responsibilities of each *ayllu.* Sweeping the *chhiutas* thus symbolizes the responsibility of each *ayllu* to maintain a portion of community infrastructure. The procession of Pacariqtambo's patron saint through the churchyard and plaza sanctifies the mapping rite that legitimizes the apportionment of territory and social responsibilities within the community.[49] *Chhiuta*-like representations have archaeological manifestations in ancient architecture, and the variation in the size and number of parallel strips reflects the unique geographical and historical circumstances of the site setting.[50]

Mapping rite amulets are often found at the many pre-Columbian cosmopolises in the Andes (fig. 6.24 below, for example). Cosmopolises are sites that replicate an idealized vision of the earth and cosmos through design alignments and architecture.[51] Mapping rites become a form of sacred technology when performed within an Andean cosmopolis or *huaca* shrine, since the architecture is designed to change elements of the earth and cosmos by representing them.

Rock Art

Rock art as a whole is generally multireferential and cannot simply be "read" by modern viewers. I am unaware of any systematic excavation of Andean rock art sites, and thus context as well as dating remains a major problem in interpreting images. There are nevertheless strong formal similarities between some rock art images and pre-Columbian artifacts.[52] Although stylistic analyses and image content strongly suggest that many reported examples of rock art are pre-Columbian, such appraisals only establish a terminus post quem.

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logical Papers of the American Museum of Natural History 44 (1951): 137–308, esp. 190–99, 239–40, 253, and 275–77.

48. Bastien, *Mountain of the Condor,* 51–56, 135–49, and 178–83 (note 18). The Aymara peoples of Chucuito sometimes use more permanent features as a topographic reference during mapping rites. During a drought, they make a pilgrimage to the stone shrine of Atojja, near the peak of the same name. The "eyes" of the shrine, according to Tschopik, represent Lake Titicaca. See Tschopik, "Aymara of Chucuito," 197 and 277–78 (note 47).

49. Gary Urton, "Chuta: El espacio de la práctica social en Pacariqtambo, Perú," *Revista Andina* 2 (1984): 7–43, and idem, "Andean Social Organization," 179–83 (note 19).

50. Urton, "Andean Social Organization," 184–93.

51. For a general review of this worldwide practice, see Paul Wheatley, *The Pivot of the Four Quarters: A Preliminary Enquiry into the Origins and Character of the Ancient Chinese City* (Chicago: Aldine, 1971), 225–57 and 411–76; Yi-Fu Tuan, *Space and Place: The Perspective of Experience* (Minneapolis: University of Minnesota Press, 1977), 85–117; and idem, *Topophilia: A Study of Environmental Perception, Attitudes, and Values* (Englewood Cliffs, N.J.: Prentice-Hall, 1974), 129–72.

52. For example, Antonio Núñez Jiménez, *Petroglifos del Perú: Panorama mundial del arte rupestre,* 2d ed., 4 vols. (Havana: Editorial Científico-Técnica, 1986), 109.

Antonio Núñez Jiménez's monumental catalog of Peruvian rock art contains many examples of images that may be maps, although he does not always label them as such.[53] Some of the images use natural or cultural features to separate and frame adjacent places and events, both real and imagined. In landscape scenes cultural and human figures are nearly always portrayed in profile or at a low angle. Geographic space is usually depicted from above, as shown in the probable plan view depictions of river drainages and quebradas. There are several references to probable journeys in Núñez Jiménez's compilation, some of which may use dots and lines to connect places or events both real and imagined. Celestial objects are occasionally rendered with respect to horizon features. Several images are reminiscent of spatial themes discussed earlier, including landscape-animal-body metaphors and the possible use of rectangular blocks to represent households and landholdings.

Figure 6.20, from Salta in the Andean part of Argentina, is one of eleven petroglyphs identified by Ercilia Navamuel as purportedly illustrating the locations of villages, corrals, agricultural landholdings, streams and quebradas, mountains, and springs. Several of the villages depicted in the rock art are apparently known archaeological sites today. In addition, some petroglyphs are of interest because they have been said to illustrate the solar path, a calendar, and possible landscape features on the same stone.[54]

FIG. 6.20. PETROGLYPH FROM SALTA, ARGENTINA. According to Ercilia Navamuel, this petroglyph found at the archaeological site of El Duraznito is a map of the nearby pre-Hispanic city of Santa Rosa de Tastil and also shows an access road to the Las Minas quebrada.
By permission of Ercilia Navamuel, Salta, Argentina.

A Chronological Perspective on Andean Mapmaking in the Archaeological Record

This section traces, by analogy and in chronological order, the cultural and geometric precepts outlined above in the Andean archaeological record. There are many pitfalls in historical and ethnographic analogy. Andean cultural change was often driven by conquest and subjugation, not only by the Spaniards, but also by the Inkas and earlier city-state empires. Spatial and landscape representations will likely change with every conquest. The probability of a disjunction between an archaeologically defined culture, based on artifact assemblages, and a social group defined by cultural and biological reproduction increases dramatically over time. Analogies also tend to homogenize a culture's historical variation, thus obscuring the very basis of cultural evolution.

The Old Temple at Chavín de Huántar

Chavín de Huántar was the major religious center for the Chavín culture (ca. 900–200 B.C.). Although ancient Andeans extensively modified Chavín de Huántar through time, the original architectural complex, called the Old Temple, can be distinguished. Like other Peruvian ceremonial centers, the Old Temple, a U-shaped pyramidal platform mound surrounding a lower circular courtyard, is thought to have had a geomantic function.[55] In addition, thousands of ceramics found in the temple's Gallery of the Offerings may have been part of mapping rites. It has been suggested that some of these pieces, perhaps made in distant villages and possibly representing their myths and *huacas,* were used in ritual offerings.[56]

Unlike its architectural predecessors, the Old Temple opens not toward the headwaters of the local river but rather opposite Huantasán, the highest peak in the Cordillera Blanca. Huantasán is one of the sources for the nearby Mosna and Wacheksta Rivers and is also the incarnation of a *huaca* worshiped in Inka and colonial times.[57] Studies by Urton and Aveni note that the build-

53. Núñez Jiménez, *Petroglifos del Perú.*

54. Ercilia Navamuel, *Atlas histórico de Salta: Conocimiento geográfico indígena e hispano* (Salta, Argentina: Aráoz Anzoátegui Impresores, 1986), esp. 7.

55. William Harris Isbell, "Cosmological Order Expressed in Prehistoric Ceremonial Centers," in vol. 4 of *Actes du XLII^e Congrès International des Américanistes (1976)* (Paris: Société des Américanistes, 1978), 269–97, esp. 286–95, and Donald Ward Lathrap, "Jaws: The Control of Power in the Early Nuclear American Ceremonial Center," in *Early Ceremonial Architecture in the Andes,* ed. Christopher B. Donnan (Washington, D.C.: Dumbarton Oaks Research Library and Collection, 1985), 241–67, esp. 242–45.

56. Burger, *Chavín,* 139–40 (note 4); Luis Guillermo Lumbreras, *Chavín de Huántar en el nacimiento de la civilización andina* (Lima: Instituto Andino de Estudios Arqueológicos, 1989), 183–216; and idem, *Chavín de Huántar: Excavaciones en la Galería de las Ofrendas* (Mainz: P. von Zabern, 1993).

57. Johan Reinhard, "Chavín and Tiahuanaco: A New Look at Two Andean Ceremonial Centers," *National Geographic Research* 1 (1985):

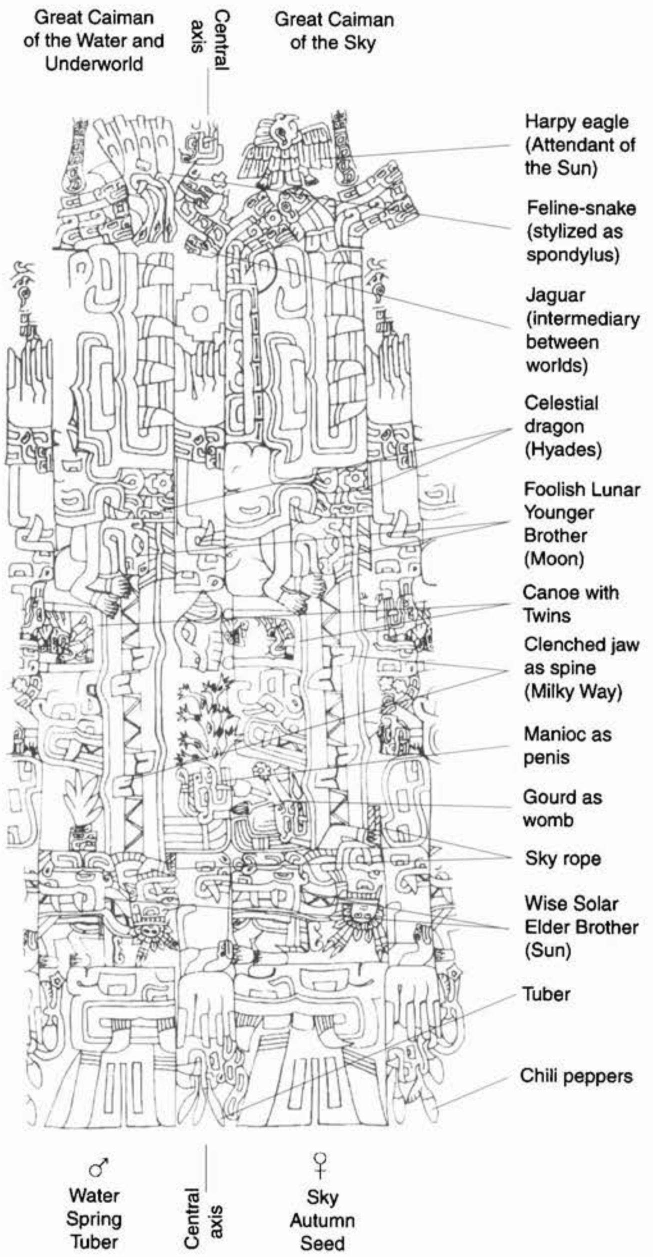


FIG. 6.21. DRAWING AND INTERPRETATION OF THE TELLO OBELISK FROM THE OLD TEMPLE COMPLEX OF CHAVÍN DE HUÁNTAR, 600–500 B.C. The relief sculpture on the Tello Obelisk, a prismatic granite shaft about 2.5×0.3 meters, is a caimanic world tree that depicts the sun and the waning moon at opposite sides of the heavens, as they appear at twilight, and fuses terrestrial symbolism with celestial ordinations. The two highly stylized caimans to the left (Great Caiman of the Water and Underworld) and right (Great Caiman of the Sky) of the obelisk's central axis depict cosmographical, celestial, and terrestrial elements. The geometric organization is similar to the inferred social and territorial organization of Chavín de Huántar, even though many of the plants and animals illustrated are from exotic locations, such as the Amazonian harpy eagle and manioc plant or the Ecuadorian spondylus shell. A stylized canoe on the clenched jaw as spine of each caiman represents the celestial canoe that carried the Twins across the Milky Way in various Amazonian myths. Other mythological incarnations include the sun, moon, and constellations.
From a drawing by Janet C. Smith, based on rubbings of the original by John Howland Rowe, in "El arte de Chavín; estudio de su forma y su significando," *Historia y Cultura* 6 (1973): 249–76, fig. 6. By permission of John Howland Rowe. Interpretation by William Gustav Gartner.

ings are not laid out according to the cardinal directions but are oriented more than thirteen degrees clockwise of due east–possibly related to celestial phenomena.[58] The Old Temple alignments symbolically unite Huantasán, a source of the temple waters, with the path of the Pleiades, a celestial harbinger of the rainy season.[59]

There are several subterranean passageways, called galleries, within the Old Temple. The most important is the cruciform Lanzón Gallery, at the center of the U. The gallery contains an east-facing granite shaft, 5.5 meters tall, carved with an anthropomorphic figure–the Lanzón, Chavín de Huántar's supreme deity. The shaft was an integral part of the building structure. It protrudes into a second cruciform chamber above, and its base is set deep into the floor, signifying the Lanzón deity's role as an *axis mundi* unifying heavens, earth, and Underworld.[60]

In addition to the Lanzón, one other sculpture is exceptional in its form and considered particularly sacred–the Tello Obelisk (fig. 6.21). Like the Lanzón, and unlike any other sculptures in the Old Temple, it is a carved granite shaft that also acts as an *axis mundi.* The carving has been interpreted as two highly stylized caimans separated by a thick central axis, each one an aspect of the Great Caiman. The caiman is generally known as the master of fishes, a reference to its pivotal role in fish reproduction and the ecology of the Amazonian backwaters. Donald Ward Lathrap takes the importance of the caiman even further. He argues that it represents the entire cosmos and

395–422, esp. 398–401. Huantasán is the ultimate source for water that cascades quite audibly through an elaborate and hidden system of enclosed aqueducts within the Old Temple complex. See Luis Guillermo Lumbreras, Chacho González, and Bernard Lietaer, *Acerca de la función del sistema hidráulico de Chavín* (Lima: Museo Nacional de Antropología y Arqueología, 1976), esp. 13–15.

58. Burger, *Chavín,* 132 (note 4), and Gary Urton and Anthony F. Aveni, "Archaeoastronomical Fieldwork on the Coast of Peru," in *Calendars in Mesoamerica and Peru: Native American Computations of Time,* ed. Anthony F. Aveni and Gordon Brotherston (Oxford: BAR, 1983), 221–34, esp. table 1.

59. The rugged terrain towering above Chavín de Huántar does not favor horizon astronomy. It is more probable that astronomical observations were made on nearby summit sites such as Poqoq and Huaqaq. See Reinhard, "Chavín and Tiahuanaco," 401 (note 57).

60. Burger, *Chavín,* 135–37 (note 4), and Julio C. Tello, *Chavín: Cultura matriz de la civilización andina* (Lima: Universidad Nacional Mayor de San Marcos, 1960), esp. 104–9.

is the most important cosmological symbol in nuclear America.[61]

Each caiman on the Tello Obelisk contains figure panels depicting fused plant, animal, and character elements in profile.[62] Life forms and geographic features abstracted from the realms of water, earth, and sky are organized into associative relationships.[63] Left of the central axis is the Great Caiman of the Water and Underworld, associated with spring, tubers, and vegetatively reproduced plants. Right of the central axis is the Great Caiman of the Sky, associated with autumn and seed plants.[64] Together the caimans signify dualisms, such as animal-plant, wild-domestic, and above-below.[65] The bilateral symmetry of the Tello Obelisk mirrors the dual territorial and social organization of Chavín de Huántar inferred from the archaeological record.

Characters from celestial myths are depicted on the obelisk, illustrating a fundamental astrobiological tenet—heavenly movements are correlated with life cycles on earth. The Wise Solar Elder Brother holds a sky rope to ascend to the heavens, symbolized by the clenched jaw as spine motif that represents the Milky Way. The harpy eagle, also known as the Attendant of the Sun, acts as a guide. A stylized canoe carries the mythical Twins across the Milky Way and toward the Foolish Lunar Younger Brother, who loses his legs to the celestial dragon (the Hyades) as the Pleiades watch.[66] In sum, the Tello Obelisk is a cosmographical map, a pictorial narrative of mythicized histories and ethnoecology, and a visual attempt to integrate exotic information within the everyday geometric structures of Chavín life.

PARACAS TEXTILES AND ARTIFACTS

The Paracas cultural tradition spanned a minimum of nine hundred years (700 B.C.–A.D. 100) in the major river valleys around the Paracas Peninsula, south Peruvian coast. Some early Paracas textiles and artifacts clearly reference Chavín art, although differences exist in media, function, technique, and iconography.[67]

Paracas is famous for its beautiful textiles, which commonly depict plants and animals from specific habitats.[68] For ancient Paracas, predators may have functioned as *parajes,* that is, as a means of categorizing loosely defined landscape zones. Plant and animal images may have acted as visual metaphors for ecological zones in Paracas iconography. This may also help explain the preponderance of human figures in animal and plant costumes that dominate Paracas textile imagery. Anne Paul speculates that Paracas leaders wore these textiles during rituals that linked natural features to the social and cosmic order.[69]

Julio Tello examined the Paracas polychrome mantle (fig. 6.22), a textile looted from the Necrópolis of Cerro Colorado on the Paracas Peninsula. He interpreted the unusually varied imagery of this textile as a calendar and noted that the same individual costumed dancers appear in isolation on other Paracas textiles.[70] This mantle may commemorate a calendrically timed mapping rite among Paracas *ayllus* or other social groups that legitimized the territorial division of sunken gardens or shallow valleys suitable for cultivation along the arid coast (*mahamaes*). The four columns of geometric blocks with a central severed-head motif are fundamental to this interpretation, which expresses bonds to locality through descent.[71]

61. Lathrap, "Jaws," 245–46 (note 55).

62. Tello, *Chavín,* 177–86 (note 60), and Donald Ward Lathrap, "Gifts of the Cayman: Some Thoughts on the Subsistence Basis of Chavín," in *Variation in Anthropology: Essays in Honor of John C. McGregor,* ed. Donald Ward Lathrap and Jody Douglas (Urbana: Illinois Archaeological Survey, 1973), 91–105.

63. John Howland Rowe, "Form and Meaning in Chavín Art," in *Peruvian Archaeology: Selected Readings,* ed. John Howland Rowe and Dorothy Menzel (Palo Alto, Calif.: Peek, 1967), 72–103. Rowe describes these relationships as "kennings," or visual metaphors, which are prevalent in Chavín art. For more on the Chavín style, see Burger, *Chavín,* 146–49 (note 4).

64. Lathrap, "Jaws," 249–51 (note 55).

65. Burger, *Chavín,* 131 (note 4), and R. Tom Zuidema, "An Andean Model for the Study of Chavín Iconography," *Journal of the Steward Anthropological Society* 20, nos. 1–2 (1992): 37–54.

66. Peter G. Roe, "Obdurate Words: Some Comparative Thoughts on *Maya Cosmos* and Ancient Mayan Fertility Imagery," *Cambridge Archaeological Journal* 5 (1995): 127–30, esp. fig. 4.

67. This is especially true for Carhua textiles and Paracas pottery from the Ica Valley. See Richard L. Burger, "Unity and Heterogeneity within the Chavín Horizon," in *Peruvian Prehistory: An Overview of Pre-Inca and Inca Society,* ed. Richard W. Keatinge (Cambridge: Cambridge University Press, 1988), 99–144, esp. 120; John Howland Rowe, *Chavín Art: An Inquiry into Its Form and Meaning* (New York: Museum of Primitive Art, 1962), 5–6; and Dwight T. Wallace, "A Technical and Iconographic Analysis of Carhua Painted Textiles," in *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul (Iowa City: University of Iowa Press, 1991), 61–109, esp. 104–8.

68. Ann H. Peters, "Ecology and Society in Embroidered Images from the Paracas Necrópolis," in *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul (Iowa City: University of Iowa Press, 1991), 240–314.

69. Anne Paul, "Paracas Necrópolis Textiles: Symbolic Visions of Coastal Peru," in *The Ancient Americas: Art from Sacred Landscapes,* ed. Richard F. Townsend (Chicago: Art Institute of Chicago, 1992), 278–89, esp. 285–86 and 288–89. Textiles often depict dancers during ritual movements, frequently facing in the direction of the textile weave. See Mary Frame, "Structure, Image, and Abstraction: Paracas Necrópolis Headbands as System Templates," and Anne Paul, "Paracas Necrópolis Bundle 89," both in *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul (Iowa City: University of Iowa Press, 1991), 110–71, esp. 134–44, and 172–221, esp. 177–210.

70. Julio C. Tello, *Paracas,* vol. 1, *El medio geográfico: La explotación de antiguedades en el centro Andino. La cultura Paracas y sus vinculaciones con otras del centro Andino* (New York: Institute of Andean Research, 1959), 70–71 and pl. 79.

71. Trophy headtaking in South American cultures such as the Nasca appears to affirm social and territorial status. See Helaine Silverman,

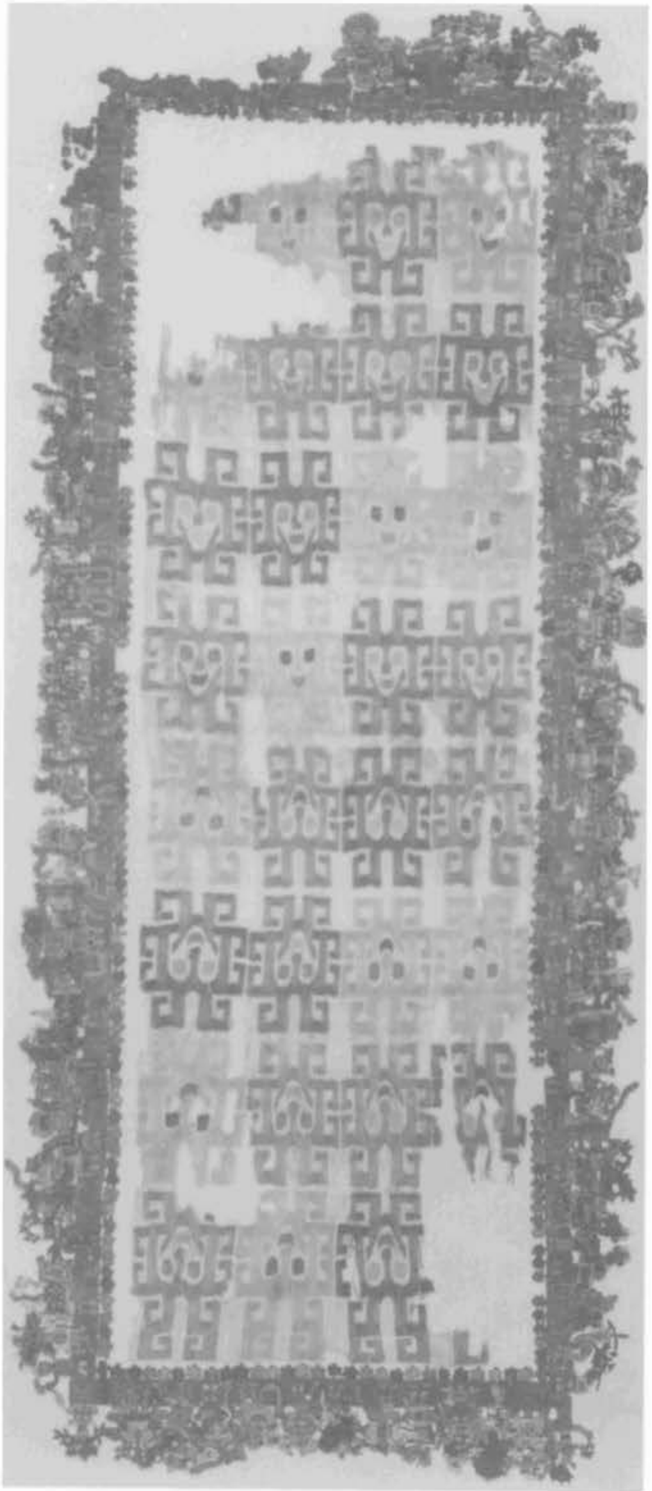


FIG. 6.22. PARACAS POLYCHROME MANTLE. This textile found at the Necrópolis of Cerro Colorado depicts a large rectangular plaza. The plaza contains four parallel strips of eight geometric-design blocks, each with a central severed-head motif signifying an ancestral lineage and locality through descent. Each column probably corresponds to one of the four major Paracas *mahamaes* (cultivation sites), along the Pisco, Cañete, Chincha, and upper Ica Rivers. The partitioning of the surrounding geometric motif into quarters may have a general landscape association such as the four directions. It has also been suggested that this textile functioned as a calendar.
Size of the original: 1.24 × 0.49 m. Photograph courtesy of the Brooklyn Museum, New York.

Thirty-two lineages are grouped into four rows. Each row corresponds to large-scale social and territorial divisions within the core Paracas culture area. The four major Paracas *mahamaes*–along the Pisco, Cañete, Chincha, and upper Ica Rivers–are the probable corresponding landscape divisions. As with the *chhiutas* rite, the public proclamation of corporate responsibility for community infrastructure reinforces the *ayllu* as a social group and as a territory. Ritual impersonators, wearing masks and full ceremonial regalia, stand at the plaza's periphery. Other geographic relations may be signified by animal and plant elements on the dancers' costumes.

A worldwide cosmological theme is the passage of the soul through a maze situated between this world and the hereafter.[72] A carved gourd, found in a Paracas tomb along with other artifacts necessary in the afterlife,[73] illustrates three souls (heads) within a spiritual labyrinth (fig. 6.23). One soul appears in two positions, signifying that the bold lines and geometric symbols are pathways and imagined landscape symbols. At the bottom of the severed head are the same paired geometric lines as appear below the severed heads in figure 6.22, suggesting a link between blood and social and territorial spaces. The spirit world can be difficult to navigate without the proper tools or instruction, and a spirit map could be part of this preparation.

According to Julio Tello and Mejía Xesspe, figure 6.24 is a faithful reproduction of living quarters at the village site of Arena Blanca.[74] It is also a partial representation of a desert *paraje*. The lower part of the vessel depicts the interiors of different houses, and the upper part depicts the exterior of an apartment compound. This ceremonial vessel ostensibly portrays the household concern with practical and spiritual matters, the latter signified by spirit masks hanging on the house walls. Each mask has subtle stylistic variations, suggesting that they differentiate households.

Cahuachi in the Ancient Nasca World (Iowa City: University of Iowa Press, 1993), 218–26, esp. 224–25.

72. Catherine Delano-Smith, "Cartography in the Prehistoric Period in the Old World: Europe, The Middle East, and North Africa," in *The History of Cartography*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:54–101, esp. 87–88.

73. For a description of the tomb's contents, see Julio C. Tello, *Paracas*, vol. 2, with Toribio Mejía Xesspe, *Cavernas y necrópolis* (Lima: Universidad Nacional Mayor de San Marcos, 1979), 133–46.

74. Tello and Xesspe, *Cavernas y necrópolis*, 259.

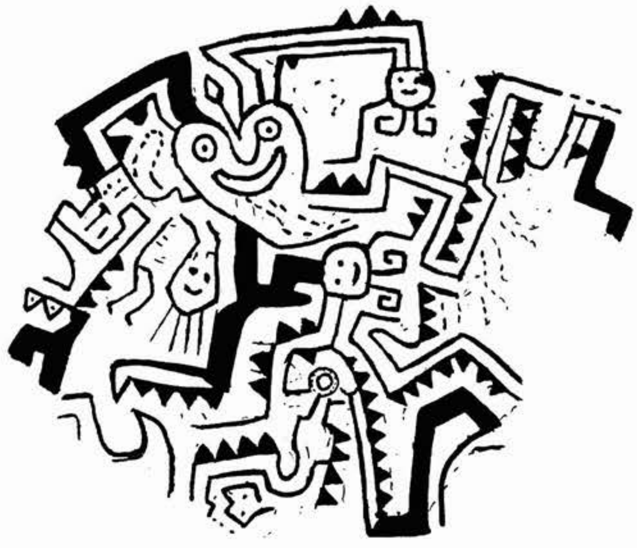


FIG. 6.23. PARACAS SPIRIT MAP ON A CARVED GOURD. This gourd was found in a tomb containing ceremonial and utilitarian artifacts necessary for life in the afterworld. The labyrinthine paths and three severed head as soul figures illustrated might have helped the soul navigate in the spirit world. From Julio C. Tello, *Paracas,* vol. 2, with Toribio Mejía Xesspe, *Cavernas y necrópolis* (Lima: Universidad Nacional Mayor de San Marcos, 1979), 145 (fig. 23). By permission of the Universidad Nacional Mayor de San Marcos, Fondo Editorial, Lima, Peru.

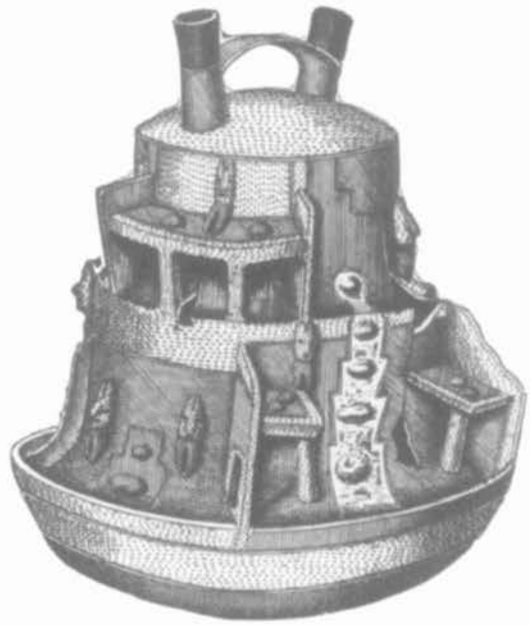


FIG. 6.24. PARACAS HOUSE MODEL FROM THE CAVERNS AT CERRO COLORADO, PARACAS PENINSULA. This ceramic vessel, basal diameter 14 cm, realistically portrays the interiors of Paracas house structures and an apartment compound at Arena Blanca. The prominent position of the masks hanging on house walls and their stylistic distinctiveness suggest that they differentiate households.
From Julio C. Tello, *Paracas,* vol. 2, with Toribio Mejía Xesspe, *Cavernas y necrópolis* (Lima: Universidad Nacional Mayor de San Marcos, 1979), 278 (fig. 77). By permission of the Universidad Nacional Mayor de San Marcos, Fondo Editorial, Lima, Peru.

NAZCA LINES AND NASCA CERAMICS

During the second century A.D. the center of power in Peru shifted southward from the Paracas Peninsula to the desiccated Nazca plain. Although there are artistic and ideological continuities between the Paracas and Nasca cultural traditions (ca. 700 B.C.–A.D. 200 and 200 B.C.–A.D. 600), one cannot say that the latter is entirely derived from the former.[75]

Nazca is world renowned for a number of large ground drawings, or geoglyphs, known as the Nazca lines. They cover about two hundred square kilometers of the elevated dry plain (pampa) near the coast and between the Ingenio and Nazca Rivers. Constructing geoglyphs involves removing dark, desert-patinated stones to reveal the underlying light-colored deposits. Some Nazca geoglyphs are made with nonoverlapping lines, as if one drew a figure without ever lifting pen from paper. Other geoglyphs have a dense maze of overlapping and confusing intersections. Although proposals have been made, no consistent unit of measure common to all geoglyphs has been discovered.[76] Modern analysis indicates that relatively simple surveying methods, utilizing wooden stakes, uniform lengths of string, and a good eye, are more than adequate to produce Nazca line geometry.[77]

The most famous Nazca geoglyphs are those shaped like plants, animals, costumed performers, or geometric figures. However, the most common ground drawings, thought to have been made later, are straight lines, and many are connected to form sets of radial lines emanating from a central point.[78] These geoglyphs are perhaps the earliest expression of radial landscape organization

75. Helaine Silverman, "The Paracas Problem: Archaeological Perspectives," in *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul (Iowa City: University of Iowa Press, 1991), 349–415. Following other scholars we use the geographic term Nazca to refer to the town, river, plain, area, and geoglyphs on the Nazca pampa. Nasca refers to the early intermediate period culture and peoples.

76. Anthony F. Aveni, "An Assessment of Previous Studies of the Nazca Geoglyphs," in *The Lines of Nazca,* ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 1–40, esp. 22. Aveni's book, containing chapters by several leading specialists, is a good introduction to the topic. It evaluates previous literature and examines current scholarly thought concerning the form, function, and makers of the geoglyphs.

77. Evan Hadingham, *Lines to the Mountain Gods: Nazca and the Mysteries of Peru* (New York: Random House, 1988), 135–40. Archaeology supports such surveying techniques: a radiocarbon date of 525 ± 80 A.D. was obtained from a wooden stake pounded into the terminus of a Nazca line, and a textile over 160 feet long, with threads of varying lengths, was uncovered beneath a temple mound at Cauhuachi. See William Duncan Strong, *Paracas, Nazca, and Tihuanacoid Cultural Relationships in South Coastal Peru* (Salt Lake City: Society for American Archaeology, 1957), esp. 14–16 and 46 (table 4).

78. Anthony F. Aveni's introduction to *The Lines of Nazca,* ed. An-

FIG. 6.25. RAY CENTER GEOGLYPH FROM THE NAZCA PAMPA. The most common type of Nazca geoglyph is the ray center, a system of lines emanating from a central point. An obvious manifestation of radial organization, the emanating lines are most often aligned with water sources and are usually perpendicular to topographic contours controlling overland flow. Ray center lines often connect to other ray centers, and some of the lines are not straight but bent. Very few ray centers exhibit astronomical alignments beyond that expected by chance.
By permission of the Servicio Aerofotográfico Nacional, Lima, Peru (0–17123, del 22-6-65).

(fig. 6.25). Sixty-two ray centers have been identified, along with more than 750 member lines. Most of the ray centers are on small natural promontories on the border of the pampa, and all ray centers are on the banks of major rivers or tributaries or at the base of the last hill descending out to the pampa, resulting in the hypothesis that they are connected in some way to water and irrigation.[79] In addition, the radial lines frequently connect to other line centers, distant hills, and other topographic features that affect the overland flow of water (such as bends in rivers or dunes overlooking the banks of rivers).[80]

A few Nazca geoglyphs exhibit astronomical alignments, for example, the Pleiades, the sun at the zenith, and α and β Centauri.[81] Many celestial objects, including these, have a specific temporal relation to subsistence systems such as the seasonal return of montane meltwaters to Nazcan rivers and canals, or the return of fish to nearshore environments.[82] Although astronomical alignments were championed as an early explanation for Nazca line layout, subsequent studies have shown that only a few geoglyphs exhibit them.[83]

The Nazca lines certainly commemorate cosmographical concepts, but ritual performance seems necessary for the geoglyphs to fully convey a geographic understanding of the Nasca world. A number of ray center lines point to Cahuachi, which is the largest ceremonial center in the region and as such may have been a pilgrimage center and focus for ceremonial activities related to agriculture and water.[84] Archaeological reconnaissance indicates that the geoglyphs may have been processional routes, because cairns, offerings, and piles of broken decorative pottery are clustered along them.[85] The lines were certainly walkable, and in addition to ritual pilgrimage, it has been speculated that they may have simply been used as roads across the pampa.[86]

Gary Urton postulates a system of maintenance for the radial geoglyphs analogous to the ritual sweeping of *chhiutas* in Pacariqtambo described above. In his scheme, Nasca sociopolitical organization corresponds to ter-

thony F. Aveni (Philadelphia: American Philosophical Society, 1990), vii–x, esp. viii.

79. Anthony F. Aveni, "Order in the Nazca Lines," in *The Lines of Nazca,* ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 40–113, esp. 82–83.

80. Aveni, "Order in the Nazca Lines," 110–11. Statistical analysis has also shown that the lines do not point toward hill summits. See C. L. N. Ruggles, "A Statistical Examination of the Radial Line Azimuths at Nazca," in *The Lines of Nazca,* ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 247–69, esp. 268.

81. Aveni, "Order in the Nazca Lines," 98.

82. Gary Urton, "Astronomy and Calendrics on the Coast of Peru," in *Ethnoastronomy and Archaeoastronomy in the American Tropics,* ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 231–47.

83. See Maria Reiche, "Giant Ground-Drawings on the Peruvian Desert," in vol. 1 of *Verhandlungen des XXXVIII. Internationalen Amerikanistenkongresses (1968)* (Munich: Klaus Renner, 1969), 379–84; idem, *Mystery on the Desert* (Stuttgart-Vaihingen, 1968); and Paul Kosok, *Life, Land, and Water in Ancient Peru* (New York: Long Island University Press, 1965), 49–62, for examples of earlier studies. More recent analysis includes Aveni, "Assessment of Previous Studies," 15–23 (note 76); idem, "Order in the Nazca Lines," 88–98 (note 79); and Ruggles, "Statistical Examination," 261–69 (note 80).

84. Helaine Silverman, "The Early Nasca Pilgrimage Center of Cahuachi and the Nazca Lines: Anthropological and Archaeological Perspectives," in *The Lines of Nazca,* ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 207–44, esp. 232–40, and idem, "Beyond the Pampa: The Geoglyphs in the Valleys of Nazca," *National Geographic Research* 6 (1990): 435–56, esp. 444–46.

85. Persis Banvard Clarkson, "The Archaeology of the Nazca Pampa: Environmental and Cultural Parameters," in *The Lines of Nazca,* ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 115–72, esp. 136–51, and Silverman, "Beyond the Pampa," 446–47.

86. For example, Aveni's epilogue in *The Lines of Nazca,* ed. Anthony F. Aveni (Philadelphia: American Philosophical Society, 1990), 285–90, esp. 289.

ritorial landscape divisions. Individual geoglyphs are maintained through a rotating and reciprocal system of kin-based labor obligations similar to the Inka *mit'a* system (a labor tax that included periodic personal service for state-sponsored agriculture and other activities). The Nazca lines thus may represent a concrete division of territory into social spaces, a graphic manifestation of the *ayllu* as a social group and as a territory.[87] This may explain why younger geoglyphs often truncate older ones, since expressing social and ecological conditions at the time of construction was more important than preserving the image for successive generations.

The large size and orthographic perspective of the Nazca ground drawings have inspired many controversial interpretations. It is likely that Nazca geoglyphs were designed, in part, to attract preterhuman and extramundane forces and direct their blessings of water and fertility toward the landholdings of particular *ayllus*.[88] In this sense the Nazca lines are maps for Andean gods. Another consideration in their use and construction is the part pure artistic expression may have played. Although the complexity and size of these land sculptures do not point toward a single, definitive explanation for their construction and use, it is clear that the Nazca lines will continue to capture our imagination.

Cultural themes are also encoded in Nasca pottery.[89] The design on an unusual ceramic vessel (fig. 6.26) has been interpreted by Anne Peters as resembling *lomas* pastures (fog-supported coastal vegetation), with a mountainlike appearance of undulating snakes. She further suggests that the floating camelids resemble the llama "dark cloud" constellation in the Milky Way.[90]

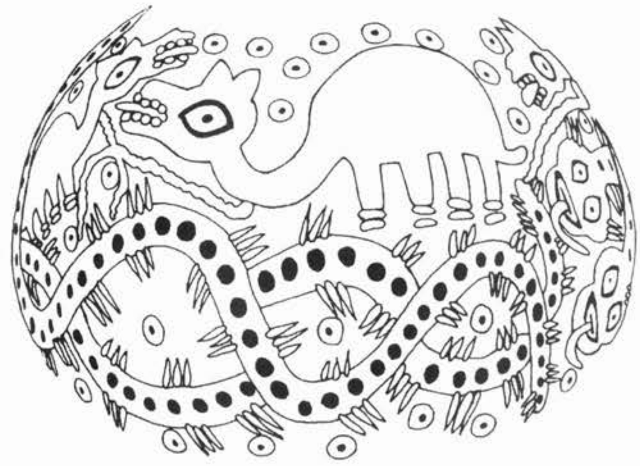


FIG. 6.26. NASCA COSMOGRAM OF THE HYDROLOGIC CYCLE, *LOMAS* HILLS, AND THE HEAVENS. This ceramic water bottle from the south coast of Peru may depict *lomas,* the fog-supported vegetation along the arid Pacific coast and an important seasonal graze for camelids, depictions of which sprout from two giant intertwined snakes representing the pampas hills. A circle and dot motif occurs at every critical point in Andean conceptions of the hydrologic cycle; that is, beneath, within, and on top of a topographic prominence. A circle and dot motif also occurs in the sky–reminiscent of Andean star imagery. Two sets of opposed camelids with bulging eyes, separated by a distorted cross, float above the pampas. The eyes likely signify α and β Centauri, also known as the eyes of the llama. The opposed llamas may constitute an early conception of the llama dark cloud constellation.
By permission of Ann H. Peters, Le Moyne College, Syracuse, New York.

Figure 6.27 illustrates a class of Nasca pots alternatively called "chieftain" or "*figura mitológica*" vessels. The vessel depicts a specific individual with gaping eyes and a sewn mouth, wearing gold funerary ornaments like those found in south coast mummy bundles.[91] This chieftain possibly represents a mummy bundle, and its careful funerary preparation suggests it is an ancestor *huaca.* Zuidema details symbolic associations between the *figura mitológica* and agriculture, and he notes that native chroniclers described cosmological concepts encoded on these vessels nearly a millennium after they were made.[92] The vessel may represent specific *ayllu* landholdings. Ancient Nasca peoples claiming real or fictive descent from the ancestor *huaca* depicted in figure 6.27 legitimized their access to specific irrigated lands.

The ancient Nasca peoples constructed an elaborate hydraulic system of underground canals called *puquios,* which made agriculture possible on the arid south coast.[93] *Puquios* are shown in figure 6.27 by the linear "streamer" that connects the arms with a leg, then disappears under the leg, and finally reemerges above the rectangular grid of severed heads at the bottom of the vessel. The grid of severed heads probably represents agricultural fields, since severed heads are linked to agricultural offerings and since Andean peoples express their relation to terri-

87. Urton, "Andean Social Organization" (note 19).

88. Johan Reinhard, *The Nazca Lines: A New Perspective on Their Origin and Meaning,* 3d ed. (Lima: Editorial Los Pinos, 1987), esp. 9–11 and 55–56, and idem, "Interpreting the Nazca Lines," in *The Ancient Americas: Art from Sacred Landscapes,* ed. Richard F. Townsend (Chicago: Art Institute of Chicago, 1992), 291–301.

89. Reinhard, "Interpreting the Nazca Lines," 298; Richard F. Townsend, "Deciphering the Nazca World: Ceramic Images from Ancient Peru," *Museum Studies* 11 (1985): 116–39, esp. 122–24; and Isbell, "Prehistoric Ground Drawings," 146 (note 6).

90. Peters, "Ecology and Society," 281–82 (note 68). On the "dark cloud" animal constellations, including the llama, see Urton, *At the Crossroads,* 170–73 (note 14).

91. Tello and Xesspe, *Cavernas y necrópolis,* 464 (fig. 125) (note 73).

92. R. Tom Zuidema, "Significado en el arte Nasca: Relaciones iconográficas entre las culturas inca, huari y nasca en el sur del Perú," in *Reyes y guerreros: Ensayos de cultura andina,* comp. Manuel Burga (Lima: FOMCIENCIAS, 1989), 386–401, esp. 399–400.

93. Katharina J. Schreiber and Josué Lancho Rojas, "The Puquios of Nasca," *Latin American Antiquity* 6 (1995): 229–54. Monica Barnes and David Fleming, "Filtration-Gallery Irrigation in the Spanish New World," *Latin American Antiquity* 2 (1991): 48–68, argue, however, that *puquios* originated in colonial times.

FIG. 6.27. NASCA CERAMIC CHIEFTAIN VESSEL, SOUTH COAST OF PERU. The so-called Nasca chieftain vessels depict different individuals wearing funeral attire, hence each vessel represents a specific mummy bundle ancestor *huaca*. All Nasca chieftain vessels have the same structure, but they differ markedly in artistic detail. The head, shoulders, and legs of ceramic Nasca chieftains protrude from their vessels, corresponding to Andean anatomical metaphors for the landscape: the head is the summit, the shoulders are the central slopes, and the lower hips signify the coastal plain where mountain rivers diverge. The legs have the sinuous shape of rivers and are dwarfed by the head, just as Andean summits tower over meandering drainage systems. This same sculptural technique is used to depict realistic hillocks on other Nasca vessels.
Height of the original: 74.5 cm; widest diameter: 42.9 cm. Photograph courtesy of the Instituto Nacional de Cultura, Museo Nacional de Arqueología, Antropología e Historia del Perú, Lima (C-54196).

tory through descent.[94] The landscape iconography shown here mimics the water movement from mountain rivers to underground *puquios* on the coastal plain to the reemergence of water on Nazca agricultural fields. Indeed, the vessel depicting a mummy bundle ancestor *huaca* holds liquids beneath its surface images just as *puquios* hold water beneath the Nazca desert.[95]

MOCHE CERAMICS

The Moche culture flourished on the north coast of Peru from about A.D. 1 to 700, overlapping the late terminal and classic Nasca traditions on the south coast. Moche art is renowned for its realism, and ceramic landscape models are common. Most Moche portrayals of people and animals, except those on polychrome wall murals, are between five and twenty centimeters high. Sculpted landscape elements usually conform to their natural relative sizes, although people, artifacts, and animals may be greatly exaggerated to emphasize a message.[96] Particular floral and faunal attributes may also be magnified and often appear in isolation on ritual attire. Moche artists depict plants and animals in profile on decorated pottery. The exception is freshwater plant blossoms and nonmammals, several associated with water (e.g., crab, octopus, ray, spider), which are rendered in plan view.[97]

Two Moche landscape vessels (figs. 6.28 and 6.29) conform to the artistic principles outlined above. Mountains and pinnate drainage systems consisting of irrigation canals and rivers are often modeled in Moche ceramics, and many activities depicted in mountain scenes seem to have ritual or symbolic significance.[98] The landscape setting in figure 6.28 shows a single set of high-elevation mountains–possibly the bioclimatic *puna* zone. In figure 6.29 the higher set of mountains may also represent the *puna,* while the lower set represents the comparatively warm, low-elevation *yungas* zone, and the warrior's house is thus situated between the two biomes. Mountain worship is clearly present among the Moche peoples, and specific peaks are associated with particular deities and geographic agents. Many Moche ceramics show deities, often differentiated by their headdresses, emerging from mountain caves or attending various montane sacrificial rites.[99]

Ceramic house models are common in Moche contexts. Diverse types of architecture are represented in

94. Severed heads have many purposes and symbolic associations in Nasca society, not all of them related to lineage or warfare. Browne, Silverman, and Garcia distinguish between trophy and ritual heads when analyzing a Nasca cache of severed heads and suggest they may have also functioned to affirm territorial and resource claims through associations with ancestry and kinship. See David M. Browne, Helaine Silverman, and Rubén Garcia, "A Cache of Forty-eight Nasca Trophy Heads from Cerro Carapo, Peru," *Latin American Antiquity* 4 (1993): 274–94, esp. 277 and 290–91. Silverman, *Cahuachi* (note 71), specifically links severed heads, ancestors, and territory.

95. Townsend, "Deciphering the Nazca World," 297–98 (note 89).

96. For a summary on the Moche use of scale, relative size, and perspective, see Christopher B. Donnan, *Moche Art of Peru: Pre-Columbian Symbolic Communication,* rev. ed. (Los Angeles: Museum of Cultural History, University of California, Los Angeles, 1978), 29–33.

97. Donnan, *Moche Art of Peru,* 33, 37–41, and 73–76, and Rafael Larco Hoyle, *Los Mochicas,* 2 vols. (Lima: Casa Editora "La Crónica" y "Variedades," 1938–39), 1:77–141 and pl. 6.

98. Donnan, *Moche Art of Peru,* 144.

99. Elizabeth P. Benson, *The Mochica: A Culture of Peru* (New York: Praeger, 1972), 27–44.

FIG. 6.28. CERAMIC MOCHE LANDSCAPE VESSEL WITH ANDEAN FOX. This vessel is formed into an Andean fox that stands over mountains of comparable height and a single drainage system. The single set of mountains references high elevation mountains (*puna*). The Andean fox may be a visual incarnation of a toponym or the fox (*atoq*) dark cloud constellation.
Height of the original: ca. 21 cm. Boyer Fund, Logan Museum of Anthropology, Beloit College, Beloit, Wisconsin (cat. no. 7229). Photograph courtesy of William Gustav Gartner.

FIG. 6.29. CERAMIC MOCHE LANDSCAPE VESSEL SHOWING HOUSE AND SHIELD. An exaggerated house and warrior's shield, separated from the rest of the scene by a block of color, are shown between two sets of comparably sized mountains on this Moche vessel. A road connects the warrior's house with the lower set of mountains. Valleys with two pinnate drainage systems represent two primary canals, with lateral lines representing secondary parts of the irrigation system.
By permission of Christopher B. Donnan, Los Angeles, California.

these models: open structures with simple sloping roofs or overlapping gabled roofs, and closed composite structures with various forms of roof decoration, including crenelated forms and war clubs.[100] Although such structures have not yet been confirmed by archaeological excavation, most other images represented by Moche art are based on artifacts that have been found. There is some evidence that such structures may have sat atop specific pyramid mounds, which may reflect their symbolic and ritual importance. Just as Moche vessels depicting architectural structures may have been used in rituals, models depicting architectural compounds (*maquetas*) may have also served as amulets in mapping rites.[101]

Moche house models also depict spatial relations and territorial apportionment through parallel strip motifs. According to George Kubler, the vertically stacked color bands in figure 6.30 represent pyramidal terraces and platforms. The vessel itself probably depicts a typical Moche-style house group.[102]

TIWANAKU

Tiwanaku is near the shores of Lake Titicaca, Bolivia, the highest large lake in the Andes. Taypikala, the civic-

100. Donnan, *Moche Art of Peru,* 79–83 (note 96).

101. Architectural *maquetas* are plan view, scaled representations of the load-bearing walls of individual rooms and structures. See, for example, Cristóbal Campana, *La cultura mochica* (Lima: Consejo Nacional de Ciencia y Tecnología, 1994), 29.

102. Kubler, *Art and Architecture,* 253 (note 43).

FIG. 6.30. CERAMIC MOCHE HOUSE COMPOUND MODEL, VIRU VALLEY. This vessel represents a Moche-period house compound with rectangular enclosures, living quarters, paths, and stairs, on a pyramidal mound. The color bands of the vessel represent discrete elevational surfaces. Distance may also be implied by the color bands.
Height of the original: 19 cm; width and depth: 11 cm. Photograph courtesy of the Instituto Nacional de Cultura, Museo Nacional de Arqueología, Antropología e Historia del Perú, Lima (C-54613).

ceremonial core of Tiwanaku culture (ca. A.D. 300–1100), was an architectural manifestation of the earth and cosmos. Surrounded by a moat, Taypikala evokes the image of the sacred island later immortalized in an Inka creation myth.[103] Its monumental architecture is aligned with prominent landscape features and the sunrise at the equinoxes. Akapana, one of the two great pyramid mounds in Taypikala, has surface and subterranean water canals that mimic the unusual hydrology of the Quimsachta range. Since the upper terrace fill of Akapana contains distinctive blue-green pebbles from a Quimsachta mountain, the likeness was surely intentional. As the center of a cosmopolis, Taypikala embodied the perceived order of the universe. It was considered to be a point of cosmic convergence that extended to the social and territorial organization of the Tiwanaku realm.[104]

Ethnohistorical research provides important insights into how ancient Tiwanaku may have represented geographic relations. Thérèse Bouysse-Cassagne has outlined sixteenth-century spatial concepts for Aymara chiefdoms around Lake Titicaca. The spatial organization of Aymara culture and territory was built around a system of double dualisms (fig. 6.31). *Urco* and *uma* were spatial divisions of the regional sociopolitical landscape. *Alaa* and *manca* signified the social and territorial divisions for low-elevation valleys near the Pacific and Amazon, respectively. The concept of *urco* also encompassed categories such as west, high, dry, high-elevation pastoralism, celestial, male, and perhaps the tuber. *Uma* embodied such concepts as east, low, wet, maize agriculture, Underworld, female, and low-elevation plants and animals.[105]

The integration of chiefdoms at the Amazon or Pacific coast periphery with those around Lake Titicaca at the center fostered a multiethnic form of complementarity governed by the concepts of *urco* and *uma*.[106] Two lords, one from each moiety, ruled the kingdom of Lupaqa, a well-documented sixteenth-century Titicaca chiefdom often used as a sociopolitical model for the region. Lupaqa's moieties comprised multiethnic *ayllus* that ensured comparable access to resources and labor for all corporate groups.[107] Ethnic tensions no doubt arose in such a complex sociopolitical landscape, but they were mediated by rituals in a symbolic space called *taypi*, or "place in the middle." Lake Titicaca was *taypi* in the fragmented sociopolitical landscape of the sixteenth century. During the middle horizon, *taypi* was Tiwanaku.[108]

The Bennett Stela stood in the semisubterranean temple at Tiwanaku, probably facing due west toward the Ponce Stela, another monolith aligned with the Bennett Stela along the solar path.[109] This architectural complex also contained an eclectic assemblage of stone statues arranged in subsidiary positions around the Bennett Stela.[110] Most of these statues were foreign to Tiwanaku

103. Kolata, *Tiwanaku*, 87–88 and 93–94 (note 16). The Inkas believed that Viracocha emerged from Lake Titicaca to create the earth and cosmos at Tiwanaku. Kolata's interpretation of Tiwanaku's urban design is called into question, however, in William Harris Isbell, review of *Tiwanaku: Portrait of an Andean Civilization*, by Alan L. Kolata, *American Anthropologist* 96 (1994): 1030–31.

104. Kolata, *Tiwanaku*, 8–10, 96–98, 108–9, and 111–17, and Reinhard, "Chavín and Tiahuanaco," 415 (note 57). Both Kolata and Reinhard attach significance to the summit of Akapana as one of the few places where one can see the pilgrimage points and weather shrines of Lake Titicaca and the nearly 6,500 meter-high crest of Mount Illimani.

105. Thérèse Bouysse-Cassagne, "Urco and Uma: Aymara Concepts of Space," in *Anthropological History of Andean Polities*, ed. John V. Murra, Nathan Wachtel, and Jacques Revel (Cambridge: Cambridge University Press, 1986), 201–27, esp. 201–13.

106. Bouysse-Cassagne, "Urco and Uma," 215.

107. Murra, "Aymara Kingdom," 117–18 and 125–28 (note 12).

108. Bouysse-Cassagne, "Urco and Uma," 209 and 215–21 (note 105), and Kolata, *Tiwanaku*, 89 (note 16).

109. Kolata, *Tiwanaku*, 143.

110. Kolata, *Tiwanaku*, 135, and Carlos Ponce Sanginés, *Descripción*

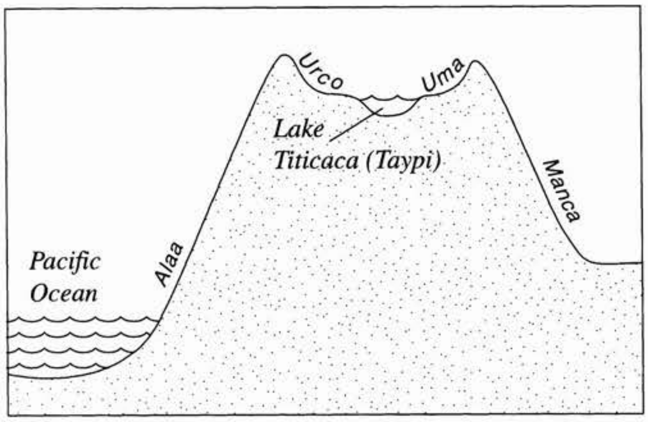


FIG. 6.31. AYMARA CONCEPTIONS OF SPACE. Historical and archaeological studies of Aymara kingdoms surrounding Lake Titicaca demonstrate a social and territorial organization based on "double dualisms," a geometric structure replicated in the iconographic organization of the Bennett Stela (see fig. 6.32). The axis of *taypi* (Lake Titicaca) separates the realms of *urco* from *uma* and *alaa* from *manca.*
After Thérèse Bouysse-Cassagne, "Urco and Uma: Aymara Concepts of Space," in *Anthropological History of Andean Polities,* ed. John V. Murra, Nathan Wachtel, and Jacques Revel (Cambridge: Cambridge University Press, 1986), 201–27, esp. fig. 12.2.

and represented captured *huacas* and emblems of distant ethnic groups.[111] Unfortunately, their original spatial arrangement will never be known; however, there are suggestions that they were topologically arranged around the Bennett Stela in a maplike display of Tiwanaku's power and its conquests.[112]

Two types of geometric organization on the Bennett Stela reflect Aymara conceptions of space (fig. 6.32). A horizontal procession of figure panels occurs at the top of the spine (headband) and another on top of the waistband. A vertical stack of figure panels occurs at the base of the spine. Horizontal strips of figure panels fuse symbols associated with pastoralism and agriculture, the cornerstones of the Tiwanaku subsistence economy.[113] Each horizontal strip also has representative elements associated with high-elevation settings (*urco*), such as llamas, and low-elevation tropical biomes (*uma*), such as parrots. The two horizontal bands containing *uma* and *urco* referents are consistent with Aymara spatial dualism. The

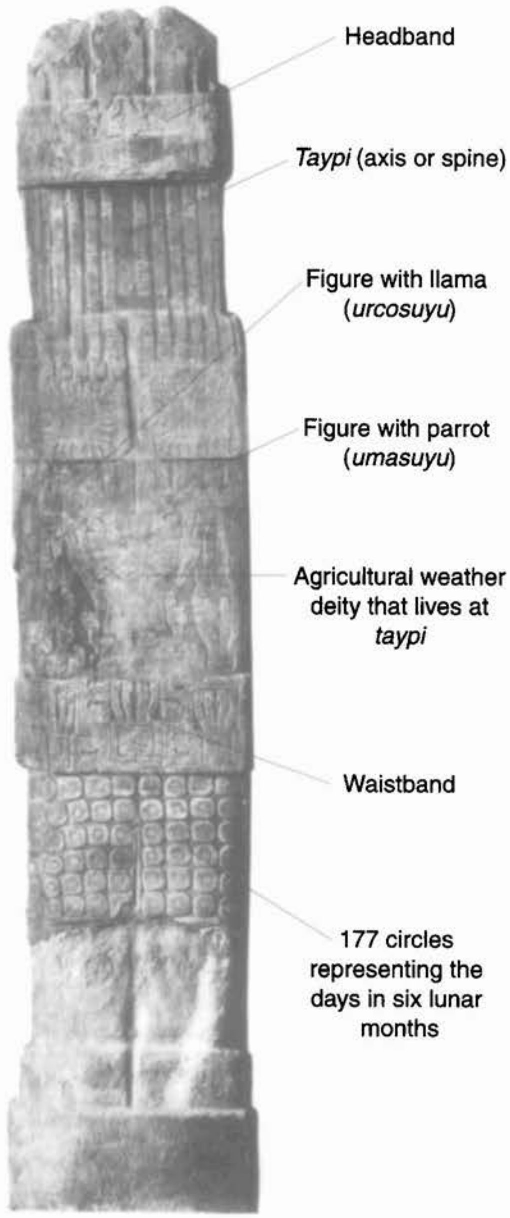


FIG. 6.32. INTERPRETATION OF THE BENNETT STELA AS A COSMOGRAM. The Bennett Stela is a graphic representation of space and time as perceived and controlled by the Tiwanaku peoples. At the bottom of the spine is a representation of the agricultural weather deity who resides at *taypi,* the precursor of the Inka deity Viracocha. The deity's outstretched arms support two figures, one with tropical parrots signifying *umasuyu* on the right and another with llama heads symbolizing *urcosuyu* on the left. The role of *taypi* in mediating Tiwanaku social and territorial organization is represented by the spine, which organizes the thirty figures and other symbolic elements into the double dualisms of *urco* and *uma, alaa* and *manca.*
After Arthur Posnansky, *Tihuanacu: The Cradle of American Man,* 2 vols., trans. James F. Shearer (New York: J. J. Augustin, 1945), vol. 2, fig. 115. Interpretation by William Gustav Gartner.

sumaria del templete semisubterráneo de Tiwanaku, 5th rev. ed. (La Paz: Librería y Editorial "Juventud," 1981), 109–76. Ponce Sanginés provides descriptions and locations of the many carved stelae and pillars found in the semisubterranean complex.

111. On the importance of *huaca* capture during Inka times, see Cobo, *Inca Religion and Customs,* 47, and idem, *History of the Inca Empire,* 187–88 and 191 (both note 25).

112. Kolata, *Tiwanaku,* 141–43 (note 16); originally proposed by Lathrap, "Jaws," 251–52 (note 55).

113. Kolata, *Tiwanaku,* 135–41.

FIG. 6.33. TIWANAKU HOUSE MODEL, 500–300 B.C. This stone house model (four views), with carved door molding and cornice as distinctive architectural features, was found near the temple of Kalasasaya at Tiwanaku. During mapping rites, stone house amulets would have been arranged around a geographic referent, such as the stone *huacas* at Kalasasaya.
Photograph courtesy of the Dirección Nacional de Arqueología y Antropología de Bolivia, Secretaria Nacional de Cultura de Bolivia, La Paz.

symmetrical nature of this horizontal imagery illustrates the parity of power between two moieties.

According to Zuidema, the Bennett Stela's lower wrap has 177 circles, representing the number of days in six lunar (synodic) months. The thirty engraved figures signify the days in a solar month. He also interprets the cultivated and wild plants growing from the llamas as a symbol for the seasonal land rotation between pastoralists and agriculturalists.[114] People with distinct headdresses, capes, and staffs–probably symbolizing the multiethnic groups composing the Tiwanaku state–meander across the shoulders and chest of the stela. The spatial symbolism and layout of the Bennett Stela suggest that the spine is *taypi,* or the place in the middle, probably Taypikala, and that it served to fuse social and cosmic divisions manifested spatially by the figures and symbolic elements as a hierarchical and harmonious whole.

Numerous house models have been found at Tiwanaku,[115] probably amulets used in mapping rites performed within Taypikala. A variety of stone houses and whistles were recovered in and around Kalasasaya, another structural complex at Tiwanaku (fig. 6.33). The formal variability in carved cornices and doorways suggests that models like the one in figure 6.33 may represent houses from different regions. Stone house models would have been arranged around some referent during mapping rites to represent a particular locale. Similarly, according to the symbolism of the Bennett Stela, calendrical rites detailed seasonal access to land.[116] Other rites might have called on the power of Puma Punka, one of the twin pyramids at Tiwanaku, to focus the blessings of supernatural forces and direct them to the locale signified by the house model arrangement.

FIG. 6.34. *MAQUETA* OF THE TEMPLE UPPER COURT AT MOQUEGUA, PERU. This illustration of a house model (*maqueta*) found at the Omo site in the Moquegua Valley of Peru represents the stairways, terraces, sunken platforms, and the exterior and interior walls of buildings and rooms at the site's upper court. Omo's civic-ceremonial architecture is strikingly similar to that at Tiwanaku.
Size of the original fragment: 15 × 13 cm. Photograph by permission of Paul S. Goldstein.

Tiwanaku's influence reached well beyond the Titicaca basin to Moquegua, Peru. Recent excavations at the Omo site have uncovered a ceremonial structure consisting of three courts and what appears to be a stone scale model of the temple's upper court (fig. 6.34). Tiwanaku architectural features such as stairways, terraces, sunken courts, and platforms are in evidence at the site. This supports Goldstein's thesis that the Omo site was an administrative satellite of Tiwanaku.[117]

Arthur Posnansky believed the Tiwanaku people used a surveying device to align their civic-ceremonial archi-

114. R. Tom Zuidema, "Llama Sacrifices and Computation: The Roots of the Inca Calendar in Huari-Tiahuanaco Culture," forthcoming.

115. Carlos Ponce Sanginés, *Tiwanaku: Espacio, tiempo y cultura,* 4th ed. (La Paz: Editorial "Los Amigos del Libro," 1981), figs. 81–83.

116. Zuidema, "Llama Sacrifices" (note 114).

117. Paul Goldstein, "Tiwanaku Temples and State Expansion: A Tiwanaku Sunken Court Temple in Moquegua, Peru," *Latin American Antiquity* 4 (1993): 22–47, esp. 38–40.

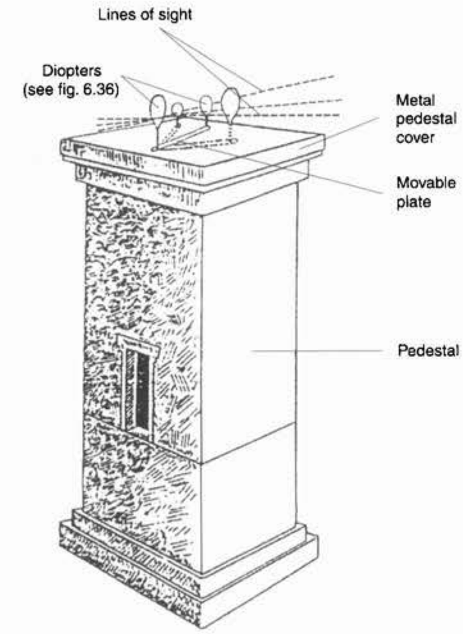


FIG. 6.35. PROPOSED TIWANAKU SURVEY INSTRUMENTS. Arthur Posnansky suggested that Tiwanaku surveyors used a device to lay out their capital city and to align civic-ceremonial architecture with the heavens. According to his speculative scheme, a pedestal is leveled by means of a water-filled container. Surveyors then anchored the appropriate length diopter into a drilled plate on top of the pedestal to obtain a line of sight.
After Arthur Posnansky, *Tihuanacu: The Cradle of American Man,* 2 vols., trans. James F. Shearer (New York: J. J. Augustin, 1945), vol. 2, fig. 18.

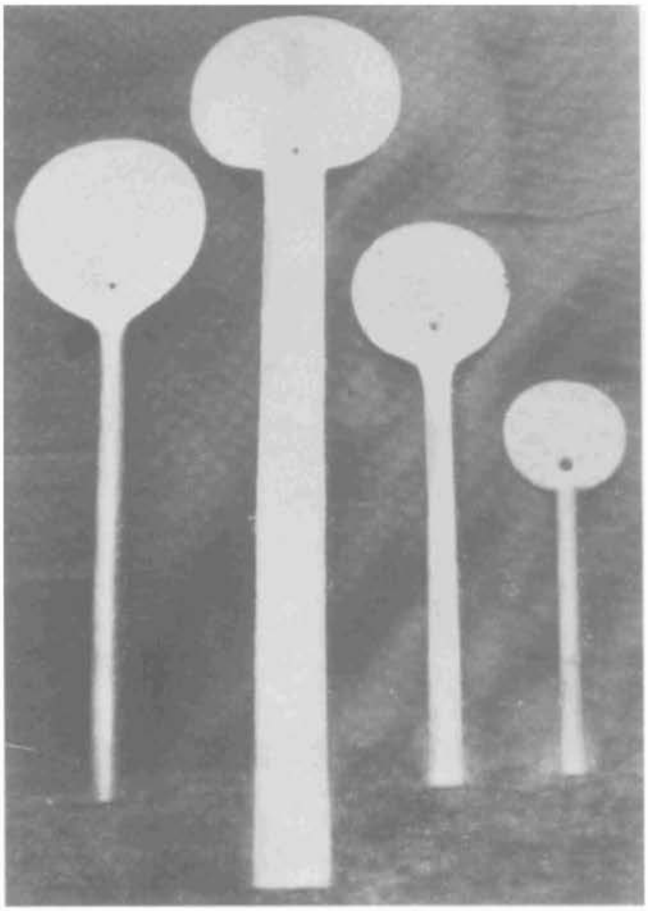


FIG. 6.36. SILVER DIOPTERS FOUND AT TIWANAKU. Several silver diopters with unpointed handles were found near Tiwanaku. Arthur Posnansky believed Tiwanaku builders used these instruments to obtain a line of sight. See figure 6.35.
From Arthur Posnansky, *Tihuanacu: The Cradle of American Man,* 2 vols., trans. James F. Shearer (New York: J. J. Augustin, 1945), vol. 2, fig. 16a.

tecture with the heavens.[118] In Posnansky's controversial scheme, two metal diopters with drilled holes are set on a hypothetical pedestal leveled by a container filled with water (figs. 6.35 and 6.36). Tiwanaku's architects attained a precise line of sight with landscape and astronomical features by utilizing a standardized set of sighting devices. However, the diopters are more often interpreted as ornaments or ceremonial implements.[119] Still, it is likely that the Tiwanaku people possessed a standardized system of survey. Tiwanaku is one of the few pre-Columbian urban centers to have had subterranean water delivery and waste removal systems. The Tiwanaku people also reorganized canals, raised fields, and roads into an integrated regional system.[120]

A second type of surveying device may also have middle horizon origins. The Chimú kingdom and its capital of Chan Chan were fifteenth-century rivals to the Inkas. However, their rise to power began in the tenth century. About A.D. 1000, the Chimús constructed the longest intervalley irrigation canal in the New World. An unusual ceramic bowl found in the Virú Valley may have functioned as a surveying device for this and other public works projects. According to Charles Ortloff, instruments that calibrated distance using a leveling bowl filled with water, sighting tube, and staff could have been used to construct the Chicama-Moche canal (fig. 6.37).[121]

118. Arthur Posnansky, *Tihuanacu: The Cradle of American Man,* 2 vols., trans. James F. Shearer (New York: J. J. Augustin, 1945), 2:57–64.

119. Javier F. Escalante Moscoso, *Arquitectura prehispánica en los Andes bolivianos* (La Paz, Bolivia: CIMA, 1993), 386–89, explains that the term *tupu,* or what Posnansky refers to as *topo,* is a homonym in both Quechua and Aymara, alternatively meaning a measurement, animal bedding, an Inka league, the Royal Road, the size of an individual *chakra,* and a breast pin or ornament.

120. Kolata, *Tiwanaku,* 155–56 (note 16), and Alan L. Kolata, "The Technology and Organization of Agricultural Production in the Tiwanaku State," *Latin American Antiquity* 2 (1991): 115–19.

121. Charles R. Ortloff, "Surveying and Hydraulic Engineering of the Pre-Columbian Chimú State: AD 900–1450," *Cambridge Archaeological Journal* 5 (1995): 55–74, esp. 63–67. The utility of this Chimú surveying system might be moot, since the seventy-four-kilometer

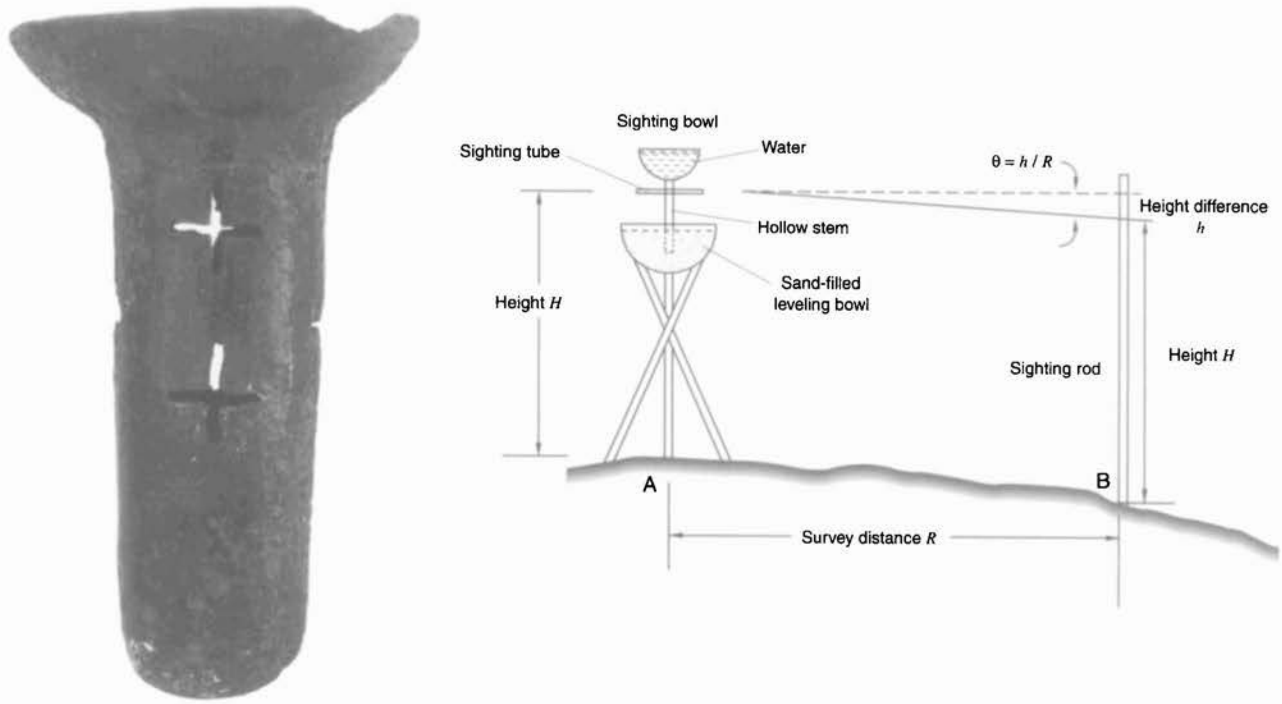


FIG. 6.37. PROPOSED CHIMÚ SURVEY INSTRUMENTS. This photograph and explanatory diagram represent how the fifteenth-century Chimú culture might have used survey instruments in public works projects, particularly canals. This speculative system, developed by Charles Ortloff, was inspired by an unusual ceramic bowl with a cruciform hole through an attached hollow stem found in the Virú Valley. When the water-filled bowl is leveled by adjusting the bowl and attached stem embedded in a bowl of sand until the water reaches the rim, the sighting tube, which is designed to be parallel to the surface of the water, provides an artificial horizon. A desired angle of slope for building a canal can be achieved as follows: using markings on the cruciform openings, a given angle of declination can be set for sighting on a calibrated staff, which can then trace out a contour at the desired height on the surrounding terrain to produce the correct slope. Alternatively, horizontal angles can be observed by moving the sighting tube sideways in the cruciform opening. Surveying field tests with such a device yielded accuracies typical of Chimú canal bed slope angles.
Photograph courtesy of the Museo Arqueológico de Ancash, Instituto Nacional de Cultura–Ancash, Peru. Diagram after Charles R. Ortloff, "Surveying and Hydraulic Engineering of the Pre-Columbian Chimú State: AD 900–1450," *Cambridge Archaeological Journal* 5 (1995): 55–74, esp. 65 (fig. 11).

Although Ortloff's interpretation is speculative, staffs marked at regular intervals are common in middle horizon iconography and lend tangential support to his interpretation.[122]

INKA MAPMAKING

The writings of Spanish chroniclers intimate a well-developed and highly abstract system of mapping and mapmaking in Inka culture (ca. 1438–1532). The classic works often cited by Andean historians include the writings of the missionaries Bernabé Cobo (1580–1657) and Cristóbal de Molina (1494?–1578); the government officials Juan Polo de Ondegardo (d. 1575) and Pedro Sarmiento de Gamboa (1532?–1608?); and the conquistadores Pedro de Cieza de León (1518–60) and Juan de Betanzos (d. 1576), who married into an Inka royal family shortly after the conquest.[123] This rich corpus of historical works is sometimes criticized for ethnocentric dis-

Chicama-Moche irrigation canal may never have carried water. Parts of the canal apparently run uphill, while roughness and variations in width would restrict flow at certain points. Ortloff, Moseley, and Feldman explain the uphill gradient by evoking tectonic uplift. Kus, on the other hand, suggests that the canal is a form of monumental architecture designed to let reemerging elites publicly display their prestige and economic superiority. See Charles R. Ortloff, Michael E. Moseley, and Robert A. Feldman, "Hydraulic Engineering Aspects of the Chimu Chicama-Moche Intervalley Canal," *American Antiquity* 47 (1982): 572–95, and James S. Kus, "Irrigation and Urbanization in Pre-Hispanic Peru: The Moche Valley," *Association of Pacific Coast Geographers Yearbook* 36 (1974): 45–56, esp. 54–55.

122. Báculo, god with staffs, is discussed in Anita Gwynn Cook, *Wari y Tiwanaku: Entre el estilo y la imagen* (Lima: Pontificia Universidad Católica del Peru, Fondo Editorial, 1994), esp. 183–90 and pl. 7.

123. Cobo, *Inca Religion and Customs,* 9–10, 13, and 17–18; idem, *History of the Inca Empire,* 94, 99, 211–14, 223–27, and 253–54 (both note 25); Molina, *Fábulas y mitos,* 49–50 and 127–28 (note 8); Polo de Ondegardo, *El mundo de los Incas,* 46–50 and 93 (note 25); Pedro Sarmiento de Gamboa, *Historia de los Incas,* 3d ed., ed. Angel Rosenblatt (Buenos Aires: Emecé, 1947), 114–15, 117–20, and 197; Pedro de Cieza de León, *The Incas of Pedro de Cieza de León,* trans.

tortions and omissions, indiscriminate borrowing, and historical inconsistencies. We also have the serendipitous survival of manuscripts by two native Andean writers, Felipe Guamán Poma de Ayala and Juan de Santa Cruz Pachacuti Yamqui Salcamayhua, who wrote less than a century after the conquest.[124] These works have the advantage of a native perspective, but they often shift tenses and mix Spanish with native languages and are thus difficult to interpret.

Perhaps the best-known chronicler is Garcilaso de la Vega (1539–1616), who was of mixed European and native descent. Although Garcilaso provides the most detail on Inka life, his writings suffer from internal inconsistencies, and his statements cannot always be corroborated by other evidence.[125]

Native residents of Muina, a village five leagues south of Cuzco, constructed an ephemeral map of the Cuzco Valley for the Spaniard Damián de la Bandera, a census inspector from the royal chancery in Lima. Garcilaso apparently accompanied Bandera, and he described the map as follows:

> I saw the model of Cuzco and part of the surrounding area in clay, pebbles, and sticks. It was done to scale with the squares, large and small; the streets, broad and narrow; the districts and houses, even the most obscure; and the three streams that flow through the city, marvellously executed. The countryside with high hills and low, flats and ravines, rivers and streams with their twists and turns were all wonderfully rendered, and the best cosmographer in the world could not have done it better.[126]

Garcilaso is prone to exaggeration. Yet Betanzos notes that the Spanish often relied on the geographic knowledge of Inka officials after the conquest.[127] And as this chapter illustrates, ethnohistorical, ethnographic, and archaeological records all suggest that ephemeral maps–often created as part of a mapping rite rather than prompted by a European official–were widespread throughout the central Andes.

There are pitfalls in using historical documents, as illustrated by a debate concerning the urban plan of Cuzco and the role of puma imagery and metaphor. Some believe the layout of the central part of Cuzco has the shape of a giant puma. Betanzos and Sarmiento invoke the symbol of the lion (puma) when describing Cuzco. The toponym for the major river junction in Cuzco, Pumap Chupan, means "puma tail."[128] Zuidema argues that the puma is a symbol of the Inka body politic and a metaphor for Inka settlement of the Cuzco Valley. He also suggests that native toponyms incorporating puma anatomy are often associated with springs, rivers, and irrigation canals because of the animal's symbolic association with water.[129] Still others suggest that Cuzco's relation to puma symbolism was inspired by sixteenth- and seventeenth-century European cartographic convention.[130] This controversy demonstrates the many possible interpretations of historical information and the varied perspectives that may influence its compilation.

THE INKA *CEQUE* SYSTEM

The ninth Inka king, Pachacuti Inka Yupanque (1391?–1473?), planned Cuzco's layout with figures of clay (*maquetas*), personally surveyed territorial apportionments, and designed Coricancha, the Inka Temple of the Sun. He is also credited with establishing the Inka *ceque* system, a set of forty-one sighting lines that radiated outward from Coricancha and organized the Inka system of *huacas* (fig. 6.38).

> [He] outlined the city and had clay models made just as he planned to have it built. . . .
>
> [and] with his own hands, along with the rest of the lords of the city, had a cord brought; indicated and measured with the cord the lots and houses that were to be made and their foundations and structures. . . .
>
> When the city was finished and made to perfection, Inca Yupanque ordered all the lords of Cuzco and the rest of its inhabitants to meet at a certain open field. After they assembled, he ordered that there be brought there the sketch of the city and the clay painting that

Harriet de Onis, ed. Victor Wolfgang von Hagen (Norman: University of Oklahoma Press, 1959), 128, 135–38, 139–40, 168–69, and 249; and Juan de Betanzos, *Narrative of the Incas,* trans. and ed. Roland Hamilton and Dana Buchanan (Austin: University of Texas Press, 1996), 7–8, 44–111 passim, 155–57, 159, 175, and 278.

124. Felipe Guamán Poma de Ayala, *Nueva crónica y buen gobierno,* 3 vols., ed. John V. Murra, Rolena Adorno, and Jorge L. Urioste (Madrid: Historia 16, 1987), and Juan de Santa Cruz Pachacuti Yamqui Salcamayhua, *Relación de antigüedades deste reyno del Piru,* ed. Pierre Duviols and César Itier (Lima: Institut Français d'Études Andines, 1993).

125. John Hemming, *The Conquest of the Incas* (New York: Harcourt Brace Jovanovich, 1970), 18.

126. Garcilaso de la Vega, *Royal Commentaries of the Incas, and General History of Peru,* trans. Harold V. Livermore (Austin: University of Texas Press, 1966), 124.

127. Betanzos, *Narrative of the Incas,* 278 (note 123).

128. John Howland Rowe, "What Kind of Settlement Was Inca Cuzco?" *Ñawpa Pacha* 5 (1967): 59–76, esp. 65–66 and pl. 34; Betanzos, *Narrative of the Incas,* 74 (note 123); and Sarmiento de Gamboa, *Historia de los Incas,* 233 (note 123).

129. R. Tom Zuidema, "The Lion in the City: Royal Symbols of Transition in Cuzco," *Journal of Latin American Lore* 9 (1983): 39–100, esp. 40–42 and 78–87. The Inkas equated the puma with the hydrologic cycle, since its sinuous tail mimics river bends while its reddish brown coat recalls the color of the sediment-laden river waters around Cuzco during the rainy season.

130. As exemplified, for example, by Nicolaes Visscher's 1633 map titled *Leo Hollandicus,* sixteenth- and seventeenth-century European maps often stylized the political boundaries of a country as an animal. Monica Barnes and Daniel J. Sliva, "El puma de Cuzco: ¿Plano de la ciudad Ynga o noción europea?" *Revista Andina* 11 (1993): 79–102.

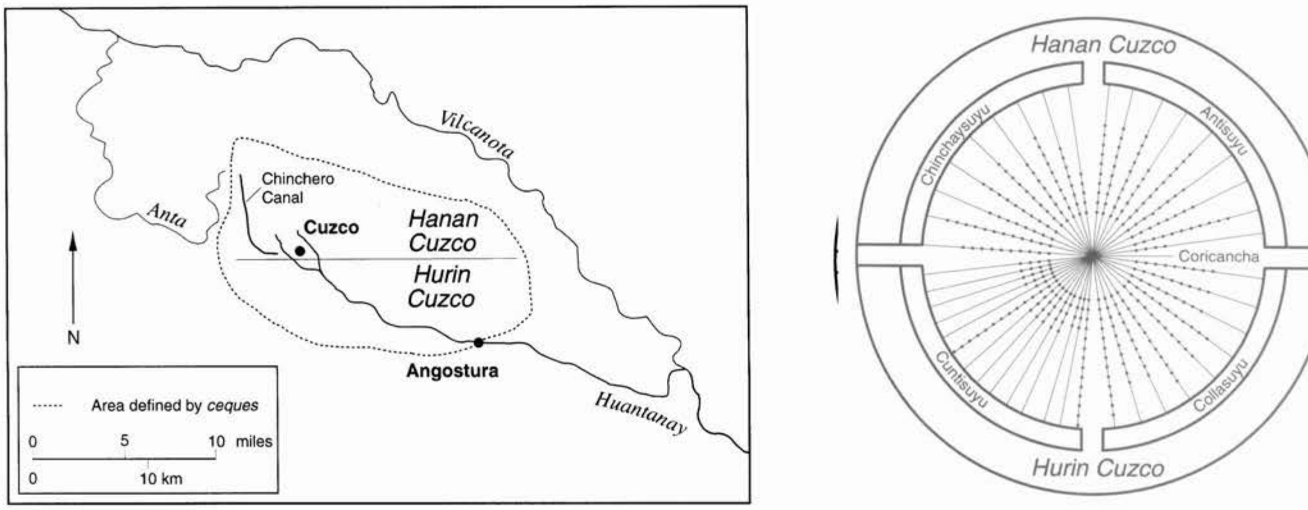


FIG. 6.38. THE INKA *CEQUE* SYSTEM. On the right is an idealized diagram of the forty-one sighting lines (*ceques*) that radiate out from Cuzco's Temple of the Sun, Coricancha, to points on the local horizon and beyond. The dots represent the 328 *huacas* on the *ceques,* one for each day of the sidereal lunar year. Springs, fountains, and critical points of the Cuzco Valley irrigation system constitute approximately one-third of the *huacas.* Inka rulers used the *ceque* lines as cultural and territorial boundaries when they resettled the Cuzco Valley. A *suyu,* one of the four provinces of the Inka empire, minimally consisted of nine *ceques* with at least one member from each social class (*collana* [Inka], *payan* [honorary Inka], and *cayao* [non-Inka]). *Suyus* in turn were grouped into *hanan* (upper) and *hurin* (lower) Cuzco. The map on the left illustrates the area defined by all forty-one *ceques,* although certain ceques extended to the edge of the Inka empire.
After Jeanette E. Sherbondy, "Water and Power: The Role of Irrigation Districts in the Transition from Inca to Spanish Cuzco," in *Irrigation at High Altitudes: The Social Organization of Water Control Systems in the Andes,* ed. William P. Mitchell and David Guillet (Arlington, Va.: Society for Latin American Anthropology, American Anthropological Association, 1993), 69–97, esp. 75 (fig. 3.1) and 77 (map 3.1).

> he had ordered made. With this in front of him, he assigned the houses and lots already built.[131]

Certain families, lineages, and social classes were assigned to particular locales. Lineages were also assigned ritual responsibilities related to the upkeep of *huacas* and calendrical festivities. Pachacuti Inka Yupanque, in carefully welding society and territory within the Inka capital, essentially assumed the role of the Inka creator deity Viracocha in what could be viewed as a dramatic reenactment of the *huaca* origin myth.[132] Careful spatial reckoning of the landscape, ritual mapping, and mapmaking clearly were critical undertakings in both events.

Ceque organization was driven by territorial apportionment, topography, astronomy, and cultural history to points on and sometimes beyond the local horizon.[133] Water sources and Cuzco Valley hydrology account for the placement of most *ceque* lines and more than one-third of the *huaca* locations.[134] As elsewhere, canals and rivers in the Cuzco Valley often formed the territorial boundaries between sociopolitical groups. The land apportioned to each Cuzco Valley *ayllu* was reckoned with respect to canals and rivers and was surveyed with uniformly cut ropes.[135] Mountain passes and Inka roads were also important in anchoring the *ceque* system.[136] Few *ceques* exhibit astronomical alignments. However, certain *ceques* were important referents for rituals associated with the agricultural calendar, for they are related to the 328 *huacas*—the number of days in a sidereal lunar year. The

131. Quotation from Betanzos, *Narrative of the Incas,* 69 and 71 (note 123); see also John Howland Rowe, "An Account of the Shrines of Ancient Cuzco," *Ñawpa Pacha* 17 (1979): 1–80, esp. 10.

132. Molina, *Fábulas y mitos,* 58–134 (note 8).

133. R. Tom Zuidema, "Catachillay: The Role of the Pleiades and of the Southern Cross and α and β Centauri in the Calendar of the Incas," in *Ethnoastronomy and Archaeoastronomy in the American Tropics,* ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 203–29, esp. 204–11. Certain *ceques* are aligned with the rising and setting of celestial objects, although the only observations made from Coricancha were the December solstice sunset and the helical rising of the Pleiades. *Ceques* are also aligned with topographic features such as mountain passes and points of historical interest. For example, one *ceque* extends from Cuzco to Huanacauri to Vilcanota and finally to the ruins of Tiwanaku nearly three hundred kilometers away. These sites are all related to the birth of the sun in Inka origin myths. Not surprisingly, this *ceque* was an important pilgrimage route.

134. Jeanette E. Sherbondy, "Irrigation and Inca Cosmology," in *Culture and Environment: A Fragile Coexistence,* ed. Ross W. Jamieson, Sylvia Abonyi, and Neil A. Mirau (Calgary: University of Calgary Archaeological Association, 1993), 343–51, esp. 348.

135. Examples of using ropes to measure space are recounted by Betanzos, *Narrative of the Incas,* 45 and 55 (note 123).

136. Zuidema, "Catachillay," 206 (fig. 2) (note 133), and Rowe, "Shrines of Ancient Cuzco," 3–4 (note 131).

Inkas assigned these ritual responsibilities to particular *ayllus* and social groups. *Ceques* also constituted social and kinship boundaries.[137]

The *ceque* system, as presented above, is not without its critics. Some believe that the *ceques* are not straight, but zigzag across the landscape. It may, however, have been the cultural context that determined whether the Inkas viewed the *ceque* as a straight line (as a mental mapping or sighting line for two or more *huacas* sometimes on different *ceques*) or as an irregular line (as a ritual pathway that linked every *huaca* on a single *ceque* line).[138] Questions of astronomical precision and the function of *ceques* in calendrical organization have led to bitter exchanges between various Andeanists.[139] Finally, a few believe the *ceque* system is so complicated that it could not have adequately satisfied the purposes stated above.[140] Nevertheless, the formulation and analysis of the *ceque* system, especially by Zuidema and Sherbondy, are far more compelling than the counterarguments of their critics. The importance of the *ceque* system to the history of Andean spatial representation is well articulated by Zuidema: "The visibility of all the *ceques* from one center meant that a person located in the Temple of the Sun had before him 'an open book.' The *ceques* organized space as a map and made the inspection of and reflection upon it as possible as if the person were seeing an actual map."[141] Similarities between the *ceque* system and the Nazca ray centers include radial organization, ritual function, and the likely role of both structures in conceptually aligning important water sources.[142]

HUACAS IN THE *CEQUE* SYSTEM: CARVED LANDSCAPE MODELS AND MAPPING RITES

Some *huacas* in the *ceque* system were models of specific locations, especially stones and boulders that came from, or resembled, distant places.[143] One *huaca,* for example, consisted of "three stones in representation of the Pachayachachic, Inti Illapa, and Punchau," all mountains associated with Viracocha in Inka creation myths. On the road of Antisuyu, one of the main boundaries of Cuzco and the Inka empire, one shrine was "shaped like the hill of Huanacauri" and was moved to the end of the road to

FIG. 6.39. INKA MAPPING RITE DRAWN BY FELIPE GUAMÁN POMA DE AYALA, CA. 1615. Topa Inka arranges amulets representing mountain *huacas* of the Cuzco Valley in front of the carved stone *huaca* called Cocopona. Topa Inka's text talks about the perceived role of mountains in the hydrologic cycle and the generation of weather patterns. The construction of ephemeral maps during rituals is millennia old in the Andes and continues to the present.
Size of the original: ca. 18 × 12 cm. Photograph courtesy of the Royal Library, Copenhagen (Nueva crónica y buen gobierno, fol. 261).

137. R. Tom Zuidema, *Inca Civilization in Cuzco,* trans. Jean-Jacques Decoster (Austin: University of Texas Press, 1990), 73–78; idem, *Ceque System,* 40–67, 213–35 (note 15); and idem, "Hierarchy and Space in Incaic Social Organization," *Ethnohistory* 30 (1983): 49–75.

138. Molina, *Fábulas y mitos,* 127 (note 8), intimates that the *ceques* were straight lines for particular rites only. This implies that for other rites they zigzagged. For more on the linear irregularities of the *ceque* lines, see Susan A. Niles, *Callachaca: Style and Status in an Inca Community* (Iowa City: University of Iowa Press, 1987); Brian S. Bauer and David S. P. Dearborn, *Astronomy and Empire in the Ancient Andes: The Cultural Origins of Inca Sky Watching* (Austin: University of Texas Press, 1995), esp. 93–94, 97–98, and 130–33; and Brian S. Bauer, "Ritual Pathways of the Inca: An Analysis of the Collasuyu *Ceques* in Cuzco," *Latin American Antiquity* 3 (1992): 183–205, esp. 202.

139. See, for example, "Comments," in *Archaeoastronomy* 10 (1987–88): 22–34.

140. See Mariusz S. Ziółkowski, "Knots and Oddities: The Quipu-Calendar or Supposed Cuzco Luni-Sidereal Calendar," and Robert M. Sadowski, "A Few Remarks on the Astronomy of R. T. Zuidema's 'Quipu-Calendar,'" both in *Time and Calendars in the Inca Empire,* ed. Mariusz S. Ziółkowski and Robert M. Sadowski (Oxford: BAR, 1989), 197–208 and 209–13.

141. R. Tom Zuidema, "Bureaucracy and Systematic Knowledge in Andean Civilization," in *The Inca and Aztec States, 1400–1800: Anthropology and History,* ed. George A. Collier, Renato I. Rosaldo, and John D. Wirth (New York: Academic Press, 1982), 419–58, esp. 445–46.

142. Aveni, "Order in the Nazca Lines," 50–71 and 110–13 (note 79).

143. Hyslop, *Inka Settlement Planning,* 102–28 (note 16).

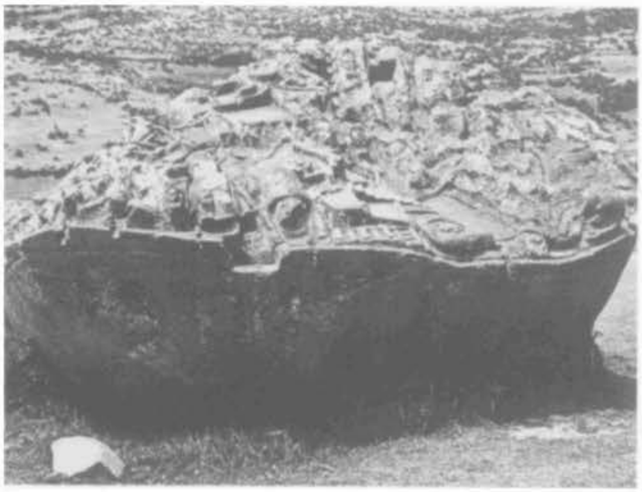


FIG. 6.40. THE SAYHUITE STONE. The Sayhuite Stone is one of many carved stone landscapes found in the department of Cuzco. Miniature agricultural terraces, grooves representing rivers and irrigation canals, paths, gates, architectural platforms, and altars are found on the stone, suggesting it is a model of a real region. The built landscape is covered with fanciful creatures including monkeys, pumas, camelids, snakes, frogs, lizards, and crabs armed with arrows. The animals may represent geographic information in several possible ways: signifying toponyms or *parajes;* illustrating myths that are location specific; and representing boundaries.
From Enrico Guidoni and Roberto Magni, *The Andes* (New York: Grosset and Dunlap, 1977), 127.

serve as a directional guide. On the road of Collasuyu, another hill-shaped *huaca* contained a maplike arrangement of "many idols of all four suyus."[144]

Huacas were placed at critical points in the sacred geography of the Cuzco Valley and functioned as geographic referents and as portals to the other world during mapping rites. Beneath the *huaca* shrine in one of Guamán Poma's illustrations are amulets representing prominent mountains and their spirits arranged as an ephemeral map of the Cuzco Valley (fig. 6.39).[145] Topa Inka, the tenth Inka king, reflecting the Andean belief that specific mountains control the weather, asks the mountain spirits, "Who among you is saying, 'Let it not rain, let it freeze, let it hail?' Speak immediately."[146] The anticipated response requires an accurate spatial arrangement of the models. This implies that they represent local geography; the location of individual mountains must be understood.

The Inkas also carved boulders into landscape summaries, some of which were *huacas*. The most famous carved boulder is the Sayhuite Stone, on top of a terraced hill near Curahausi, about 190 kilometers from Cuzco. The Sayhuite Stone is purportedly a representation of the immediate river valley (fig. 6.40). Local canals, terraces, buildings, a plaza, roads, fountains or springs, and a possible reference to another carved boulder known as the Rumihuasi Stone are all present.[147] Animal representatives from the realms of water, earth, and sky–such as amphibians, sea creatures, felines, and birds–are also shown, possibly signifying their role in water rituals[148] or representing *parajes* or toponyms. Depictions on the stone of crabs carrying weapons also appear on Moche ceramic vessels and may represent the Inka appropriation of ancient myth on the north coast. Felines are often found adjacent to river and canal junctions on the Sayhuite Stone. This may refer to the Inka practice of placing puma skins at such junctions to act as territorial markers.[149]

The Q'inku (Kenko) Stone (fig. 6.41) is also near Cuzco and is said to commemorate the burial of the Inka ruler Inka Yupanque.[150] Near the base of the Q'inku Stone is a model of an unidentified royal sanctuary. The steps and grooves most likely represent the terracing and irrigation system of the Inkas, and in this sense it resembles the Sayhuite Stone.

The Piedra Cansada is another carved boulder mentioned by a number of early chroniclers. Also known as the Tired Stone because it came to rest at this location after a long journey, the Piedra Cansada was a *huaca* in the *ceque* system.[151] Situated just north of Saqsahuaman, the boulder references both this great Inka fortress and the nearby irrigation and terracing system.[152] Although it lacks the animism of the Sayhuite Stone and contains a number of geometric shapes that have yet to be deciphered, ethnohistoric accounts indicate that the Tired Stone is related to a royal *ayllu* of *hanan* (upper) Cuzco.[153]

THE INKA ROAD SYSTEM

Although the primary purpose of the Inka road system was transport, it was also a conceptual device for Andean

144. Rowe, "Shrines of Ancient Cuzco," 21 (shrine Ch-4:8), 35 (shrine An-4:7), and 41 (shrine Co-2:2) (note 131).

145. Guamán Poma, *Nueva crónica,* 1:252–54 (note 124).

146. Rowe, "Shrines of Ancient Cuzco," 15 (note 131). See also Reinhard, "Chavín and Tiahuanaco," 396–97 (note 57).

147. Hyslop, *Inka Settlement Planning,* 114 (note 16); John Hemming and Edward Ranney, *Monuments of the Incas* (Boston: Little, Brown, 1982), 164–67; and Maarten van de Guchte, "'Carving the World': Inca Monumental Sculpture and Landscape" (Ph.D. diss., University of Illinois at Urbana-Champaign, 1990).

148. Rebeca Carrión Cachot de Girard, *El culto al agua en el antiguo Perú: La Paccha elemento cultural pan-andino* (Lima: Museo Nacional de Antropología y Arqueología, 1955), 10–18.

149. Zuidema, "Lion in the City," 95 (note 129).

150. Enrico Guidoni and Roberto Magni, *The Andes* (New York: Grosset and Dunlap, 1977), 147 and 167.

151. Hyslop, *Inka Settlement Planning,* 115–17 (note 16).

152. Maarten van de Guchte, "El ciclo mítico andino de la Piedra Cansada," *Revista Andina* 2 (1984): 539–56.

153. Hyslop, *Inka Settlement Planning,* 115 (note 16), and Rowe, "Shrines of Ancient Cuzco," 21 (shrine Ch-4:6) (note 131).

FIG. 6.41. THE Q'INKU (KENKO) STONE. The Q'inku Stone portrays many of the same animals and components of the built landscape found on the Sayhuite Stone. However, the configurations of landscape elements differs. The Q'inku and the Sayhuite Stones depict landscape settings, although it is not clear if their topography is actual, imagined, or a combination of both.
By permission of Edward Ranney, Santa Fe, New Mexico.

cultural geography and an organizational reference for Andean spatial divisions. Four main roads connected the four corners of the empire, acted as territorial boundaries between the four *suyus,* and served as divisions for *ceque* enumeration.[154]

Figure 6.42 illustrates an Inka road official on the road from Cuzco to the Pacific coast. Guamán Poma states that there were "specialized ones who measured and set measurements and marks by every road within the quarters."[155] Stone markers were placed at a surveyed distance of one to one and one-half Spanish leagues, a length standardized across the empire by the eighth emperor Viracocha Inka (accession to throne A.D. 1400).[156] Such markers were used as territorial boundaries in regions adjacent to Inka roads.[157]

THE *KHIPU*

Khipus (*quipus*) are knotted-string devices based on the hierarchical organization of data through a decimal system whereby information is positioned according to ones, tens, and hundreds.[158] The oldest *khipus* found date from

154. Hyslop, *Inka Road System,* 340–41 (note 7), and Rowe, "Shrines of Ancient Cuzco," 3–4.

155. Guamán Poma, *Nueva crónica,* 1:358–59 (note 124).

156. Hyslop, *Inka Road System,* 296–97 (note 7). Standardized measurements were relational for the Inkas. For example, the *tupu* is the amount of land area a childless couple needs to subsist depending on the productivity of the land. (The word *tupu* is used in other contexts to express distance.) Since the land's productivity varied, the size of the measurement varied, even though the definition was the same. Why road distances varied is uncertain. However, travel distances are often related in temporal terms today; for example, point A is four hours' walk from point B. Such temporal measurements–if a walk is four or five hours long, for instance–will also vary depending on the nature of the terrain, one's speed, and other factors.

157. Betanzos, *Narrative of the Incas,* 110 and 120 (note 123); Cobo, *History of the Inca Empire,* 211 (note 25); Cieza de León, *Incas of Pedro de Cieza de León,* 137, 140, and 306 (note 123); and Sarmiento de Gamboa, *Historia de los Incas,* 193 (note 123) all discuss the road as a boundary marker.

158. Knotted cords have a worldwide distribution and are also prevalent throughout the native Americas. Most of the archaeologically recovered *khipus* come from elite graves and therefore do not represent the full range of *khipu* function. See Cyrus Lawrence Day, *Quipus and*

FIG. 6.42. INKA ROAD SYSTEM DRAWN BY FELIPE GUAMÁN POMA DE AYALA. According to historical accounts, Inka administrators conceived of their domain through roads and described the location of peoples and places with respect to the Inka highway. As shown above, stone monuments along the highway marked critical points in the Inka road system and referenced the *tupu*, a standardized measure of one to one and one-half leagues.
Size of the original: ca. 18 × 12 cm. Photograph courtesy of the Royal Library, Copenhagen (Nueva crónica y buen gobierno, fol. 354).

the middle horizon and probably evolved from conceptions of space, time, and recordkeeping in the early intermediate period (ca. 200 B.C.–A.D. 600).[159] Guamán Poma refers to accounting, treasury, messenger, and astrological (astronomical) *khipu* secretaries. The *khipu* is so unlike European forms of representation that Guamán Poma identifies the first illustrated *khipu* in his work with a sign with the word "*carta*" written on it–a man holds in his right hand both a *khipu* and the placard (the only artifact in his folio to be labeled in this manner) (fig. 6.43). In Spanish, *carta* refers to a letter, document, chart, or map. Chroniclers wrote that *khipus* were artifacts that recorded historical events, census and tribute information, ceremonial rites and laws, calendrical information, and geographical narratives, and that they also served as maps.[160]

Khipus are composed of a primary cord and a set of attached secondary strings or pendants (fig. 6.44). Any number of subsidiary strings can be attached to the pendant. Knots were usually tied on the pendant and subsidiary strings at regularly spaced positions reflecting a decimal organization.[161] Color, thread type and weave, knot directionality, and other variables are also potentially important in interpreting *khipus*.[162]

Early research stressed the number and hierarchical arrangement of strings as well as the positional sequence of knots–variables that are of primary interest.[163] *Khipu* knots frequently occur in discrete clusters and represent the number of units in decimal placeholding categories. Pendant strings were often tied together by a knotted cord

Witches' Knots: The Role of the Knot in Primitive and Ancient Cultures (Lawrence: University of Kansas Press, 1967), 1–40, and Garrick Mallery, "Picture-Writing of the American Indians," in *Tenth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, 1888–'89* (Washington, D.C.: United States Government Printing Office, 1893), 1–822, esp. 223–27.

159. William J. Conklin, "The Information System of Middle Horizon Quipus," in *Ethnoastronomy and Archaeoastronomy in the American Tropics*, ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 261–81. Several researchers have explored a possible link between *khipus* and the Nazca ray centers, as well as the roles of both in the radial organization of landscape. See, for example, Tony Morrison, *Pathways to the Gods: The Mystery of the Andes Lines* (New York: Harper and Row, 1978), 122–29, and Aveni, "Order in the Nazca Lines," 50–71 (note 79).

160. Betanzos, *Narrative of the Incas*, 51, 90–91, and 161 (note 123); Cobo, *History of the Inca Empire*, 94, 99, 142, and 253–56 (note 25); Cieza de León, *Incas of Pedro de Cieza de León*, 77–78, 105, 163, 166–67, 173–75, 177, 187, and 231–32 (note 123); Guamán Poma, *Nueva crónica*, 1:196–97, 338–40, 352–53, and 362–65; 2:858–60 and 966–69 (note 124); Molina, *Fábulas y mitos*, 57–58 and 128 (note 8); Matienzo, *Gobierno del Perú*, 24, 51–56, 116, and 119 (note 32); Polo de Ondegardo, *El mundo de los Incas*, 35 and 111 (note 25); and Vega, *Royal Commentaries*, 98, 124–25, 226–27, 262, 267, 269–70, 274–75, 326, 329–333, and 397 (note 126).

161. Marcia Ascher, "Mathematical Ideas of the Incas," in *Native American Mathematics*, ed. Michael P. Closs (Austin: University of Texas Press, 1986), 261–89.

162. Marcia Ascher and Robert Ascher, *Mathematics of the Incas: Code of the Quipu* (Mineola, N.Y.: Dover, 1997), esp. 12–35 (originally published as *Code of the Quipu: A Study in Media, Mathematics, and Culture* [Ann Arbor: University of Michigan Press, 1981]). Various combinations of z- and s-patterned spun yarns consistently covary when tied together in left- and right-oriented plies. Urton's research suggests that spinning and plying variations, along with *khipu* knot directionality, encode binary classes of meaning. See Gary Urton, "A New Twist in an Old Yarn: Variation in Knot Directionality in the Inka Khipus," *Baessler-Archiv*, n.s. 42 (1994): 271–305, esp. 291–92.

163. L. Leland Locke, "The Ancient Quipu: A Peruvian Knot Record," *American Anthropologist*, n.s. 14 (1912): 325–32; idem, "A Peruvian Quipu," *Museum of the American Indian* 7, no. 5 (1927): 1–11; and Erland Nordenskiöld, "The Secret of the Peruvian Quipus," in *The Secret of the Peruvian Quipus*, Comparative Ethnographical Studies, vol. 6, pt. 1 (1925; reprinted New York: AMS Press, 1979).

that summed up the value of each string in its group. More complex knots elevated the scale of enumeration to four, five, and even six figures, while an absence of knots meant zero. Some *khipus* lacked a summary cord but had numerical values relevant to solar years, the movements of Jupiter and Mercury, and possibly other celestial movements critical to an agricultural calendar.[164] Henry Wassén compiled historical accounts suggesting that specialized Inka secretaries used *khipus* in conjunction with other media organized decimally, such as the abacal maize tablet (*yupana*) in figure 6.45.[165]

Similarities between the *khipu* and the Inka *ceque* system have been noted by several scholars.[166] A *khipu* map of the *ceque* system certainly existed at one time—Cristóbal de Molina states that he learned the toponyms, locations, and calendrical associations assigned to each of Cuzco's 328 *huacas* from a *khipu* secretary (*khipucamayo*).[167] Matienzo wrote that the Spanish chronicler Polo de Ondegardo learned of Cuzco's *huacas* from *khipus*.[168] Unfortunately, the *khipu* map of the *ceque* system has been lost, and neither Molina nor Matienzo provides enough detail to reconstruct this *khipu* map in its entirety. However, it is clear that the Inkas imposed the radial principles and functions of the *ceque* system throughout their empire.[169]

The *khipu* illustrated in figure 6.44 may be a map of the landscape organization imposed on the Ica Valley of southern Peru. According to Zuidema, there are sixty-six pendant cords separated into seven groups. The first group contains six pendants; each one may have represented one of the six *ayllus* that lived at Ica during contact times. The Inka agricultural calendar assigned place-specific rituals to social groups during the interim between the first and second zenith passages of the sun. This period is latitude dependent. At the latitude of the Ica Valley (14.5°S), there are 104 days between the two zenith passages. This is the total sum recorded by the knots on the third, fourth, and fifth pendants. It is no co-

FIG. 6.43. *KHIPU* SHOWN WITH "*CARTA*" PLACARD. Felipe Guamán Poma de Ayala's sixteenth-century letter to the king of Spain illustrated a *khipu* along with a sign that explained it as a "*carta*." The Spanish term *carta* has been used to signify maps and other documents.
Size of the original: ca. 18 × 12 cm. Photograph courtesy of the Royal Library, Copenhagen (Nueva crónica y buen gobierno, fol. 202).

164. Erland Nordenskiöld, "Calculations with the Years and Months in the Peruvian Quipus," in *The Secret of the Peruvian Quipus*, Comparative Ethnographical Studies, vol. 6, pt. 2 (1925; reprinted New York: AMS Press, 1979).

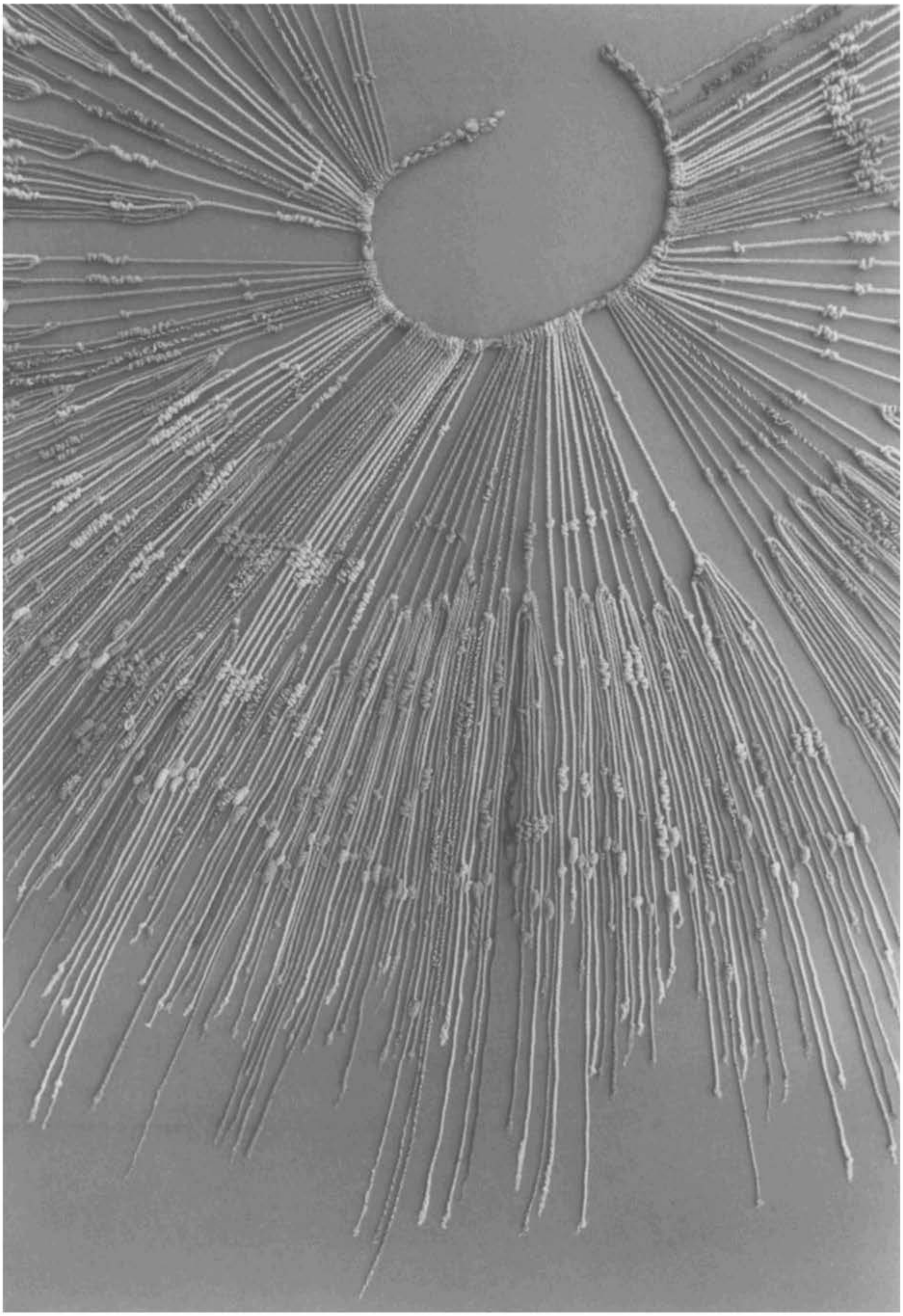
165. Henry Wassén, "El antiguo ábaco peruano según el manuscrito de Guaman Poma," *Etnologiska Studier* 11 (1940): 1–30; idem, "The Ancient Peruvian Abacus," in *Origin of the Indian Civilizations in South America*, ed. Erland Nordenskiöld, Comparative Ethnographical Studies, vol. 9 (1931; reprinted New York: AMS Press, 1979), 189–205; and Ortloff, "Surveying and Hydraulic Engineering," 70–72 (note 121). *Yupanas* have been found throughout the central Andes, and several calculation methods have been attributed to them. It may be significant that some *yupanas* have also been identified as architectural *maquetas*, perhaps signifying a geographically specific use for them. See Carlos Radicati di Primeglio, "Tableros de escaques en el antiguo Perú," and Hugo Pereyra Sánchez, "La yupana, complemento operacional del quipu," both in *Quipu y yupana: Colección de escritos*, ed. Carol Mackey et al. (Lima: Consejo Nacional de Ciencia y Tecnología, 1990), 219–34, esp. 221–27, and 235–55, esp. 242–55, and Kubler, *Art and Architecture*, pl. 163b (note 43).

166. For detailed comparisons between *khipus* and the *ceque* system see John Howland Rowe, "Inca Culture at the Time of the Spanish Conquest," in *Handbook of South American Indians*, 7 vols., ed. Julian H. Steward (Washington, D.C.: Bureau of American Ethnology, 1946–59), 2:183–330, esp. 300, and R. Tom Zuidema, "The Inca Calendar," in *Native American Astronomy*, ed. Anthony F. Aveni (Austin: University of Texas Press, 1977), 219–59, esp. 231.

167. Molina, *Fábulas y mitos*, 122–23 and 128 (note 8).

168. Matienzo, *Gobierno del Perú*, 119 (note 32).

169. Although most discussions of radial organization center on the *ceque* system of Cuzco, radial systems of thought had architectural and material manifestations throughout the Andes during the late horizon. See Hyslop, *Inka Settlement Planning*, 202–15 (note 16); John Hyslop, *Inkawasi, the New Cuzco: Cañete, Lunahuaná, Peru* (New York: Institute of Andean Research, 1985), esp. 52–56; and Jeanette E. Sherbondy, "Organización hidráulica y poder en el Cuzco de los Incas," *Revista Española de Antropología Americana* 17 (1987): 117–53, esp. 118–20.



(Facing page)
FIG. 6.44. *KHIPU* FROM THE ICA VALLEY, PERU, CA. 1500. This *khipu* records the calendrical organization of the Ica landscape and is modeled after the *ceque* system of Cuzco. The *khipu* consists of a primary string to which seven groups of strings are attached: one group of six pendants, each with its own subsidiary string; five groups of eight to ten pendants without subsidiary strings; plus a final group of three pendant strings without knots. The first group of six pendant strings is of primary interest here, since each one may represent the territory of the six known Ica Valley *ayllus*. The total value of the knots on the six pendant strings equals 104, the number of days between the first and second zenith passages of the sun at Ica. It is possible that the *khipu* is a record of *ayllu* ritual responsibilities (R. Tom Zuidema, "A Quipu Calendar from Ica, Peru, with a Comparison to the Ceque Calendar from Cuzco," in *World Archaeoastronomy: Selected Papers from the Second Oxford International Conference on Archaeoastronomy*, ed. Anthony F. Aveni [Cambridge: Cambridge University Press, 1989], 341–51, esp. 345–50).
Museo Nacional de Arqueología, Anthropología e Historia del Perú, Lima. By permission of Marcia Ascher and Robert Ascher, Ithaca, New York.

incidence that the pendants are consecutive, since they signify the topological order of *ayllus* belonging to the moiety responsible for interzenith calendrical rituals. The total value recorded in the knots of pendants six, one, and two equals 178–one unit more than the number of days in six synodic lunar months. This signifies the calendrical responsibilities of the other moiety plus a calendrical correction factor. One may read these pendants as a topological sequence when the *khipu* is laid out flat.[170]

Martti Pärssinen has proposed a second kind of *khipu* map, one not related to the Inka calendar or the *ceque* system. According to Pärssinen's hypothesis, geographic information can be numerically encoded on a *khipu*. Chroniclers note that every main town of an Inka province had an assigned number. A colonial document describes the tour of conquered provinces by Topa Inka between 1485 and 1489. This tour may be based on a native narration from a *khipu*, because the document consistently lists the location, event, and persons accompanying Topa Inka in that order–just as *khipus* always retain the same order of hierarchical categories.[171]

As illustrated in figure 6.46, the sentence, "He conquered the province of the Paltas and then the valley of Pacasmayo" can be mapped on a *khipu*.[172] Since provincial capitals are identified by numbers, the two subsidiary strands on the *khipu's* right side could record the number twenty-two for Palta and twenty-one for Chan Chan. The Pacasmayo Valley is not a provincial capital, but both the place-name and its location can still be recorded on the *khipu* by phonetically recording the Quechua syllables Pa-cas-mayo. Each subsidiary string could represent a category, such as "cultivated plants." A numerical value on that string would represent a particular item such as potatoes (*papa*).[173] The word *papa* would then be

FIG. 6.45. *KHIPU* OFFICIAL WITH *KHIPU* AND ABACAL MAIZE TABLET (*YUPANA*) DRAWN BY FELIPE GUAMÁN POMA DE AYALA. A *khipu* official displays the tools of his trade. Specialized *khipu* secretaries kept census, tribute, and production accounts and may have recorded historical events, ceremonial rites and laws, calendrical and astronomical information, and geographic narratives on their *khipus*. Historical sources indicate that *khipus* were used with other artifacts such as picture boards or *yupanas*.
Size of the original: ca. 18 × 12 cm. Photograph courtesy of the Royal Library, Copenhagen (Nueva crónica y buen gobierno, fol. 360).

linked phonetically with other words on the *khipu* to create a toponym. The Pacasmayo Valley is between Palta and Chan Chan, as signified by the joining of the Pacas-

170. R. Tom Zuidema, "A Quipu Calendar from Ica, Peru, with a Comparison to the Ceque Calendar from Cuzco," in *World Archaeoastronomy: Selected Papers from the Second Oxford International Conference on Archaeoastronomy*, ed. Anthony F. Aveni (Cambridge: Cambridge University Press, 1989), 341–51.

171. Martti Pärssinen, *Tawantinsuyu: The Inca State and Its Political Organization* (Helsinki: SHS, 1992), esp. 31–50.

172. Pärssinen, *Tawantinsuyu*, 36–37 and 45–47.

173. John V. Murra, *Formaciones económicas y políticas del mundo andino* (Lima: Instituto de Estudios Peruanos, 1975), 243–54, describes a 1561 ledger recording transactions in goods between Europeans and the Inkas. The types of categories and the sequence of items within those categories remain consistent with relatively few exceptions.

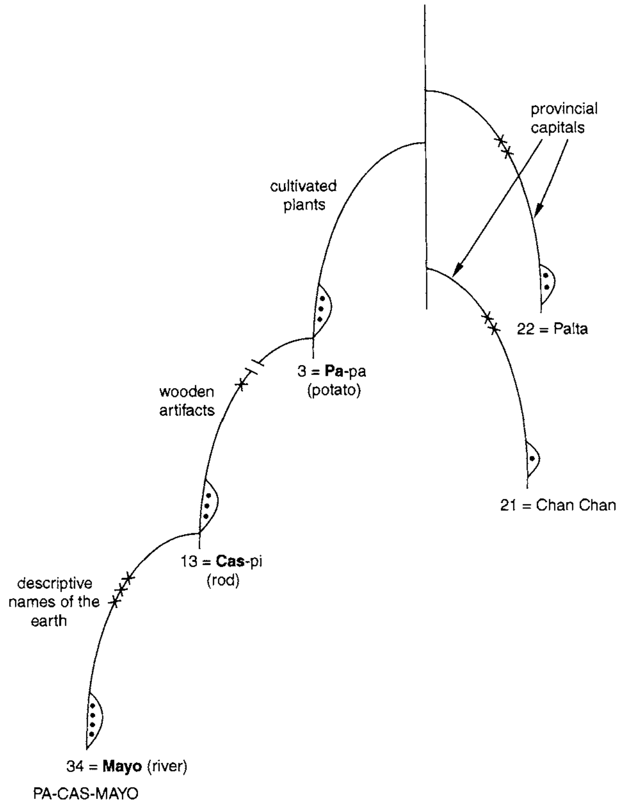


FIG. 6.46. THE *KHIPU* AS A MAP OF THE PACASMAYO VALLEY. Martti Pärssinen has suggested a method whereby the *khipu* could function as a map. The Inkas assigned numbers to all provincial capitals within the empire. Toponyms would consist of syllables derived from categories of production, culture-historical events, and many other possible geographic descriptors. Strands on the right side of the *khipu* indicate the category of provincial capitals. Numbers assigned to the capitals are represented by knots in the tens (*X*s) and ones (dots) positions. The number twenty-two is the provincial number for Palta, and twenty-one stands for Chan Chan. Each strand on the left side would correspond to a general category of goods, such as "cultivated plants." Specific items in each category would be recognized according to their assigned numbers. For instance, potato (*papa*) would be recognized by the number three on the "cultivated plants" strand. Placenames would be formed by joining the syllables of each item together phonetically, and the location of the place would be relative to the provincial capitals. Pacasmayo is between Palta and Chan Chan.
After Martti Pärssinen, *Tawantinsuyu: The Inca State and Its Political Organization* (Helsinki: SHS, 1992), 47.

mayo subsidiary strings to the pendant cord between the two strings representing provincial capitals. One can also imagine a similar system of *khipu* maps based on numbers assigned to stone markers associated with Inka highways (fig. 6.42 above) or *huacas.*

TOCAPU DESIGNS

Tocapu designs are rectangles that contain abstract geometric designs and are often arranged as a grid. *Tocapu* design blocks repeat at irregular intervals, with individual blocks probably representing specific sociopolitical groups. *Tocapu* iconography appears to express political and cosmological information.[174] Guamán Poma frequently illustrates tunics, mantles, and waistbands that display *tocapu* designs (see the waistband in fig. 6.39, for example) throughout his letter to the king of Spain.[175] Important personages wear garments with *tocapu* designs during *ceque* festivals and rituals at *huacas.*

Several sixteenth-century Spanish writers attest to the careful and exacting work that went into producing *tocapus.* They also note that *tocapu* abstractions were used with other graphic devices, and together they recorded social, historical, or other information.[176] Zuidema suggests that because certain individual blocks are miniature representations of larger textiles, the irregular repetition of blocks could reflect a "horizontal concept . . . which might lead to a geographic pattern of the actual distribution of *huacas* and their social groups."[177] The arrangement of *tocapu* designs as grids also suggests some type of geographic relation–perhaps a listing of locations analogous to Mesoamerican cadastral maps.[178]

MAPS IN NATIVE MANUSCRIPTS

Santa Cruz Pachacuti's work about Peru's ancient kings was completed in 1613. His style of writing and representation is very different from that of his Andean contemporary Guamán Poma. In Guamán Poma's letter to the king of Spain, which was primarily a plea for kinder treatment of his people by colonial overlords, he adopted certain European conventions, such as the separation of imagery and text, for his presentation of Andean life to European audiences.[179] Conversely, as illustrated in figures 6.47 and 6.48, Santa Cruz Pachacuti did not distinguish between text and image.

Figure 6.47 illustrates the house of Manco Capac, the semimythical Inka king who conquered the upper and lower kingdoms of the Cuzco Valley and founded the Inka dynasty at Pacariqtambo in the mid-thirteenth cen-

174. Zuidema, "Bureaucracy and Systematic Knowledge," 447–49 (note 141).

175. Some other examples include Guamán Poma, *Nueva crónica,* 1:90–135 and 238–57 (note 124).

176. Cummins, "Representation in the Sixteenth Century," 199–200 (note 9).

177. Zuidema, "Bureaucracy and Systematic Knowledge," 448 (note 141).

178. See Barbara J. Williams, "Mexican Pictorial Cadastral Registers: An Analysis of the Códice de Santa María Asunción and the Codex Vergara," in *Explorations in Ethnohistory: Indians of Central Mexico in the Sixteenth Century,* ed. H. R. Harvey and Hanns J. Prem (Albuquerque: University of New Mexico Press, 1984), 103–25, esp. 117–20.

179. Cummins, "Representation in the Sixteenth Century," 204 (note 9).

tury.[180] The figure portrays the welding of geographic location and ancestry that is the conceptual heart of the *ayllu*. In keeping with Andean modes of representation, the imagery stresses metaphorical associations over mimetic iconography, such as the trees for ancestry and the squares for geographical place.[181] Manco Capac's mythological house is built on the same principles as the social and territorial partitioning of Cuzco's *ceque* system and the Inka empire. The dual organization of Cuzco's moieties is symbolized by the left and right lower caves, dual descent through the silver and gold trees. The three classes of *ayllus* are represented by the division of each of the caves into three parts. Finally, the land of the four quarters is signified by the four corners of the diamond in the central square, which also defines a space in the middle, surely a reference to Cuzco.

Santa Cruz Pachacuti drew a profile view of one of Coricancha's walls and used symbols and scenes to convey the meanings encoded in the temple's architecture and its associated artifacts and civic-ceremonial rituals (figs. 6.48 and 6.49). The message of the map of Coricancha is clear–it is the focal point from which social and natural order emanates and an architectural codification fostering a spatial and temporal understanding of the Inka world. The cosmographic order of the Inkas expressed on the wall at Coricancha has been analyzed under several different, though not mutually exclusive, rubrics. These include the hydrologic cycle, gender parallelism, astronomy, and ritual.[182]

Guamán Poma's account of Andean cities and towns includes a map of the Inka realm and the Spanish conquest combining Western and native cartographic precepts (fig. 6.50).[183] His choice of map signs and organization is designed to illustrate parallels between Inka and European societies. For example, both the Inkas and the Spaniards had heraldic icons that welded landscape and lineage by their symbolism. The importance of heraldry to Guamán Poma is shown by the presence of a coat of arms in the first folio of his letter and throughout his petition. Another commonality is the organization of geographic relations by means of intersecting sets of lines, manifest in both the European system of longitude and latitude and the grid shown in figure 6.50.

Guamán Poma apparently believed that the grid, as well as the circle, was a universal form of spatial organization. His representation of the pontifical world demonstrates this point (fig. 6.51). The upper panel of the figure illustrates five towns and mountains, with the city of Cuzco labeled at the center. The lower panel shows Castilla (Spain) as a land of four parts organized around

FIG. 6.47. THE HOUSE OF MANCO CAPAC DRAWN BY JUAN DE SANTA CRUZ PACHACUTI YAMQUI SALCAMAYHUA, 1613. This figure combines Inka ancestral mythology with Inka spatial conventions. Santa Cruz Pachacuti illustrates the "house" of Manco Capac–founder of the Inka royal family–as the cave from which he, his three brothers, and their wives all emerged and began their journey to establish the Inka empire. The windows of Manco Capac's house (three squares) represent the three openings of the Tampu T'oco cave, identified in Inka oral traditions. The location of these caves is probably at Pacariqtambo, about thirty-five kilometers south of Cuzco. The silver tree on the left signifies Manco Capac's maternal ancestry, and the golden tree on the right represents his paternal lineage. The text describes the golden tree as a house and the silver tree as a *huaca*. Manco Capac's right to rule is created from the union of his house (golden tree), or human occupation of the land, with the land itself (silver tree) (R. Tom Zuidema, *Inca Civilization in Cuzco*, trans. Jean-Jacques Decoster [Austin: University of Texas Press, 1990], 9). Photograph courtesy of the Biblioteca Nacional, Madrid (Signatura MS. 3169, fol. 8v).

180. The Pacariqtambo myth contains a wealth of information concerning specific places and geographic relations. Urton identifies Tampu T'oco with the archaeological site of Pumaurqu and believes that the modern town of Yarisque represents the mythical Haysquisrro. In one version of the myth, ten sociopolitical groups follow Manco Capac from Tampu T'oco. Their names and houses are synonymous with the Inka classes that managed Cuzco's irrigation districts. The Pacariqtambo myth, and also the map of Manco Capac's house, well illustrate the intertwining of myth and history that dominates Inka oral traditions and representations. Pacariqtambo is also an important *huaca* in the Cuzco *ceque* system. See Gary Urton, *History of a Myth: Pacariqtambo and the Origin of the Inkas* (Austin: University of Texas Press, 1990), 18–40; Zuidema, *Inca Civilization*, 10–22 (note 137); and Rowe, "Shrines of Ancient Cuzco," 47 (shrine Co-6:7) (note 131).

181. Cummins, "Representation in the Sixteenth Century," 202–4 (note 9).

182. See, for example, John Earls and Irene Marsha Silverblatt, "La realidad física y social en la cosmología andina," in vol. 4 of *Actes du XLII^e Congrès International des Américanistes (1976)* (Paris: Société des Américanistes, 1978), 299–325, esp. 318–23; Sherbondy, "Irrigation and Inca Cosmology," 348–49 (note 134); Irene Marsha Silverblatt, *Moon, Sun, and Witches: Gender Ideologies and Class in Inca and Colonial Peru* (Princeton: Princeton University Press, 1987), 40–47; Zuidema, "Catachillay," 212–15 (note 133); R. Tom Zuidema and Gary Urton, "La constelación de la Llama en los Andes peruanos," *Allpanchis*, no. 9 (1976): 59–119, esp. 61–67 and 109–10; Urton, *At the Crossroads*, 129–34 (note 14); and Bauer and Dearborn, *Astronomy and Empire*, 118–21 (note 138).

183. Guamán Poma, *Nueva crónica*, 3:1075–1161 (note 124). See also J. B. Harley, *Maps and the Columbian Encounter: An Interpretive Guide to the Travelling Exhibition* (Milwaukee: Golda Meir Library, 1990), 137–39.

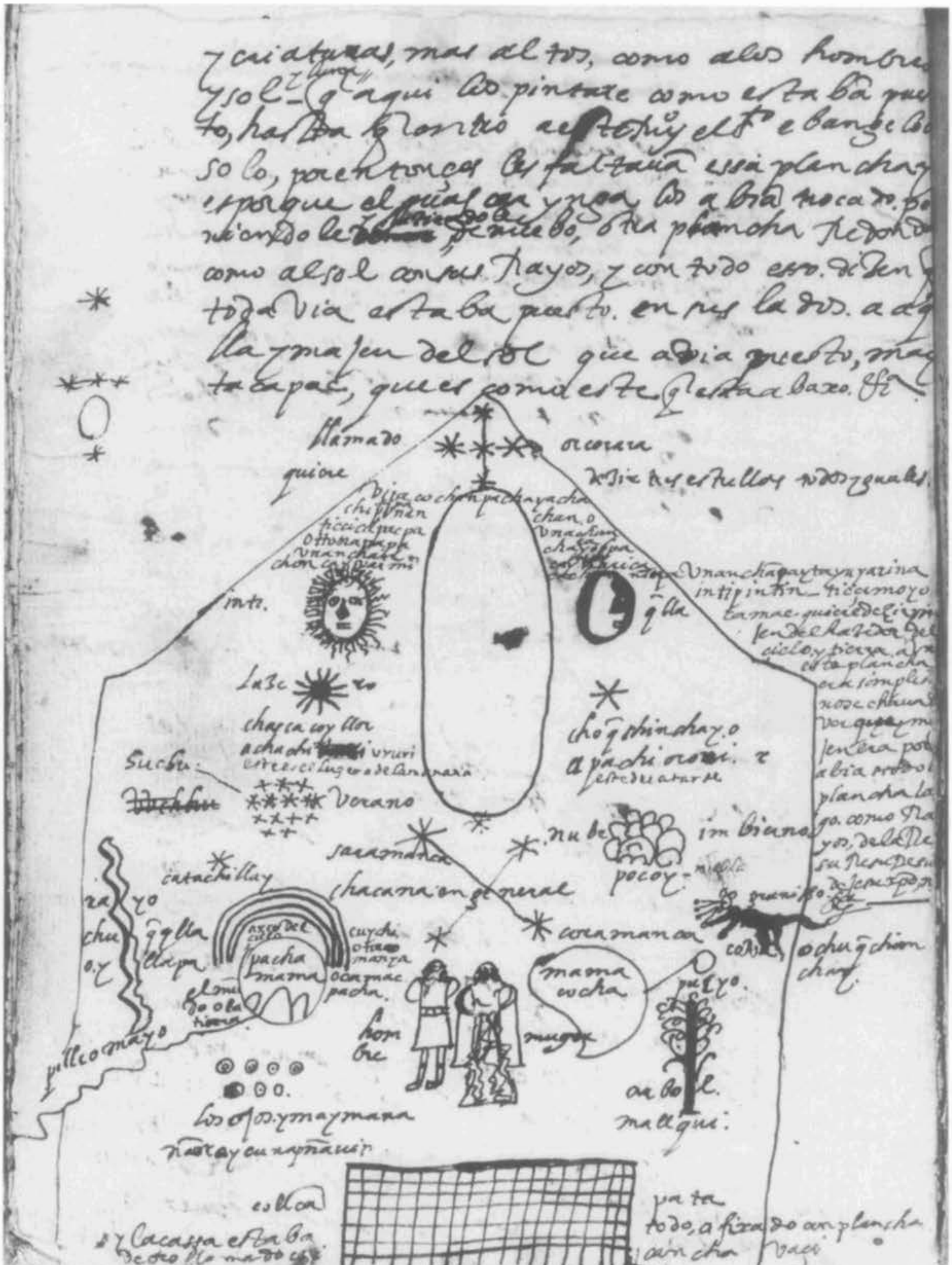


FIG. 6.48. THE TEMPLE OF CORICANCHA, 1613. Native chronicler Juan de Santa Cruz Pachacuti Yamqui Salcamayhua drew this profile view of one of Coricancha's walls to illustrate how the Inkas spatially and socially ordered their environment. See figure 6.49.

Photograph courtesy of the Biblioteca Nacional, Madrid (MS. 3169, fol. 13v).

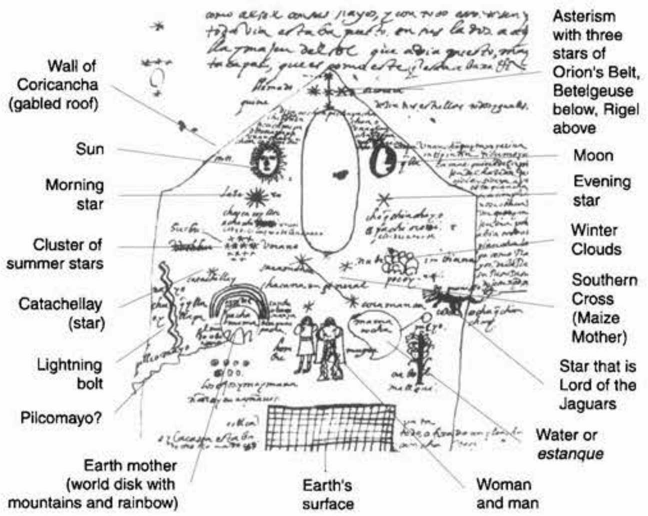


FIG. 6.49. THE SYMBOLISM OF THE WALL AT CORICANCHA (FIG. 6.48). Nine of the symbols and scenes identified in figure 6.48 are astronomical and include representations of the sun, moon, planets (the morning star and evening star), single stars, asterisms, and constellations. The Pillcomayo River (Pilcomayo?) flows from a representation of the *pacha mama,* or earth mother. The earth is shown as a disk, rotated to aid its identification, with mountains illustrated in profile. Above the Pillcomayo is a lightning bolt. At the base of the temple a man and woman stand above a grid representing the surface of the earth. To the right of the woman is a representation of water, or more likely a reservoir (*estanque*) for an irrigation system.

a powerful center just as the four Inka *suyus* are organized around Cuzco in figure 6.50. Two panels are stacked in a manner reminiscent of the dual division of Cuzco (see fig. 6.38 above). It is the Andean world that occupies the position of *hanan* Cuzco, the locus of power in Inka times. Perhaps this upper and lower ordering of Cuzco and Castilla symbolizes indigenous resistance to colonial rule.

Conclusion

Geography, history, social relations, kinship, astronomy, and mythology were all intertwined in Andean culture at the time of the Spanish conquest. Such cultural complexity, coupled with the enormous Inka administrative duties over a huge area, necessitated an accommodating and highly abstract system for charting real and imagined worlds. Yet the systematic expression of spatial knowledge was in place in the central Andes long before the Inkas. Since Chavín times, various manifestations of Andean cultures have been recognized: territorial access to land, resources, water, and agricultural landscapes; the redistribution and trade of precious and staple goods; militarism; labor obligations to elite personages; and the invoking of preterhuman and extramundane forces to influence the world order.

Researchers have only rarely broached the subject of maps in their analyses of Andean symbol systems and representations. Indeed, how does one recognize a map when the rules of graphic representation and the conception of geographic relations are so very different from the European experience? In this chapter modern ethnographic analogies have been used to develop possible themes of Andean spatial representation. The welding of society and landscape in the concept of the *ayllu,* the use of ancestors and *huacas* to legitimize the territorial order, the abstraction of landscape into a single object or sign, and the geometric structuring of geographic relations are all critical to understanding the role of spatial representation and landscape depiction in central Andean cultures.

The organization of signs and icons into radial, parallel strip, or gridlike geometries can structure the representation of geographic relations in Andean thought. These geometric structures are found in agricultural landholding patterns and are inspired by bioclimatic life zones and celestial movements. Parallel strips are the most common geometric structure found in Andean spatial representations. This structure has an early expression in the two caimans of the Tello Obelisk and some of its stacked figure panels. Other examples include the four parallel strips representing *ayllu* landholdings on the Paracas polychrome mantle and the two parallel strips of figure panels symbolizing elements of *uma* and *urco* on the Bennett Stela. The use of parallel strips to illustrate geographic relations is well documented in ethnography, as illustrated by the location of rivers and canals on modern peasant maps of the shores of Lake Titicaca, the vertical and horizontal design bands on Quinua ceramics, a Qheswa *pallay* textile signifying agricultural zones, and the differentiation of mountains from valleys and exterior from interior worlds on Q'ero *pallay* textiles. Parallel strips represent the sequential arrangement of *ayllu* landholdings in *chhiutas* mapping rites in Pacariqtambo.

The grid forms a conceptual subcategory of parallel strips. An early archaeological manifestation of the grid is the block of severed heads as souls signifying agricultural landholdings on Nasca chieftain vessels. The grid is closely related to Inka decimal organization, as reflected in the abacal maize tablet (visible in figure 6.45) and in *tocapu* designs. Santa Cruz Pachacuti represents the surface of the earth as a grid in his drawing of the temple at Coricancha, and Guamán Poma's *mappamundi* demonstrates conceptual parallels between the European use of longitude and latitude and a grid.

The Nazca ray center geoglyphs are perhaps the earliest archaeological expression of radial landscape organization, although the Inka *ceque* system is the most fa-


933
934
MAPA·MVNDI·DE·REINO·DELAS·INS
MAR
HACIA·EL DERECHO DE LA ORDE NORTE
OTRO REINO·LLAMADO·COLLASVIO·SALES
OTRO REINO·LLAMADO·CONDESVIO·HACIA LA MAR·DE·SVR·LLA
OTRO REINO·LLAMADO·CHINCHAISVIO·PVNISOL

(Facing page)
FIG. 6.50. MAP OF THE INKA EMPIRE DRAWN BY FELIPE GUAMÁN POMA DE AYALA. Guamán Poma's map of the Spanish conquest of the Inkas incorporates both Inka modes of representation and Western cartographic conventions. The four quarters of the Inka empire (Antisuyu, Collasuyu, Condesuyu, and Chinchasuyu) are clearly labeled, reinforcing Inka spatial divisions. The intersecting parallel lines are an obvious–though misplaced–reference to the European system of longitude and latitude. Coats of arms lie adjacent to cities. At the bottom of the map are Spanish ships and the fanciful sea creatures so often depicted on sixteenth- and seventeenth-century European maps. Guamán Poma's map serves as a link between these two cultures.
Size of the original: ca. 18 × 24 cm. Photograph courtesy of the Royal Library, Copenhagen (Nueva crónica y buen gobierno, fol. 983–84).

mous. The Inkas adjusted *ceque* system principles to local geographic and social conditions, as shown by the *khipu* from the Ica Valley that maps the calendrical organization of the Ica landscape. An interpretive drawing of a textile motif illustrates the radial organization of agricultural landholdings by elevation in the Q'ero Valley. Such a radial organization in society usually exists as an ideal today, as illustrated by the *ayllu* landholdings in San Andrés de Machaca, Bolivia.

Performance is a critical component of Andean spatial representation, as reflected in mapping rites. There are many ethnographic examples of such rites, during which an ephemeral map is often made by arranging amulets around a geographic referent or spiritual portal. Ground drawings may also act as a geographic referent in mapping rites. The *chhiutas* rite in Pacariqtambo, Chuquito weather and fertility rites, and Kaata afterlife rites are but a few examples that illustrate the range of performance mapping. Topa Inka arranged amulets representing prominent mountains as an ephemeral map of the Cuzco Valley during a weather rite, and ancient peoples performed a variety of mapping rites on the giant Nazca geoglyphs.

Monuments depicting geographic relations or objects may also have served as geographic referents during ancient mapping rites. Examples include the Tello Obelisk, the Bennett Stela, and *huacas* or carved stone landscapes in the Inka *ceque* system. House models and *maquetas* are common in the archaeological record and are perhaps analogous to Chuquito mapping amulets. Examples of mapping amulets include house models, landscape vessels, *maquetas,* and the mountain spirit amulets depicted in Topa Inka's weather rite.

Since membership in an *ayllu* is often based on real or fictive descent, depicting ancestors is one important way of representing and thus legitimizing territorial access and landholdings. Ancestor imagery is strongly developed along the south coast of Peru, as reflected in the masks

FIG. 6.51. THE PONTIFICAL WORLD DRAWN BY FELIPE GUAMÁN POMA DE AYALA. Guamán Poma adopts Western rules of mimetic naturalism to identify the places and regions of the pontifical world. However, he retains the geometry that Andean peoples have used for millennia to illustrate geographic relationships, such as the quadripartitioning of space around a powerful center and the ordering of social and territorial space into "upper" and "lower" positions.
Size of the original: ca. 18 × 12 cm. Photograph courtesy of the Royal Library, Copenhagen (Nueva crónica y buen gobierno, fol. 42).

found on a Paracas vessel that differentiated households, the Paracas spirit map, and the severed head as soul motif representing *ayllu* landholdings. The cultural importance of ancestors is independent of political bureaucracy, as illustrated by the drawing of the house of Manco Capac and the depiction of Inkarri on a modern Q'ero textile.

Representations of people and animals are often metaphors for the idealized landscape. Caimans represent the realms of earth and sky on the Tello Obelisk. Protrusions on the Nasca chieftain vessel correspond to Andean metaphors for topographic features affecting the flow of water, and carved boulders often depict animals, which may correspond to toponyms or specific resource zones.

Andean artifacts and representations are rarely analyzed as geographic representations or as symbolic manifestations of Andean spatial thought. The purpose of this chapter is to open the door to the possibility that this interpretation can shed light on the conceptions of geographic relations in Andean thought, presented in the context of Andean cultural ecology and cultural history.

7 · Indigenous Cartography in Lowland South America and the Caribbean

NEIL L. WHITEHEAD

This chapter will consider the traditions of spatial representation, as well as geographical conceptions expressed in European maps, of the indigenous cultures of the Caribbean and lowland South America. This vast region (fig. 7.1) includes a wide range of cultural traditions, languages, and social forms represented here by examples from all the major cultural-linguistic groups of the lowland region–Carib, Arawak, Tukano, Gê, and Tupi-Guarani. Materials from independent or isolated cultural-linguistic families such as the Warao are also included, since it is sometimes hypothesized that they represent the descendants of the most ancient migrants into the Americas.

As a result of the colonizing of South America, many native societies and traditions were utterly destroyed, especially the more complex polities that once existed in the Amazon and Orinoco basins. During the period of colonial occupation, beginning with Columbus in the Caribbean and continuing to the end of the nineteenth century in Brazil, native peoples informed colonial cartography, resulting in a mingling of indigenous and European conventions of spatial representation. With the exception of celestial and cosmographical maps occurring as pictographs, everything we know about lowland South American and Caribbean cartography has been gleaned during the process of Western contact or inferred from modern ethnographic studies. This procedure is not always satisfactory, for it would be antihistorical to overlook the importance of European colonization in affecting indigenous traditions or to project modern practices onto past societies. Nonetheless, the probable intricacy of those past traditions is at least exemplified in the continuity of their practice up to the present. We can certainly appreciate, through modern analogy, the links between the mapping of physical space and the constitution of social space, as well as the preeminent role of the priest-shamans in constructing the moral order by manipulating the cosmological order. When we are told in the historical sources that celestial observation and interpretation were the special responsibility of the priestly caste, we may properly infer that the mapping of physical space was both an arcane skill and one that conveyed political power. This suggests that the precolonial range of cartographic practice must have been far broader than we can now reconstruct. These societies certainly had refined calendrical and astronomical traditions, as well as a capacity for intricate spatial representation.[1]

Because these native traditions unfolded over a long period, however, we cannot speak of a single native cartographic tradition; rather, we must address the various ways widely distributed spatial conceptions were encoded and articulated, particularly as temporal and social constructs. Contexts included architecture and craft design, the view of the sky as a reflection of terrestrial relationships, and strictly prescribed dance and chant patterns.

Cartography and map are here understood in the broadest sense, for spatial representation on paper was not part of native tradition before the introduction of European cartographic methods. This does not indicate any lack of spatial knowledge on the part of the indigenous population or an absence of an active interest in its representation. Indeed, the earth and sky were actively mapped through a wide variety of mediums including rock carving and painting, basketry, woodworking, dance, chant, personal adornment, and architecture.

Three types of indigenous mapping are considered. The first category consists of celestial maps of the day and night sky. They are closely related to cosmographical mapping, usually depicting the content of shamanic visions during the flight of the soul over distant regions or representing the spatial relationships encoded in telluric lore. A central theme is the linking of earth and sky in a complex cosmographical system in which the layout of terrestrial features is closely reflected in star patterns in the heavens.

The second category consists of historical reports of indigenous mapmaking commissioned by Europeans eliciting geographical information for a number of purposes, including missionary work, military conquest, boundary demarcation, and the continuing search for various natural resources such as minerals, cacao, and rubber.

1. See the collection of articles in Anthony F. Aveni and Gary Urton, eds., *Ethnoastronomy and Archaeoastronomy in the American Tropics* (New York: New York Academy of Sciences, 1982).

FIG. 7.1. REFERENCE MAP OF LOWLAND SOUTH AMERICA AND THE CARIBBEAN.

Such information was sometimes literally extracted under threat of death or torture, but it was also freely offered and, no doubt, biased by native informants to suit their own purposes.[2] More recently, ethnographers and anthropologists have solicited maps by native peoples in order to study indigenous conceptions of the earth and cosmos.

Although such borrowings are not strictly indigenous mapping, it is also helpful to introduce the ways native spatial ideas were incorporated into European maps, since they provide a context for understanding indigenous cartography. These form the third category. A particular interest in the graphic depiction of telluric spatial relations has stemmed largely from the colonial curiosity of Western observers. This class of extant examples of native cartographic ideas expressed in two-dimensional picture form is derived from the inclusion of native telluric descriptions in the cartography of Europeans. However, these additions are by no means minor and often formed the basis of European cartography of the region for centuries. For example, the vast inland lake of Parime, on whose shores sat Manoa, the golden city of El Dorado, remained a feature of European maps until the mid-nineteenth century.

Maps are tokens of power, so the inclusion of native information on European maps also reflects a negotiation of power relationships, whose outcome is a matter for specific investigation in interpreting these and other visual historical sources. Indeed, such activities repeat themselves across this region and up to the present, where the success of government agencies charged with the contact and incorporation of isolated native groups, such as the Fundação Nacional do Índio (FUNAI) in Brazil, still relies on indigenous geographical knowledge.

Theoretical Considerations

Maps are also tokens of particular kinds of social relations between individuals and their environment. In the Americas, early European mapping was driven by the "plotting" of private property or the pragmatics of navigation rather than constituting disinterested mapping of a new geographic space. Accordingly, sometimes conventional north orientation was ignored or river courses were rendered only schematically. The kind of information included could range from the geographic to the mythical, the ethnological to the sociological, depending on the reasons for making the map in question. The discussion of these variations in European mapping and their meaning is not properly part of this chapter, but such considerations do underline that the types of maps familiar to the Western tradition are produced only from very particular social and cultural contexts. In lowland South America and the Caribbean, certain distinctions between land and water may have been vital to European seaborne navigators but not necessarily important to those already familiar with the lowland South American environment. In this sense the need for cartographic representation of the kind the Europeans initiated was largely superfluous to native cultures that were already "at home."

The redundancy of cartography, except in particular historical and social contexts, is evident from the ways a lived space is mapped. In lowland South America this redundancy is enhanced by the topographical uniformity of the environment, but it also entails that space is usually mapped from a subject's particular location at that time–there is no extratemporal or extraspatial "viewpoint" from which a European-style map might be envisioned. The following example, from the Achuar in Ecuador, allows us to appreciate this point.

2. For example, the Arawak of the Atlantic coast of the Guianas were specifically recruited at the end of the sixteenth century to give geographical orientation and guidance to Spanish punitive expeditions against their rivals, the Carib. But Carib constituted a political category for the Arawak, so their identifications reflected not the outcome of some form of dispassionate exercise in ethnology, but the power relations pertaining among the indigenous population at that time, represented in ethnological form. Equally, earlier European exercises in ethnological mapping of the Carib, though never given a final cartographic expression as artifact, strongly reflected the prejudices of non-Carib native leaders.

In Achuar culture, the concepts of right and left are used only to indicate an immediate and relative position, longer distances being expressed in the time it takes to cover them.[3] Beyond a local destination, travel time is counted in days or simply becomes "very far," since the events of a temporally extended journey are unpredictable. Distance is measured for architectural purposes but not for travel. To give directions to a place that has not been visited before, people use a system of landmarks that are common across the Achuar habitat and can be read by anyone. Waterways are structuring elements of this system, but their use as landmarks requires individual experience of at least a section of that system. By these means, any Achuar can delineate a portion of the network, either in linear fashion, by enumerating successive rivers, or transversely, as if the rivers were being crossed while walking. A given settlement, necessarily built along a waterway, is therefore easily found because it can be fixed by using these riverine coordinates. Away from this system, more arcane markers are used to map the environment: a peccary wallow, a salt lick, a source of pottery clay, or stands of notable flora. Landmarks like these are recounted by returning hunters and help to build and sustain an active knowledge of the spatial characteristics of the environment. Perhaps just as important, "getting lost" is not the disaster it would be to those culturally dependent on cartographic representation. In the absence of this kind of mapping, basic survival skills and orientation techniques are sufficient to see most travelers home. For the Achuar it is not the course of the sun that provides this basic orientation but the direction of flow of the waterways, which follow an overall northwest-southeast direction. Geographical knowledge is thus always socially embedded. Without the persistent political need of European colonizers to produce internal delineations of subject populations or representations of external and unfamiliar ones, native mapping in lowland South America and the Caribbean took on different forms.

In this overview it is not possible to treat all cases of native cartography in sufficient depth to render that cartography intelligible to the external observer. To appreciate the meaning and content of native maps, we must also appreciate the set of ideas about the sky, sea, and land that activates indigenous interest and know how those ideas about physical objects and places are intimately connected to evaluations of the role of humans in the cosmos. The contrast between modern Western and native South American conceptions might be best summed up by emphasizing that for native South Americans the cosmos and its order constitute a joint project of humanity and divinity. This order may be read from the celestial vault, from the form of the land and its waters, and from a knowledge of the proclivities of gods and humans. For these reasons, indigenous cartography is largely directed to ends other than geographic representation; the geography of the natural environment is mapped only as an incidental product of this much wider delineation of intellectual and physical space. Without the motivation for abstracted geographical representation, a "place" is seen as coextensive with an "event," and nothing is represented if it does not have present or particular significance. In other words, "nowhere" is precisely *where nothing happens.* The concept of place, like the concept of event, is culturally dependent; thus we will see in this chapter that native South American ideas show radically different space-time understandings that challenge a rationalist tradition of opposing the "real" and the "imagined."

For just these reasons, it is relevant to distinguish the conception of spatial relationships and their representation in a variety of forms, such as dance, music, and words, from a restricted definition of cartography as the practice of rendering those representations in graphic form. A more adequate definition of cartography needs to express not just the presence of geographical knowledge but also cosmographical or biographical information, such as the soul flight of shamans or the passage and pathways of gods, heroes, and ancestors.

For heuristic purposes, the types of native representation that have cartographic content might be divided into marking natural spaces with special positional importance as cultural places and representing such cultural places in a cartographic manner. Marking natural space as cultural place would, for example, include sites of special sociopolitical significance. The Arawak (Lokono) of northeastern South America use the kumaka tree to mark settlement sites, because this was the tree the ancestor Loquo sat under as the clans were created.[4] Places of special cosmological significance are also marked by reference to geographical features. These sites include the equatorial line, caves that are the abodes of important divinities, and places of ritual practice, such as dance areas. Finally, waterfalls and pools, as well as the savannas between forest stands, are denoted as places of ecological importance by petroglyph assemblages that enumerate faunal resources or portray fish species and how they are caught. By the same token, cultural places are also part of habitat and are marked sociopolitically. This is reflected in the way people's bodies are painted, cut, or dismembered in order

3. The following discussion of Achuar culture draws on Philippe Descola, *In the Society of Nature: A Native Ecology in Amazonia,* trans. Nora Scott (Cambridge: Cambridge University Press, 1994), esp. 62–67.

4. The term "Arawak" refers to a cultural-linguistic group spread across the entire northern part of the continent. "Lokono" refers to a particular ethnic group living today on the coasts of Guyana and Suriname. See Everard Ferdinand Im Thurn, *Among the Indians of Guiana: Being Sketches Chiefly Anthropologic from the Interior of British Guiana* (London: Kegan Paul, Trench, 1883).

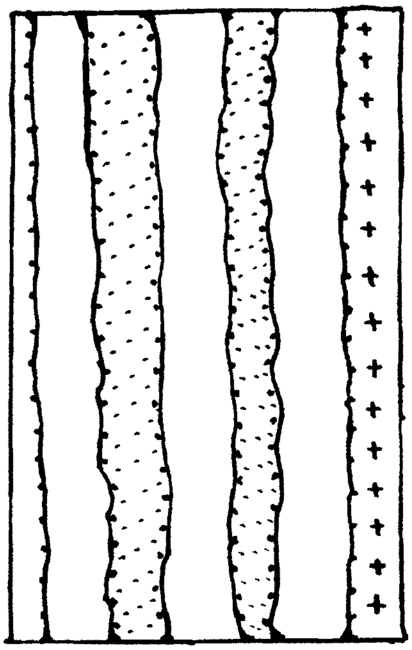


FIG. 7.2. THE STAR PATH (MILKY WAY). This representation of the Milky Way as a series of bands of stars strongly suggests the image of streams of semen; the personages of the celestial vault are the original procreators of the cosmos. The rightmost band shows individual stars, while the other bands suggest "milkiness." The pattern incorporates stylistic elements that are repeated in a variety of mediums, including basketry and drumheads. Drawn by Catherina Koloi, Kariña (Carib) of the Maroni River (Suriname).
From Edmundo Magaña, *Orión y la mujer Pléyades: Simbolismo astronómico de los indios kaliña de Surinam* (Amsterdam: Centre for Latin American Research and Documentation, 1988), fig. 2. By permission of Ren Spoelstra.

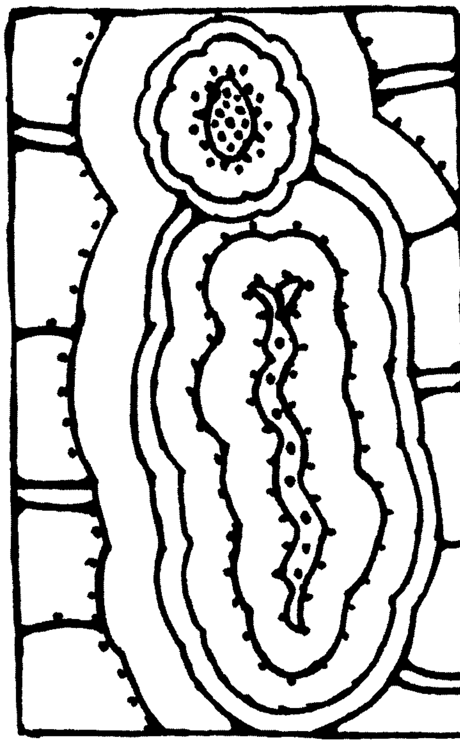


FIG. 7.3. THE BOA AND THE PLEIADES. The boa–or sometimes the celestial anaconda–is seen in the constellation Scorpio and is generally identified with aspects of male sociality (see fig. 7.5 below). In contrast, the Pleiades group is associated with the female, and the mapping of the constellation's yearly appearance, which coincides with the onset of the rains, is an example of the cosmological ordering of ecological relationships. The sexual conjunction of boa and the Pleiades, implied by the approach of the boa (at bottom) to the Pleiades (at top), alludes to the way terrestrial humans reproduce the celestial society of divinities. Drawn by Catherina Koloi, Kariña (Carib) of the Maroni River (Suriname).
From Edmundo Magaña, *Orión y la mujer Pléyades: Simbolismo astronómico de los indios kaliña de Surinam* (Amsterdam: Centre for Latin American Research and Documentation, 1988), fig. 17. By permission of Ren Spoelstra.

to express cosmological ideas, the ways houses and villages are laid out, and the way material products such as ceramics and basketry use motifs that encode aspects of spatial relationships, particularly celestial ones.

Native Celestial and Cosmological Mapping

The sky, both day and night, is perhaps the physical feature most constantly mapped by indigenous people. Its significance, however, derives not from heliocentric ideas of the cosmos, as expressed in Western thought, but from an appreciation and close observation of this source of life-giving solar light and heat and the rains that so strongly mark the tropical forest environment. In view of this significance and the behavior of the sky's inhabitants–the stars, moon, and sun–the relations between the people, animals, and plants on earth are often understood or represented by reference to celestial phenomena.

Broadly speaking, the mapping of celestial entities is socially encoded in myths about the movement of heavenly bodies, in the layout of houses and villages, and in material artifacts, particularly basketry. In fact, all three media are synergistic, in that they simultaneously validate the production of celestial motifs in each cultural field while the ostensive mapping of the movement of celestial bodies is "explained" by reference to their cultural analogues.

For example, constellations are visualized as animals or persons, and their adventures are intimately linked to everyday concerns and interests. These adventures are related as star lore, but the acuity with which celestial observation is interlaced with sociological commentary belies the apparent simplicity of each story's particular cartography (figs. 7.2–7.4). In this way the movement of celestial bodies is assimilated to the behavior of the beings

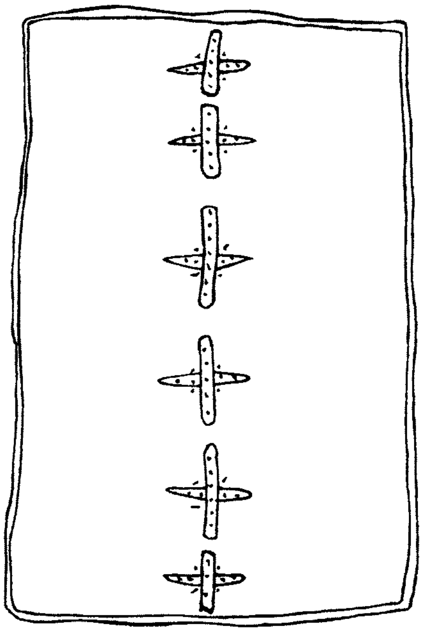


FIG. 7.4. THE PLEIADES. In addition to the associations mentioned in fig. 7.3, the Pleiades group is also configured within more local cultural tradition and is shown here as a pattern of individual stars. Obviously, enumeration is not central to this image (there are only six stars, not seven); rather, the essential representational feature is their disaggregation (in contrast to fig. 7.3 above). In the Carib legend of Tumong, the constellation represents his scattered entrails. Murdered by his brother, who desired his wife, Tumong's ghost haunts the brother until he is reburied and his entrails are scattered. The crime of fratricide, a threat to the fundamental male relationship of brothers, is linked to the celestial origins of the Pleiades. Drawn by Theresia, Kariña (Carib) of the Maroni River (Suriname).
From Edmundo Magaña, *Orión y la mujer Pléyades: Simbolismo astronómico de los indios kaliña de Surinam* (Amsterdam: Centre for Latin American Research and Documentation, 1988), fig. 18. By permission of Ren Spoelstra.

of the earth, and myths narrate their histories.[5]

For native groups from the Caribbean to southern Brazil and Paraguay there are recurrent mythical and symbolic motifs.[6] For example, the myths of the origins of the constellations Canis Major, the Pleiades, and Orion center on the symbolic adventures between humans and cosmos. A woman steals from her son-in-law (the fish trap constellation) and is dismembered by an alligator so that her head goes to the sky to become the constellation Canis Major; a woman takes a tapir for a lover and becomes the Pleiades; and a man has his leg cut off by his wife or her brothers and becomes the constellation Orion. However, there are also some consistent variations in the identification of these characters with particular constellations, as well as the introduction of other celestial actors such as the boa seen in the constellation Scorpio.[7] The boa motif is also used to encode social status (fig.

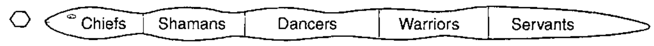


FIG. 7.5. MYTHIC BOA, NORTHWESTERN AMAZONIA. The mythic boa is used to symbolize the hierarchy of chiefs, shamans, dancers, warriors, and servants in Tukano society. The figure shows the way visual analogies are mapped between the cosmological, zoological, and sociological features of the world. The hexagon placed at the head of the boa symbolizes the solar energy that sustains the universe and thus the ranked approach of Tukano society to its source.
After Gerardo Reichel-Dolmatoff, "Algunos conceptos de geografia chamanistica de los índios Desana de Colombia," in *Contribuições à Antropologia em homenagem ao Professor Egon Schaden* (São Paulo: Coleção Museu Paulista, 1981), 255–70, fig. 2.

7.5). Finally, although all stars are said to be people, not all are identified as significant in this way.[8] Of those that are, most lie along the Milky Way or "star path," itself distinguished from the path of the sun. In this manner, the heavens are populated by both personages and their accoutrements (figs. 7.6–7.8).

In addition to providing a mythological reference, there are also more direct physical modes in which celestial and social processes are integrated. This integration is evident in the east-west layout of villages, the encoding and placing of village structures in accordance with the daily movement of celestial entities, the cardinal directionality of ceremonial processions, the movement of men to different houses in the village during their life cycles, the location of particular kinship units within the village, and the coordinated positioning of villages that exchange marriage partners.[9]

Among the Desana of the northwest Amazon, origin myths refer to the "search for the center" or the "center of the day."[10] A culture hero carries a staff to search for

5. For an example of the links between celestial myth and social practice, see Stephen Michael Fabian, *Space-Time of the Bororo of Brazil* (Gainesville: University Press of Florida, 1992), 125–40.

6. See Claude Lévi-Strauss, *Le cru et le cuit* (Paris: Plon, 1964), and idem, *Du miel aux cendres* (Paris: Plon, 1966).

7. Edmundo Magaña, *Orión y la mujer Pléyades: Simbolismo astronómico de los indios kaliña de Surinam* (Amsterdam: Centre for Latin American Research and Documentation, 1988).

8. A good example is found in the regional astronomy of the Kapon and Pemon. Although the stars and constellations are personified, their significance lies in their climatological influence. See Audrey Butt Colson and Cesáreo de Armellada, "The Pleiades, Hyades and Orion (Tamökan) in the Conceptual and Ritual System of Kapon and Pemon Groups in the Guiana Highlands," *Scripta Ethnologica: Supplementa* 9 (1989): 153–200.

9. For a discussion on the integration of social and spatial processes of two groups from Mato Grosso, central Brazil, see Fabian, *Space-Time,* 37–63 (note 5), and Thomas Gregor, *Mehinaku: The Drama of Daily Life in a Brazilian Indian Village* (Chicago: University of Chicago Press, 1977), 35–62.

10. Gerardo Reichel-Dolmatoff, "Astronomical Models of Social Be-

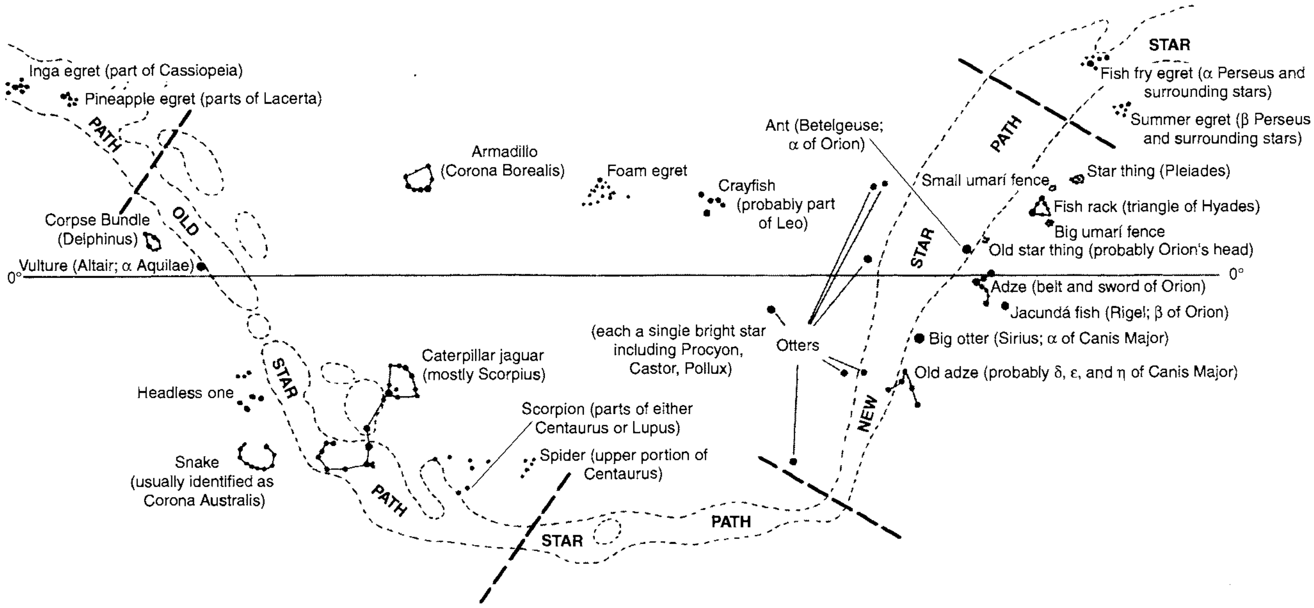


FIG. 7.6. CONSTELLATIONS OF BARASANA ASTRONOMERS. Both figures 7.6 and 7.7 illustrate the intensity with which the night sky is studied and mapped by the Tukano and other Amazonian peoples. This figure identifies the positioning of the uniquely identified constellations of Barasana astronomers. The manner of identification gives us a sense of how the movements of these celestial bodies are incorporated into wider myths that treat the interconnections among people, society, and cosmos.
After Stephen Hugh-Jones, "The Pleiades and Scorpius in Barasana Cosmology," in *Ethnoastronomy and Archaeoastronomy in the American Tropics,* ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 183–201, fig. 1.

the spot where it will not cast a shadow and eventually is able to place it on the equatorial line; it is here that the old-time people located themselves.[11] The staff is also envisioned as a shaft of sunlight that falls into a womblike lake and thereby fertilizes the earth, becoming the point where a cosmic sexual contact takes place and around which life on earth subsequently develops. The model for this structured space is found in the sky and consists of a huge hexagon, which also recalls the magic rock crystals that are central to shamanic practice, formed by the stars Pollux, Procyon, Canopus, Achernar, τ_3 Eridani, and Capella.[12] This celestial hexagon is in turn projected onto the earth, where it plots the territories of the social units of Tukano society. The native image is of a giant transparent rock crystal that stands upright on the earth, its six corners formed in the sky by the stars mentioned above, and on earth by six waterfalls in Tukano land. In addition, two major waterfalls, Ipanoré and Jirijirimo, are at the two intersections of the equator with the base of the hexagon (fig. 7.9). The central axis of the crystal tower is the line between ϵ Orionis and a large rock covered in petroglyphs, the rock of Nyí (fig. 7.16 below), at a spot where the equator crosses the north-south flowing Piraparaná River. This crystal axis is then envisioned as a phallic staff that joins the male sky to the female earth. The hexagonal pattern is also repeated in the ideal distribution of the various Tukano social units and the location of the intermarrying clans within those units. The image of the phallic or shamanic staff as a direct conduit and connection to the world above is a prevalent feature of native spatial organization and becomes the basis for a variety of symbolic transformations expressed in various mediums, such as funerary ware and the orientation of burials.[13]

Architecturally, the ideas just described are found in the design of the longhouse, whose structure and location provide a good example of how physical structures integrate celestial and social processes (fig. 7.10). The six

havior among Some Indians of Colombia," in *Ethnoastronomy and Archaeoastronomy in the American Tropics,* ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 165–81, esp. 167.

11. The notion of "old-time" or "first-time" people occurs frequently in indigenous historical accounts as a rhetorical device that marks the beginning of "real" history or the history of the people in question. See Richard Price, *First-Time: The Historical Vision of an Afro-American People* (Baltimore: Johns Hopkins University Press, 1983), 6–8, and Neil L. Whitehead, ed., *The Patamona of Paramakatoi and the Yawong Valley: An Oral History* (Georgetown, Guyana: Hamburgh Register Walter Roth Museum of Anthropology, 1996), 5–9.

12. The following description of the Tukano celestial hexagon and its terrestrial correspondences is based on Reichel-Dolmatoff, "Astronomical Models," 167–70 (note 10).

13. Denis Williams, "The Forms of the Shamanic Sign in the Prehistoric Guianas," *Journal of Archaeology and Anthropology* 9 (1993): 3–21, esp. 7–14 and figs. 3 and 6.

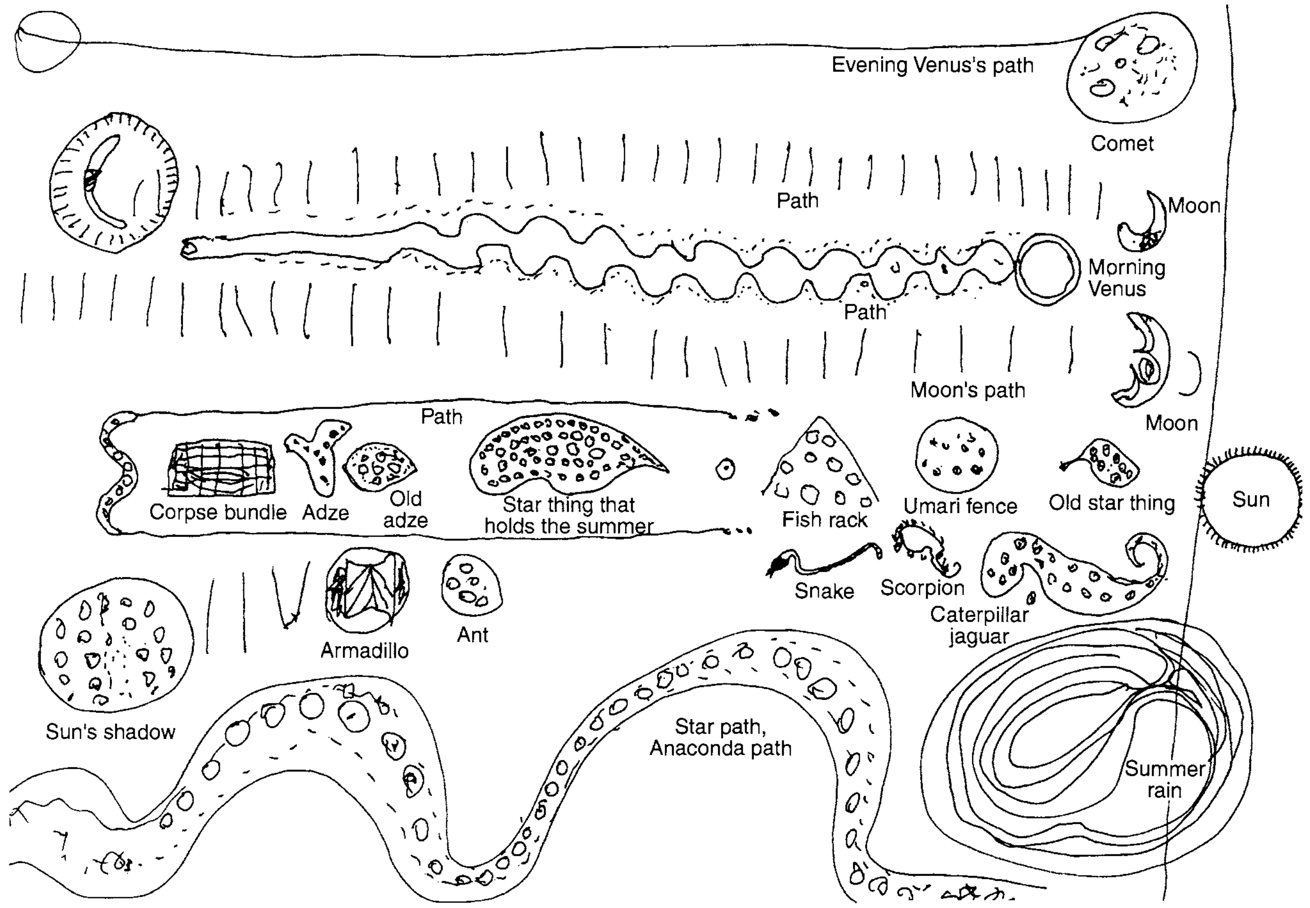


FIG. 7.7. THE BARASANA COSMOS DRAWN BY A BARASANA SHAMAN. Constellations are here mapped as identities from Barasana mythology. The star path is already familiar from the previous figures. The Pleiades, or Star Woman, is shown here as the "star thing that holds the summer." A full explanation of the interplay of celestial observation and mythological repertoire is given in Hugh-Jones, "Pleiades and Scorpius."

After Stephen Hugh-Jones, "The Pleiades and Scorpius in Barasana Cosmology," in *Ethnoastronomy and Archaeoastronomy in the American Tropics*, ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 183–201, fig. 2.

points of reference marked by the house posts are identified with the stars of the celestial hexagon, and the middle section of the roof "is supported by another set of six vertical posts that delimit a hexagonal central part that has ritual functions."[14] However, it would be wrong to assume that these cosmological principles are restricted to the modeling of social organization, for they become philosophical principles as well. The six lines of the celestial hexagon that encompass sacred space are also a metaphysical model of a moral proposition called "the path, the way," which an individual must travel in life.[15] The human brain is itself seen as organized according to the same principles as the celestial vault, so the use of powerful psychotropic drugs to induce shamanic visions constitutes an important means for mapping the cosmos as well as exploring other cosmic dimensions revealed in the journey of the soul during a drug experience.[16] As a result, astronomical mapping blends almost imperceptibly into a wider cosmology, since the heavenly bodies are understood as actors in human history and so take their place as discrete entities, distinct from their relative positioning in the overall celestial order. Moreover, the quest for cosmological knowledge takes its participants "beyond the Milky Way" and into the realm of metareality where shamans may battle with these celestial personages during a *yajé* trance.[17] Plate 13 and figures 7.11–7.13 map this normally unseen universe that is nonetheless directly connected to and interactive with that of daily observation.[18]

14. Reichel-Dolmatoff, "Astronomical Models," 172–73 (note 10).
15. Reichel-Dolmatoff, "Astronomical Models," 175.
16. Reichel-Dolmatoff, "Astronomical Models," 176.
17. Gerardo Reichel-Dolmatoff, *Beyond the Milky Way: Hallucinatory Imagery of the Tukano Indians* (Los Angeles: UCLA Latin American Center Publications, 1978), 7–14.
18. Plate 13 and figures 7.11–7.13 were produced by two Tukano in-

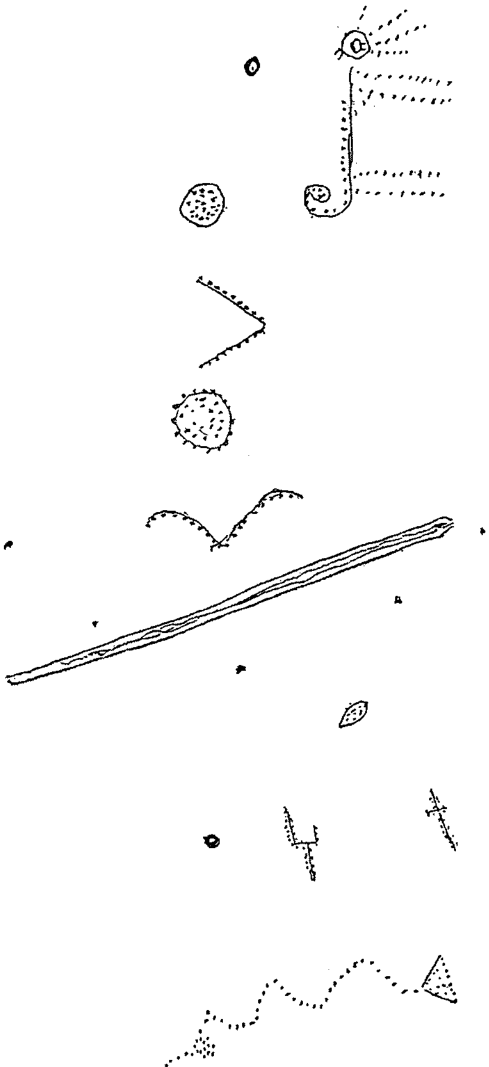


FIG. 7.8. THE NIGHT SKY OF THE TUKANO, DRAWN BY A TUKANO INDIAN FOR THEODOR KOCH-GRÜNBERG. At the bottom of this drawing is the star path of the celestial anaconda, above which appear various isolated constellations and the path of Venus across the night sky. In the top half the V-shaped fish rack constellation, the fish trap constellation (*umari* fence), and the jaguar are also visible. Compare figure 7.7.
After Theodor Koch-Grünberg, *Anfänge der Kunst im Urwald: Indianer-Handzeichnungen auf seinen Reisen in Brasilien gesammelt* (Berlin: E. Wasmuth, 1905), pl. 55.

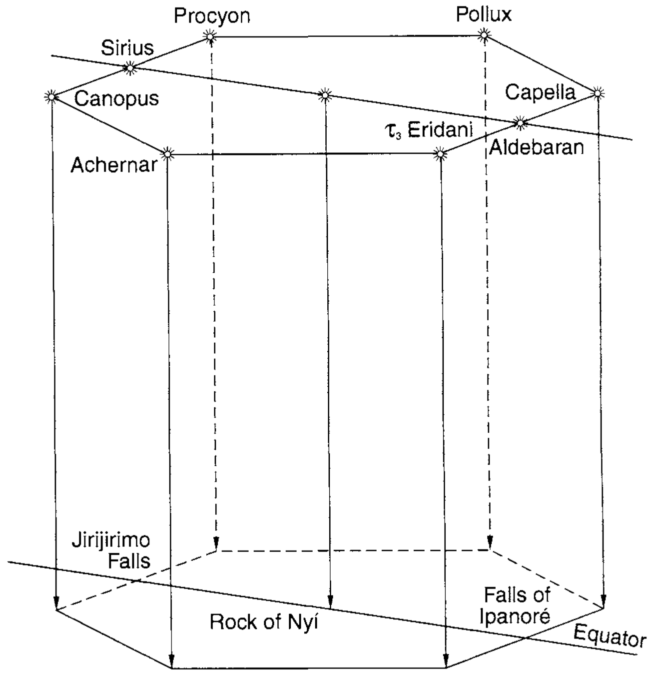


FIG. 7.9. THE HEXAGONAL PRISM THAT LINKS THE EARTH AND SKY. The Falls of Ipanoré are the point of origin of the Tukano, and the Jirijirimo Falls are the largest in the territory. The center of the prism is the rock of Nyí (see fig. 7.16 below). The hexagon is also a territorial and social map of Tukano society. It is divided into six tribal segments, united by three pairs of intermarrying clan segments, which are geographically arranged in a hexagonal pattern.
After Gerardo Reichel-Dolmatoff, "Astronomical Models of Social Behavior among Some Indians of Colombia," in *Ethnoastronomy and Archaeoastronomy in the American Tropics*, ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 165–81, fig. 1.

Such shamanic visions are part of the conceptual organization of everyday life, including subsistence activities. Among the Warao people of the Orinoco delta, both the location of settlements and the resulting means of exploiting the ecosystem follow shamanic interpretations of telluric features that are related to the cosmological order. In this way the paths of the culture heroes Dauarani and Haburi delimit zones of contrasting ecological practice and firmly link those practices to the cosmological order (figs. 7.14 and 7.15).[19]

A similar set of ideas informs Tukano ecological practice, where petroglyphic and pictographic representation is used to map the resources of the environment and even to delineate the "houses" of the "master of animals." Reichel-Dolmatoff writes:

> Another kind of sacred space is that surrounding the lonely rock hills that rise here and there over the horizon of the rain-forest. . . . On the flat walls or overhanging cliffs of many of these hills one can observe pictographs painted in shades of ochre, representing game animals or abstract geometrical designs. . . .

dividuals, Biá and Yebá, when ethnographers presented them with a clipboard, sheets of white paper (28 × 22 cm), and colored pencils. For more information on the construction of these figures, see Reichel-Dolmatoff, *Beyond the Milky Way*, 49 and 145–48.

19. Johannes Wilbert, "Geography and Telluric Lore of the Orinoco Delta," *Journal of Latin American Lore* 5 (1979): 129–50.

> These rock formations too are avoided by travellers and eventually have become game reserves because the hunters will rarely approach these spots. The sacredness of these hills or pools, with their respective petroglyphs or pictographs, is due to a complex of beliefs concerning . . . the Master of Animals . . . the fundamental idea being that these are the dwelling places of supernatural dwarf-like beings who are the keepers and protectors of all terrestrial game animals and aquatic creatures. . . . The hills and pools are imagined as womb-like enclosures where animals multiply.[20]

The master is visited by shamans during hallucinogenic trance when they seek permission for hunters and fishers to kill their prey. The master will then release a certain number of animals into the forests or rivers, but a price in human souls must be paid for this bounty. Those who transgress ritual and social rules are therefore greatly at risk, and the relationship between the shamans and the master becomes an effective means of sociological and ecological management.[21]

Another petroglyph is the rock of Nyí (fig. 7.16), where the river Piraparaná crosses the equator. The significance of the rock stems from the idea that the progenitor of the Tukano sought the place where the stick of his shamanic rattle would cast no shadow, identifying the place from which the first people emerged. The progenitor traveled in an anaconda canoe until he reached this spot on the Piraparaná River, and from here the first people spread out to take possession of the land.[22] The rock of Nyí is a feature of both the physical landscape and Tukano sacred geography.

In eastern Amazonia, very similar ideas have been noted with regard to petroglyphs as maps of ecological practice used to map and sign appropriate fishing techniques. In particular, a complex assemblage along the Kassikaityu River has been plausibly related to the control of fish stocks in that river. The individual glyphs represent fish traps appropriate to different species of fish (fig. 7.17). The systematic exploitation of these rivers thus had consequences for the use of the spawning pools where particular species occur.[23]

Other petroglyphs are given the interpretation of being traces of ancestors or of fantastic beings that preceded or inaugurated human occupation. The "nandu prints" are particularly well known. Both the Tupi-Guarani, of the southern part of the South American continent, and the European missionaries believed these marked the passage of a culture hero–Sumé or Sommay to the natives, and Tomé or Saint Thomas with whom he was identified by the missionaries.[24] Unfortunately, most of the cultural traditions related to such petroglyphs have long since disappeared, so that it is only from recent ethnographic cases that the cultural context of these spiritual maps can be recovered.

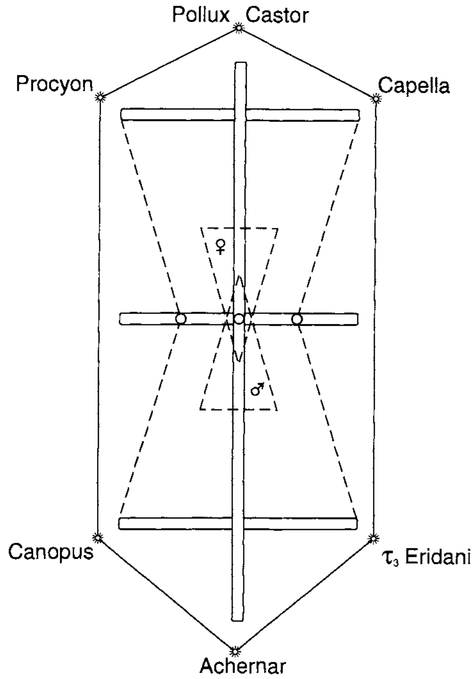


FIG. 7.10. THE LONGHOUSE IDENTIFIED AS ORION. The six stars of the hexagonal prism in figure 7.9 are also encoded in the architecture of the longhouse so that the movements of the dancers within replicate celestial movements without. The inner hourglass-shaped path marks the overlapping pattern of male and female dancers.
After Gerardo Reichel-Dolmatoff, "Astronomical Models of Social Behavior among Some Indians of Colombia," in *Ethnoastronomy and Archaeoastronomy in the American Tropics*, ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 165–81, fig. 4.

Mapped or marked natural features are also part of a wider understanding of the cosmological position of the earth and its inhabitants with regard to both the celestial order and the unseen Underworld that lies below the "earth disk." The Warao of Venezuela think that both the bottom and sides of the earth disk are smooth as it floats in the world sea, but that the surface is jagged like the skyline and cracked by the myriad waterways of the re-

20. Gerardo Reichel-Dolmatoff, *Shamanism and Art of the Eastern Tukanoan Indians* (Leiden: E. J. Brill, 1987), 6–7.

21. Reichel-Dolmatoff, *Shamanism and Art*, 8–9.

22. Reichel-Dolmatoff, *Shamanism and Art*, 4.

23. Williams has extensively documented the petroglyphs of northern South America and eastern Amazonia: Denis Williams, "Petroglyphs in the Prehistory of Northern Amazonia and the Antilles," in *Advances in World Archaeology*, 5 vols. (Orlando, Fla.: Academic Press, 1982–86), 4:335–87, esp. 364–67 and 376–80, and idem, "Controlled Resource Exploitation in Contrasting Neotropical Environments Evidenced by Meso-Indian Petroglyphs in Southern Guyana," *Journal of Archaeology and Anthropology* 2 (1979): 141–48.

24. C. N. Dubelaar, *South American and Caribbean Petroglyphs*, Caribbean Series 3 (Dordrecht: Foris, 1986), 63–65.

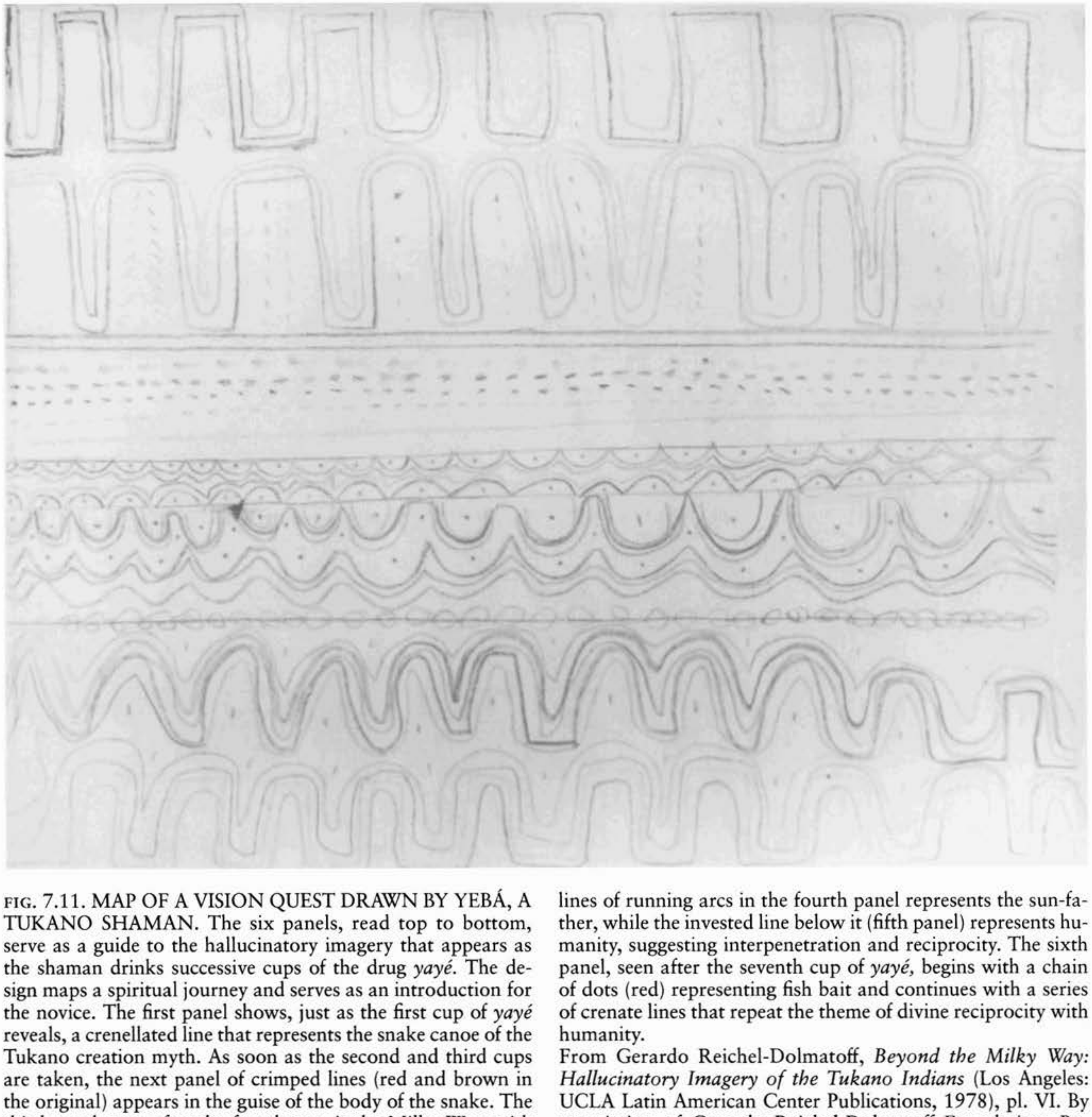


FIG. 7.11. MAP OF A VISION QUEST DRAWN BY YEBÁ, A TUKANO SHAMAN. The six panels, read top to bottom, serve as a guide to the hallucinatory imagery that appears as the shaman drinks successive cups of the drug *yayé*. The design maps a spiritual journey and serves as an introduction for the novice. The first panel shows, just as the first cup of *yayé* reveals, a crenellated line that represents the snake canoe of the Tukano creation myth. As soon as the second and third cups are taken, the next panel of crimped lines (red and brown in the original) appears in the guise of the body of the snake. The third panel, seen after the fourth cup, is the Milky Way, with the individual dots standing for clouds and some red ones for the berries that are used for fish bait. The series of engrailed lines of running arcs in the fourth panel represents the sun-father, while the invested line below it (fifth panel) represents humanity, suggesting interpenetration and reciprocity. The sixth panel, seen after the seventh cup of *yayé,* begins with a chain of dots (red) representing fish bait and continues with a series of crenate lines that repeat the theme of divine reciprocity with humanity.
From Gerardo Reichel-Dolmatoff, *Beyond the Milky Way: Hallucinatory Imagery of the Tukano Indians* (Los Angeles: UCLA Latin American Center Publications, 1978), pl. VI. By permission of Gerardo Reichel-Dolmatoff Foundation, Bogotá, Colombia.

gion. From the edge of the disk one can look across the ocean to the horizon, which lies at the end of the world (fig. 7.18). Encircling the earth in the world sea is the great "snake of being," whose body contains the luminous essence of all life forms and whose breath creates the tides. Beneath the earth and world sea lives the goddess of nadir in the form of a gigantic serpent with four heads, each with antlers pointed in a cardinal direction. The whole is contained under a bell-shaped firmament that is the celestial world. Other regions of this universe are inhabited by the "ancient ones": the butterfly god to the north, the toad god to the south, the god of origin (in avian form) to the east, and the macaw god to the west. A shaman of human origin lives at the apex of the firmament and connects to the world down an *axis mundi,* recalling the phallic staff with which the sky penetrates the earth in Tukano cosmology. Surmounting the firmament is a cosmic egg, laid by Mawári, the swallow-tailed kite, which houses a game played by insect spirits that determines the fate of life on earth and is elucidated by shamans.[25] This is above all a participatory universe, and both shamans and the dead must travel prescribed paths in the journeys of their souls across the cosmological landscape, just as humans must ensure the continuity of the cosmological order by their awareness and participation. This is no abstract or purely intellectual matter, however, since infant mortality rates can be very high, up to 49 percent, and the gods of the native cosmos must feed on human souls. There are high stakes in this struggle between people and divinities, in which almost half of the infants born are thought to lose their lives to supernatural beings.[26]

Similar conceptions exist for other lowland South American groups, including the Tukano and the Ye'cuana. Indeed, there are some striking analogies between the architectural expression of roundhouse symbolism (fig. 7.19) and the Warao model of the cosmos.[27] The cylindrical floor of the world-encompassing ocean and the earth disk that floats on it correspond to the ground plan of the Ye'cuana roundhouse, while the snake of the Underworld is likened to the "ring of family quarters whose extreme ends, like those of the snake, approach each other in the east."[28] This also recalls the use of the snake motif to map social hierarchy and its origins (fig. 7.5 above) by using the intellectual connection in native thought to the celestial anaconda. The snake is also a visual icon for the representation of rivers, physical paths of migration, and so ethnic origin (fig. 7.20).

For the Gê peoples of the savannas of central Brazil, such as the Kayapó, Xavante, Canela, and Timbira, the architecture of the house, as well as the layout of the village as a circle of dwellings connected by paths that form a spoke pattern, symbolically expresses the divisions of clan and moiety. Four major paths through the village are cardinally aligned. Like the Warao, the Kayapó conceive of the world in disk form. For the Kayapó, however, the world is formed by a series of concentric rings at whose core lies the men's house (fig. 7.21). The Apinayé, another subgroup of Gê speakers, also base their society on an ideal circular form (fig. 7.22).[29] Additional examples of the spatial arrangements of village life and the making of village plans can be found among ethnographic materials on the neighboring Mehinaku.[30]

Intimately connected to a society's origins are the origins of the environment it occupies. In the case of the

FIG. 7.12. ROUTES BETWEEN DIVINITY AND HUMANITY DRAWN BY YEBÁ. This illustration shows the wanderings of Pamuri-mahsë (the creator). The seven columns at the base of the map represent songs that correspond to different recitals of the creation myth. The row of fork-shaped elements depicts a series of ritual cigar holders men use in the gatherings that take place when two complementary exogamic groups meet and engage in ritual dialogue. To the right is the canoe that carried the first humans and their offspring, and above them appears a celestial door that visually maps the actions of men as singers and orators in their approach to divinity. To the upper left is a human figure, possibly Pamuri-mahsë, who plunges earthward bearing gourd rattles (L-shaped elements) and ritual songs (curlicues). The overall image maps the route between earth and cosmos and so emphasizes the reciprocity of men and divinities.
From Gerardo Reichel-Dolmatoff, *Beyond the Milky Way: Hallucinatory Imagery of the Tukano Indians* (Los Angeles: UCLA Latin American Center Publications, 1978), pl. X. By permission of Gerardo Reichel-Dolmatoff Foundation, Bogotá, Colombia.

25. Johannes Wilbert, "Warao Cosmology and Yekuana Roundhouse Symbolism," *Journal of Latin American Lore* 7 (1981): 37–72, esp. 37–40.

26. Johannes Wilbert, "Eschatology in a Participatory Universe: Destinies of the Soul among the Warao Indians of Venezuela," in *Death and the Afterlife in Pre-Columbian America*, ed. Elizabeth P. Benson (Washington, D.C.: Dumbarton Oaks Research Library, 1975), 163–89, esp. 180–82.

27. Wilbert, "Warao Cosmology," 40, n. 4, and 45–54.

28. Wilbert, "Eschatology," 48.

29. See Roberto Da Matta, *A Divided World: Apinayé Social Structure*, trans. Alan Campbell (Cambridge: Harvard University Press, 1982), esp. 35–45 and figs. 2–6.

30. See Gregor, *Mehinaku*, 48–60 and fig. 9 (note 9).

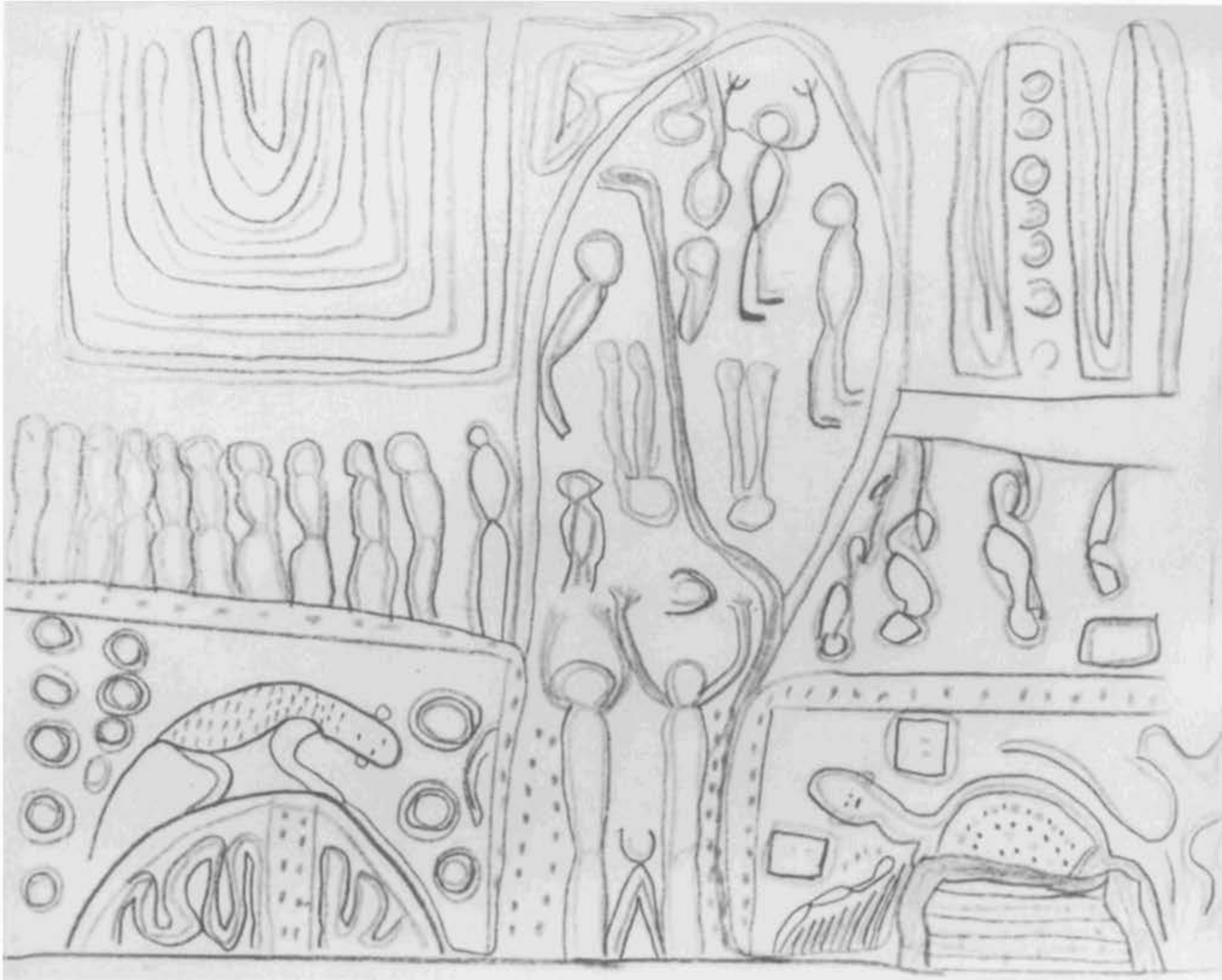


FIG. 7.13. THE VIEW FROM THE HOUSE OF PAMURI-MAHSË DRAWN BY YEBÁ. This design presents us with a chart of what can be seen from the house of Pamuri-mahsë. To the left is a jaguar atop the "house of the hills," and to the right a turtle lies over the "house of the waters." Beyond the house of the hills lies a celestial door below which are phallic beings. Immediately in front of Pamuri-mahsë's house and contained within a womblike U-shape, we see the First Man and First Woman making people.
From Gerardo Reichel-Dolmatoff, *Beyond the Milky Way: Hallucinatory Imagery of the Tukano Indians* (Los Angeles: UCLA Latin American Center Publications, 1978), pl. XVII. By permission of Gerardo Reichel-Dolmatoff Foundation, Bogotá, Colombia.

Warao, the world disk and its partitions into cosmological and ecological categories also constitute a map that can be used for ecological purposes. The disk expresses not only the location and identity of particular landscapes but also the compelling character of the relations with divinities, who are in their own way as dependent on humans as humans are on them. In this sense the world disk maps physical and metaphysical terrains, since it is vital to establish the correct place of humans with regard to multiple domains, not just the geographical. As Wilbert writes:

> This example characterizes the spirit of the canoe peoples of the Caribbean . . . an intellectually active and physically mobile society accustomed to living on an earth securely anchored within the round of the world snake that encircles it and sustained by the knowledge that as long as man lives according to established cultural norms he can live safely at the center of his universe. A north-south dynamic is built into this world view, inasmuch as the terrestrial disk is suspended between the earth-god mountains of Nabarima and Karoshimo, because the east represents the unapproachable world of the God of Origin (in the Atlantic Ocean) and the west the ominous region of the Underworld. On their journeys across the sea the Warao could always remain in the center of the universe as the circle of the horizon traveled with them, and, if

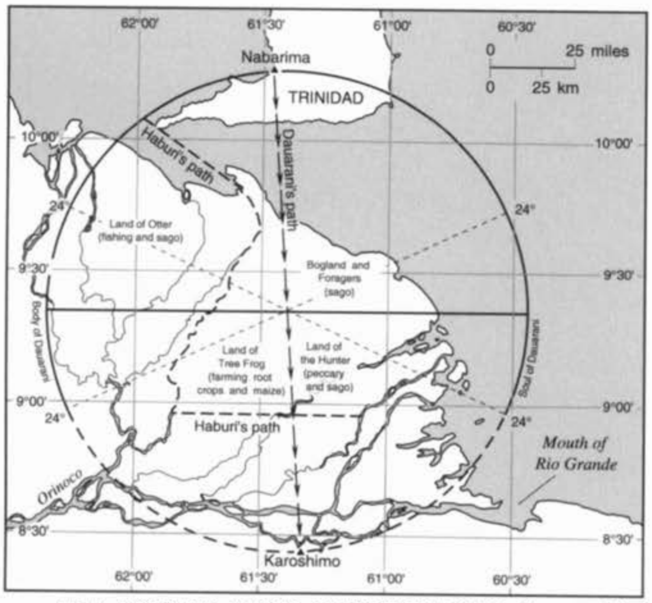


FIG. 7.14. HOBAHI, LAND OF THE WARAO. Figures 7.14 and 7.15, derived from the research of Johannes Wilbert, help us visualize the way the Warao, ancient occupiers of the Orinoco delta, map their world according to ecological and mythological criteria. This figure illustrates the division of the landscape according to the ecological significance of each quadrant of the Orinoco delta, as appropriate for the practice of sago or maize farming, peccary hunting, foraging, and fishing. These classifications are embedded in the songs and tales of the origins of the cosmos, which trace the mythological journey of the culture hero Haburi.
After Johannes Wilbert, "Geography and Telluric Lore of the Orinoco Delta," *Journal of Latin American Lore* 5 (1979): 129–50, esp. 136.

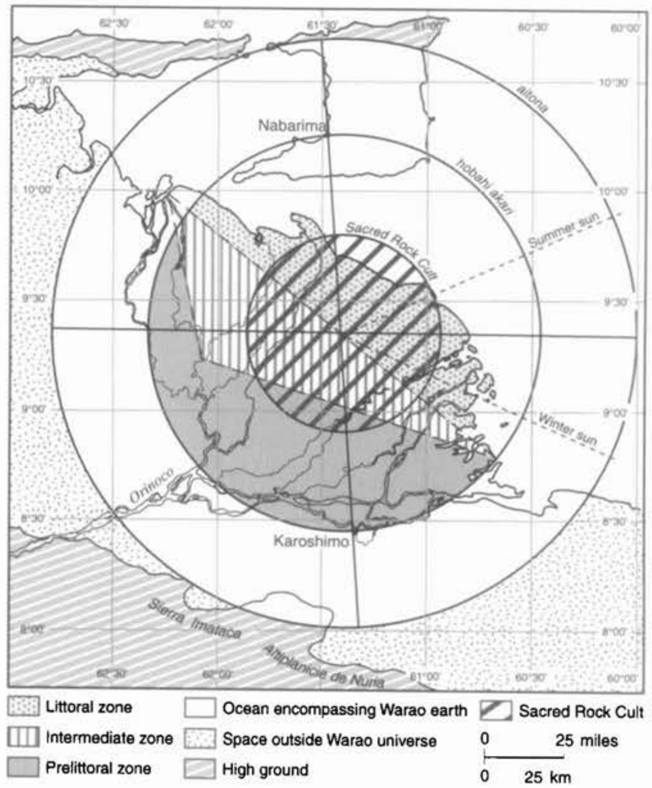


FIG. 7.15. WARAO TELLURIC LORE. In this illustration the mythical geography of Hobahi is further revealed. To the north is the abode of the earth god Nabarima, "Father of the Waves," which is visually identified with Naparima Hill near San Fernando, Trinidad. To the south is the abode of the earth god Karoshimo, "Red Neck," which is visually identified with the Cerro Manoa, Venezuela. The connecting arcs define the extent of the earth disk, which floats on the ocean's waters. By correlating terrestrial features with Warao cosmology, Wilbert determined that the diameter of the earth disk is 212 kilometers. This makes the total surface of the Warao earth 35,299 square kilometers, while the disk's radius (106 kilometers) fixes the literal center point of the earth. The earth disk, so conceived, delimits the proper domain of the Warao themselves within *hobahi akari* or "where the earth breaks off," bounded by the encompassing horizon of *aitona,* the very edge of the universe.
After Johannes Wilbert, "Geography and Telluric Lore of the Orinoco Delta," *Journal of Latin American Lore* 5 (1979): 129–50, esp. 137.

> need be, they could establish a new home wherever two mountains could serve as the poles of their earth and the abode of the earth-gods.[31]

If characteristics of landscape elements are assimilated into existing maps of the cosmos, so too, as in early European mapping of this region, the search for places whose existence is indicated by cosmological ideas also forms an element of native cartography. The best-known example of this comes from the southern regions of South America and is part of the Tupi-Guarani cultural tradition. This is the spiritual and physical search for *guayupia,* the Land without Evil. This land of immortality and contentment was a product of the apocalyptic vision of the *karai* (prophet-shamans), and the hope of its discovery provoked mass migrations among the native population, who abandoned their villages and chiefs to follow the *karai* in their mystical quest. Such migrations had a uniformly east-west orientation and for some groups were directly identified with Kandire, the Inka empire toward the west. The arrival of the remnants of one of these millenarian migrations in Chachapoyas, Peru, in 1549, provoked an episode in Spanish mystical exploration, for the Spanish joined the Tupi in searching for the kingdom of Omagua, believing it to be El Dorado.[32]

A similar conception was also held by the peoples of the Greater Antilles in the Caribbean, but here the shamanic and physical search was for the land of *guanín* (a magic alloy of gold and copper). Again we find that this

31. Wilbert, "Geography and Telluric Lore," 148 (note 19).

32. Hélène Clastres, *The Land-without-Evil: Tupí-Guaraní Prophetism,* trans. Jacqueline Grenez Brovender (Urbana: University of Illinois Press, 1995), esp. 22–24 and 49–51.

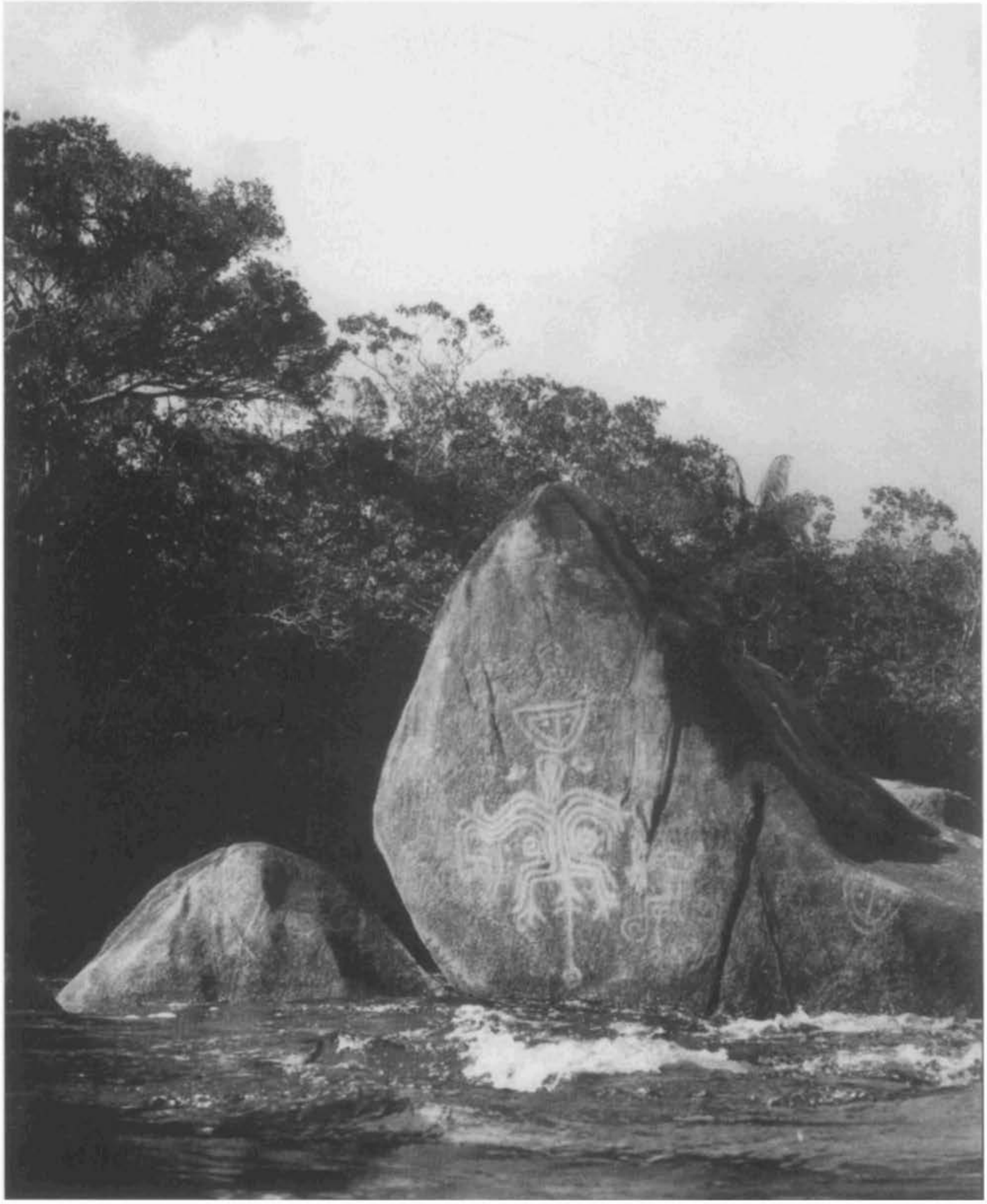


FIG. 7.16. THE ROCK OF NYÍ, PIRAPARANÁ RIVER, COLOMBIA. The inscribed petroglyph shows the mythical stick rattle in the shape of a winged phallus. The upper end points at a triangular face, which some see as a vagina. The rock marks the central axis of the cosmos and is also itself marked by the image of the stick rattle, which alludes to the role of shamans in linking earth beings to the celestial activities of mythic heroes and gods.
From Gerardo Reichel-Dolmatoff, *Shamanism and Art of the Eastern Tukanoan Indians* (Leiden: E. J. Brill, 1987), pl. I. By permission of Gerardo Reichel-Dolmatoff Foundation, Bogotá, Colombia.

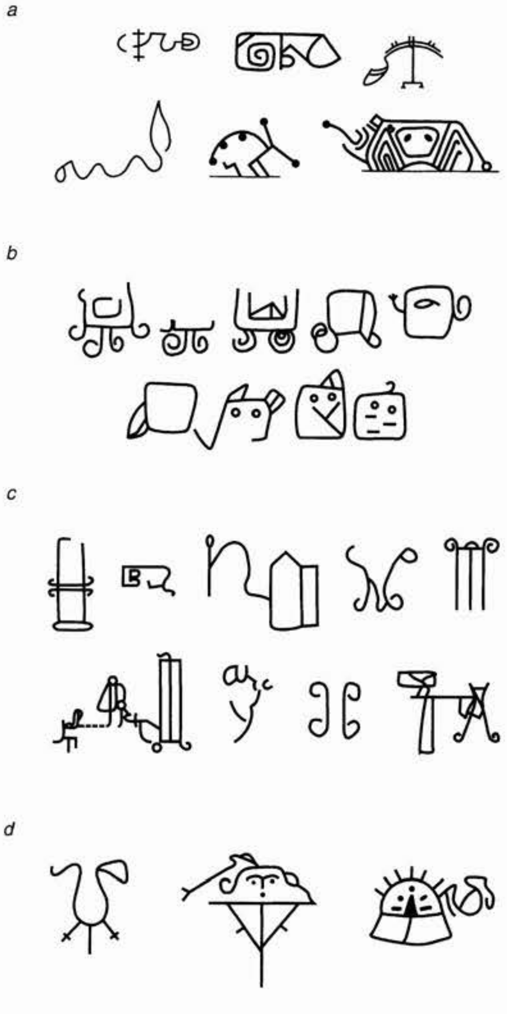


FIG. 7.17. MAPPING ECOLOGICAL USAGES. The petroglyphs in this sequence show how a direct inscription of the landscape can, with proper interpretation, serve as a map of permissible ecological activities. These examples taken from southern Guyana show the importance accorded to the "magical" or shamanic control of the unseen forces that are present in the landscape. Although the cultures that produced these petroglyphs are no longer extant, the complex of beliefs that produced them would have been analogous to those known ethnographically from among the Tukano. The petroglyphs enumerate species by indicating optimum techniques for their capture: (*a*) spring-basket fish traps (conical); (*b*) rectangular fish traps; (*c*) cylindrical fish traps; and (*d*) variations in fish trap placement. The ideal is a technique that does not excessively disturb the cosmological connections between persons, animals, and divinities.
After Denis Williams, "Petroglyphs in the Prehistory of Northern Amazonia and the Antilles," in *Advances in World Archaeology,* 5 vols. (Orlando, Fla.: Academic Press, 1982–86), 4:335–87, figs. 7.17–7.19 and 7.22.

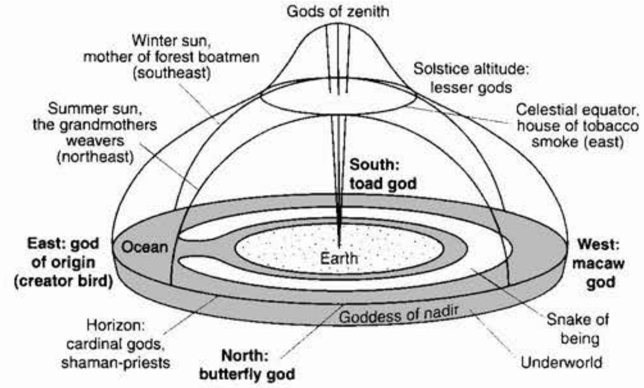


FIG. 7.18. PROFILE OF THE WARAO UNIVERSE. Figure 7.14 gave us a conception of how the Warao of the Orinoco delta organize spatial relationships according to the ecological wisdom encoded in the journeys of mythic heroes across the landscape. In this illustration we see how the earth disk is conceived spatially with regard to the rest of the cosmos. The earth disk is surrounded by the great snake of being in the all-encompassing ocean. At the cardinal points of the universe are four deities. Toad and butterfly indicate the north and south. Above are the gods of zenith. The changing annual positions of the rising and setting sun along the horizon are taken to illuminate the abodes of lesser deities. The lines drawn between these points on the solar horizon and the homeland of the Warao become physical paths for the destinies of the soul, which travels toward the zenith after death to encounter the final divine rapture.
After Johannes Wilbert, "Eschatology in a Participatory Universe: Destinies of the Soul among the Warao Indians of Venezuela," in *Death and the Afterlife in Pre-Columbian America,* ed. Elizabeth P. Benson (Washington, D.C.: Dumbarton Oaks Research Library, 1975), 163–89, fig. 2.

quest was deeply inscribed in the cosmology of the islanders but also expressive of geographic reality.[33] The land of *guanín* did indeed lie to the south and east of the islands, from where the *caníba* (enemy warriors) came to trade golden objects in exchange for persons.[34] As we shall see in the next section, this interplay between cosmological vision and physical mapping was also characteristic of European geographies of the early Renaissance. The context of the search for El Dorado will provide an

33. Sebastián Robiou Lamarche, "Ida y Vuelta a Guanín, un ensayo sobre la cosmovisión taína," in *Myth and the Imaginary in the New World,* ed. Edmundo Magaña and Peter Mason (Amsterdam: Centre for Latin American Research and Documentation, 1986), 459–98, esp. 486–89.

34. Neil L. Whitehead, "The Mazaruni Pectoral: A Golden Artefact Discovered in Guyana and the Historical Sources concerning Native Metallurgy in the Caribbean, Orinoco and Northern Amazonia," *Journal of Archaeology and Anthropology* 7 (1990): 19–40, esp. 30–31.

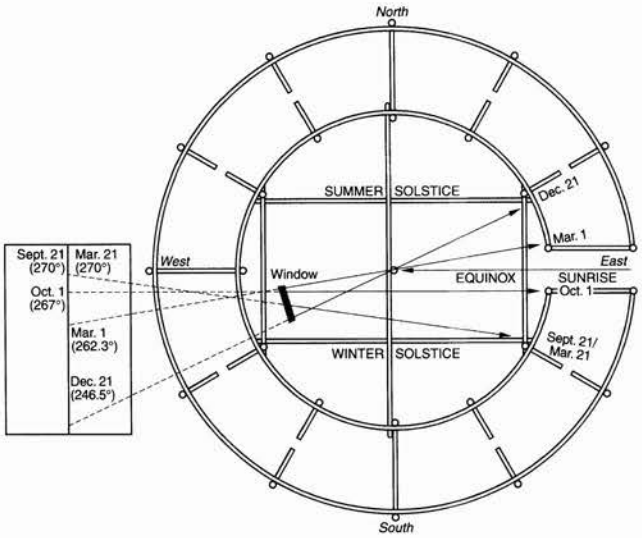


FIG. 7.19. THE ROUNDHOUSE AS COSMOLOGICAL MAP. The architecture of the Ye'cuana roundhouse from southern Venezuela (about 3–6°N) captures and illustrates key solar positions through the year. The entrance corridor of the house is oriented due east so that the equinoctial sunrise casts light on the central post. A roof window is positioned so that a beam of the setting sun at the winter solstice (21 December) aligns with the central pole and the northeastern corner of the solstice rectangle (the corners of the rectangle in the middle represent the sunrise and sunset points of the solstices on the horizon). The beam from the setting equinoctial sun falls through the roof window and illuminates the southeastern corner of the rectangle. The setting beam is cast on either side of the entrance corridor about 1 March and 1 October. In this sense the house is a microcosm of the universe, and the activities of its occupants are charged with cosmological significance.
After Johannes Wilbert, "Warao Cosmology and Yekuana Roundhouse Symbolism," *Journal of Latin American Lore* 7 (1981): 37–72, fig. 20.

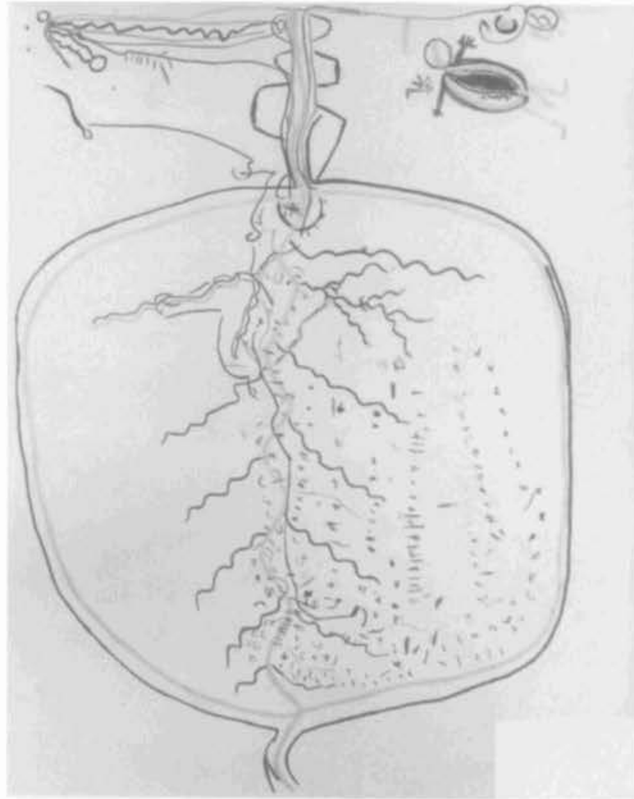


FIG. 7.20. THE AMAZON BASIN AS ANCESTRAL ANACONDA, DRAWN BY BARRETO OF THE TATUYO. Although much indigenous mapping is concerned with the structure of local relations between physical and spiritual space, this does not preclude the mapping of much wider, in this case continental, geography. In this example the mouth of the Amazon is the tail of the Anaconda, reflecting the alternative ways geographical significance is defined. It is an ascent of the Amazon, to the place where the ancestors first establish society, that interests the native cartographer, the track of that route being encapsulated in a "womb" to suggest genesis. To the upper right the shaman-bird steers the ancestors to their destination, which then suggests not just a physical ascent of the river system but a spiritual ascent to the knowledge of how real people ought to live.
From *L'Homme* 33, nos. 126–28 (1993), cover illustration. Collection Patrice Bidou, Laboratoire d'Anthropologie Sociale, Collège de France, Paris.

example of how European and Amerindian cosmologies could blend.

In indigenous conceptions, ideas about the interconnection between persons and the cosmos may be enacted directly in ritual, through the design of costume and dance movements, or in songs and chants, since in a participatory universe it is only through ritual that the cosmic order is maintained. Both the costumes of dancers and the shamanically prescribed movements they make refer to the cosmos. The feathers that adorn the costumes of the Barasana in the Vaupés region of Colombia have many potential meanings, including their reference to birds–intermediaries with the sky world–while white egret plumage overtly recalls the stars and rain. As these cosmically charged ornaments circulate around the dance floor in the longhouse, which itself replicates the celestial vault, they follow the path of celestial bodies. The annual cycle of the stars and seasons is also replicated through the annual cycle of ritual and dance.[35]

Among the Arawakan Wakuénai, these kinds of representation occur in the form of chant. During male initiation rites, ritual specialists or "owners" of the sacred *málikai* chants construct an image of their locale by naming

35. Stephen Hugh-Jones, "The Pleiades and Scorpius in Barasana Cosmology," in *Ethnoastronomy and Archaeoastronomy in the American Tropics,* ed. Anthony F. Aveni and Gary Urton (New York: New York Academy of Sciences, 1982), 183–201, esp. 198–99.

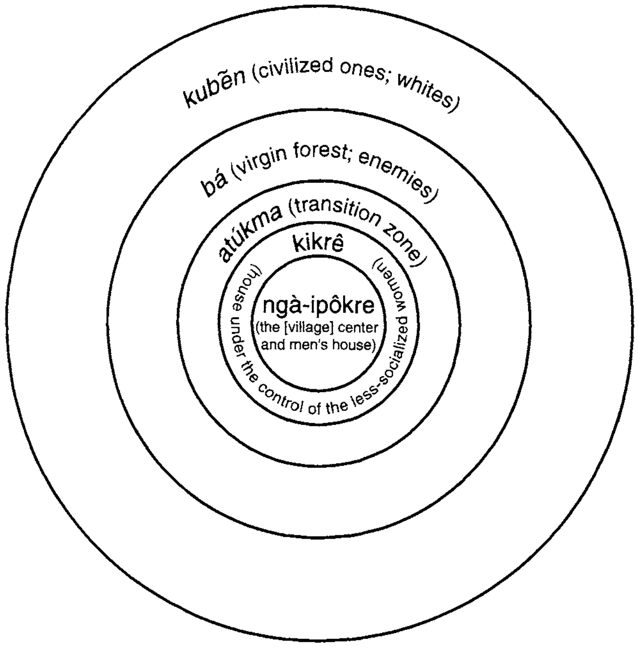


FIG. 7.21. THE WORLD OF THE KAYAPÓ. This illustration is a schematic for the Kayapó concentric conception of the place of the village in the radiating circuits of enemies and whites.
After Darrell A. Posey, "Pyka-tó-ti: Kayapó mostra aldeia de origem," *Revista de Atualiade Indígena* 15 (1979): 50–57, fig. 1.

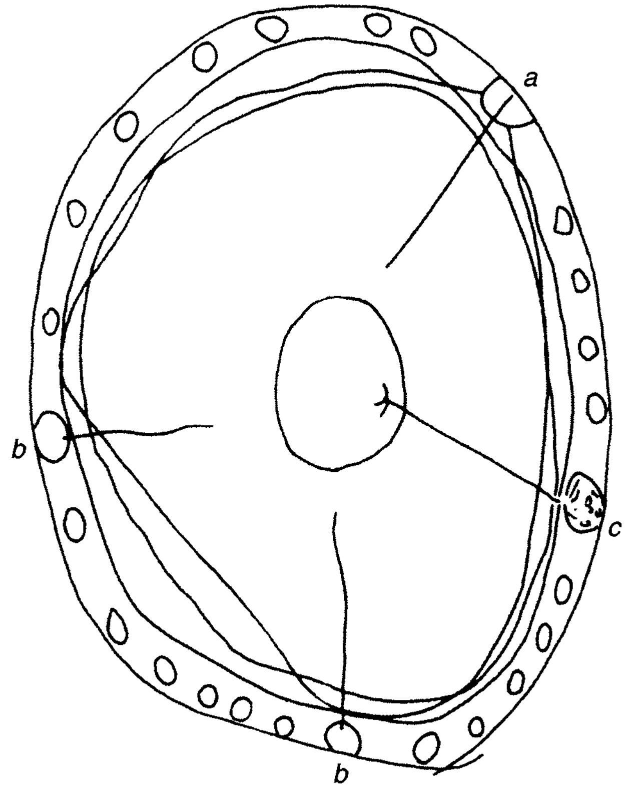


FIG. 7.22. IDEAL VILLAGE LAYOUT DRAWN BY CHIEF SÃO JOSÉ. At center is the village plaza with spokes connecting the chief's house (*a*) to those of his auxiliaries (*b*) and his counselor's house (*c*), corresponding to the two innermost circles on the schematic in figure 7.21. Although Chief São José's sketch accurately reflects the form of village layout, it also reflects his own view of social relations and reminds us of the ever-present connection between maps and wider political power.
After Roberto Da Matta, *A Divided World: Apinayé Social Structure,* trans. Alan Campbell (Cambridge: Harvard University Press, 1982), fig. 24.

sites significant in the mythology of the culture heroes Kuwái and Amáru. This recalls the telluric lore of the Warao as to the paths of Dauarani and Haburi (see fig. 7.14 above). The naming begins and ends at the place where humans emerged from the navel of the world and where Kuwái and Amáru are linked to the world of people by a cosmic umbilical cord. A long series of chants thus draws a journey across the Wakuénai landscape and thereby constructs a map of their world that shows an awareness of their place within the larger world of Arawakan speakers in South America.[36] These chants may also have been part of a deep cultural tradition of Arawakan speakers since the Lokono, and the Karipuna, who also extended into the Caribbean Islands, are particularly noted in the early sources for their complex astronomy. Although the mapping of natural and cultural spaces was largely confined to an oral cartography expressed through *areytos* (sacred chants), physical features like the constellations were held to be animate and so were also rendered in anthropomorphic form as stone *cemi* (idols) (fig. 7.23) or were associated with cosmological authority and inscribed in the ceremonial *duho* (thrones) (fig. 7.24) of the elite.[37]

Such routes of ritual knowledge were nevertheless also practical guides to trading contacts and political allies. In the case of the Baré of the upper Rio Negro, trade routes linking the Amazon, Orinoco, and Atlantic coast are encoded in sacred geographies that delineate the paths of eminent ancestors and mythic heroes, such as Kuwái and Purunaminali.[38]

To one initiated into these meanings and their forms, the patterns on basketry or executed in body paint are replete with significance and can be read as a map, pro-

36. Jonathan David Hill, *Keepers of the Sacred Chants: The Poetics of Ritual Power in an Amazonian Society* (Tucson: University of Arizona Press, 1993), 43–44 and figs. 2.1 and 2.3.

37. Ramón Pané, *An Account of the Antiquities of the Indians*, ed. José Juan Arrom, trans. Susan Griswold (Durham: Duke University Press, forthcoming).

38. See Sylvia Margarita Vidal Ontivero, "Reconstrucción de los procesos de etnogenesis y de reproducción social entre los Baré de Río Negro (siglos XVI–XVIII)" (Ph.D. diss., Instituto Venezolano de Investigaciones Cientificas, Caracas, 1993).

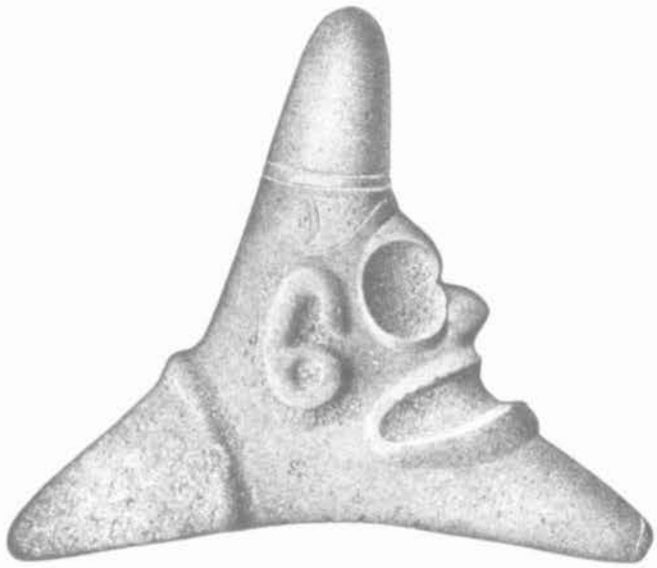


FIG. 7.23. *CEMI* AS IMMANENT LANDSCAPE. In the commonplace world of the native Aïtïj (modern-day Haiti and the Dominican Republic) farmer, the forces of terrestrial divinities loomed large and were indeed immanent within the trees, rocks, and earth as *cemi* (idols). Carving stone or wood into a *cemi* was thought to release and realize the form of the *cemi* within. Most powerful among the *cemi* were those associated with the high triangular peaks that are sites of volcanoes, some still active. The earth-transforming properties of volcanoes were evident enough, and given the richness of volcanic soils, the *cemi* within the triangular form was also powerful in agricultural matters and so would be buried in agricultural fields to enhance their fertility. It is therefore a spatial appreciation of the landscape form that connects the lonely peaks of the Caribbean islands with the divine powers of earthly production.
From Jesse Walter Fewkes, "The Aborigines of Porto Rico and Neighboring Islands," in the *Twenty-fifth Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1903–04* (Washington, D.C.: United States Printing Office, 1907), 3–220, esp. 122 (fig. 21).

FIG. 7.24. CHART OF THE COSMOS CARVED ON CEREMONIAL *DUHO*. This figure shows a cosmological design on the back of a pre-sixteenth-century wooden throne (*duho*) made by the native people of Aïtïj, illustrating the aesthetic use of spatial features. This *duho* incorporates a chart of the Pleiades supported by Orion's belt (band with three circles), whose significance is widespread on continental South America. The carving of these powerful symbols on the throne of the chief also alludes to the way a vital connection is maintained with the cosmos through the shaman and his throne. This doubly loaded reference then associates the seated chief with both earthly and divine power.
Photograph courtesy of Museo del Hombre Dominicano, Santo Domingo.

voking a chain of analogies that delineate the conceptual and physical space encoded in that motif. For example, a representation of the Milky Way can also suggest a river, a trail, a sloughed-off snakeskin, or streams of semen (see fig. 7.2 above). Meaning is engendered through reference to structurally similar objects in both culture and nature. An elaborate example of this comes from Ye'cuana basketry, and particularly the form *waja,* which functions as a flat, round serving tray (fig. 7.25). Enclosing rectilinear forms within a circle replicates the house and its garden and so gives basketry the same spatial symbolism as is found in the architecture of the house itself (see fig. 7.19 above). It also replicates the way its inhabitants surround the *waja* in prescribed ways as they eat.[39]

The modern ethnography of indigenous South American spatial concepts and their representation allows us to appreciate the now obscure traditions from which these practices emerged. Other available sources are historical reports of indigenous mapmaking and native information included in the European cartography of the New World.

39. David M. Guss, *To Weave and Sing: Art, Symbol, and Narrative in the South American Rain Forest* (Berkeley: University of California Press, 1989), 120–21, 163–70.

Historical Reports of Indigenous Mapmaking

Given the understanding we have developed of the cultural ideas that underlie indigenous representations of spatial relations, we are in a better position to evaluate various Western accounts of native mapmaking. A note of caution should be sounded at this point, however, since accounts of indigenous mapmaking may have been reported for a variety of reasons, some unconnected with the issue of native cartography–perhaps to demonstrate the author's own credentials in dealing with "savage" peoples, or even to suggest the absence of developed cartographic abilities or geographical knowledge among the native population. An example of the former would be Ralegh's presentation of a geography of the lower Orinoco River explicitly deriving from his claim to have enjoyed the confidence of the native rulers of the region, and so permitting him to finally identify the location of El Dorado.[40] By contrast, the latter motive seems to be implicit in many of the following examples; what is noteworthy in the opinion of the various authors is that native people are able to make abstract representations of spatial relationships in a way intelligible to outsiders. As we have seen, however, this entirely misses the point that indigenous mapping had cultural purposes other than geographic representation and was directed toward demonstrating spatial relations of various kinds.

These considerations are borne out by the fact that all the following examples of geographical representation were elicited from indigenous people to aid exogenous learning and to make up for the interrogators' lack of linguistic, as much as geographic, understanding. As a result, we cannot simply assume that such exercises were part of a native tradition. They should be seen as providing evidence of the flexibility of indigenous cartographic practice as well as highlighting the differing cartographic needs of "locals" and "strangers." In any case, such representations, even when made in a medium directly accessible to outsiders, might also be considered images of an ideal–not a physical–reality, since such inscriptions express relations of spiritual and political power as much as physical relationship. A good contemporary example of the importance of these considerations is from the Baniwa of the upper Rio Negro. A Baniwa elder drew a map of his village of Hipana for anthropologist Robin Wright (fig. 7.26).[41] Although the map was carefully drawn, it omitted places that the Baniwa elder disapproved of, such as the missionary's house and the school, which placed this "ideal" (*lidana*) in the context of a spiritual and political landscape, as with the Kayapó example discussed above. With this in mind, we are better able to evaluate the significance of the following historical examples of native maps commissioned by Europeans.

FIG. 7.25. THE BASKET AS CARTOGRAPHIC ICON. Just as domestic architecture can recall basic relationships that structure the universe, domestic artifacts are also significant for those who have the right cultural knowledge. The Ye'cuana roundhouse (fig. 7.19, above) and the *waja* (flat, round basket) pictured here are partially isomorphic in this regard. Baskets also share in the same spatial symbolism found elsewhere in Ye'cuana culture, such as in the layout of house and gardens or in the decoration of the body, ceramics, or other craft items. The motifs in this illustration recall the origins of hunting poisons (frog in center), the shamanic origins of basketry (squares), the acts of the originary Star People (stars as crisscross squares), and the geographical encirclement of the Ye'cuana by white people (white heron as crenellated square around frog).
Photograph by Philip Galgiani. By permission of David M. Guss.

The earliest reference to such elicitation comes from the account of Bartolomé de Las Casas. He relates the story of King João II of Portugal, who ordered one of the Indians whom Columbus had brought to Europe to use fava beans to portray the islands of his homeland, which Columbus claimed to have discovered. "The Indian, quite boldly and readily, indicated the island of Española [Hispaniola], the island of Cuba, the islands of the Lucayos [Bahamas] and others of which he had knowledge." The king then swept the beans aside and made the same re-

40. For an extended discussion of Ralegh's diplomacy and geographical reporting, see Whitehead's introduction to Walter Ralegh [Raleigh], *The Discoverie of the Large, Rich and Bewtiful Empyre of Guiana,* ed. Neil L. Whitehead (Manchester: Manchester University Press; Norman: University of Oklahoma Press, 1997).

41. Robin Wright, "History and Religion of the Baniwa Peoples of the Upper Rio Negro Valley" (Ph.D. diss., Stanford University, 1981), 49–50.

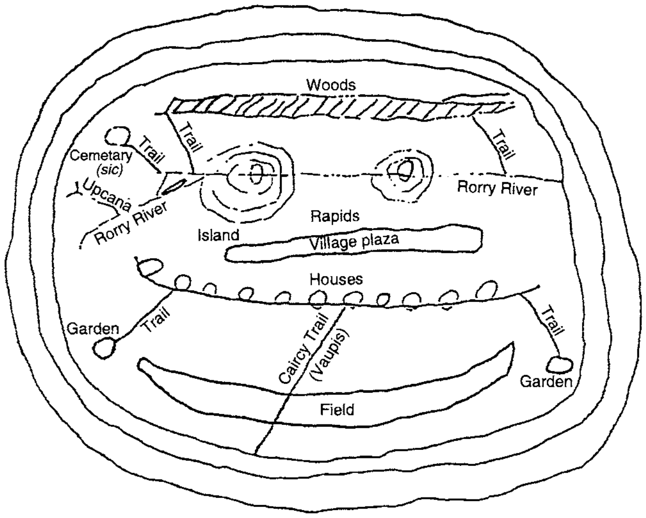


FIG. 7.26. *LIDANA:* MAP OF AN IDEAL BANIWA VILLAGE. The illustration shows the village of Hipana as a sacred center enclosed by three rings defining the world center, a zone of transition, and an outer zone beyond the forest.
By permission of Robin M. Wright, State University of Campinas, Campinas, Brazil.

quest of another Indian, who repeated the same layout of beans but added many more islands, "giving account of all of them in his own language (that no one understood)."[42]

This example underlines the issue broached above concerning the meaning of such apparent cartographic representation, no matter how far it may accord with outsiders' needs and purposes. It seems highly significant that, although the Caribbean islands might have been recognizably represented by the "Indian" through the medium of the bean map, its occasion and form were suggested by his European interrogators. Moreover, once this exercise was extended by the second "Indian," the full meaning of the forms represented could not have been known to the audience because of the language barrier.

Many such exercises in eliciting geographical representations must have taken place during the course of colonial history, but few have been recorded in the literature, and most involve making sand maps to express the basic hydrology or settlement pattern of a region. With the exception of a very early reference in Yves d'Évreux's 1614 account of the lower Amazon,[43] examples come from the nineteenth century and the dawn of ethnographic inquiry, and all are incidents of informants' drawing sketch maps with finger or stick in sand or dirt in response to a specific external inquiry.[44] Much of the material reviewed in the first part of this chapter, however, is drawn from cases where, although pencil and paper were supplied, the requests made were more general so that the results reflected clearer examples of native cartography as cultural expression. The issue here seems to be less a question of cartographic ability than an issue of cartographic forms and purposes.

The Tukano supply an important example for my arguments concerning cultural continuity and the relevance of modern ethnographic examples to an understanding of the past. Many of the materials for this chapter have been drawn from ethnographic publications on the Tukano peoples (Barasana, Desana). Similarities occur in form, style, and content between some of the materials published by Stephen Hugh-Jones in 1982 and those collected over three-quarters of a century earlier by Theodor Koch-Grünberg.[45] Comparing figures 7.7 and 7.8 should immediately suggest stylistic affinities in the representation of the night sky–stippling to indicate stars, the identification of various star paths in the form of celestial anacondas, and the presence of the fish rack, jaguar-caterpillar, and *umari* fence (fish trap) constellations.

One final example of mapping from an elicitation, which seems to draw on a still obscure native tradition of three-dimensional representation, involves modeling landforms. Richard Schomburgk gives a straightforward example, reporting that his request for geographical information produced a map modeled out of sand showing mountains, rivers, and settlements.[46] This recalls the Inka practice, noted by Wendell C. Bennett, of modeling their cities and domains in clay.[47] I have also seen similar clay models produced by the Patamona of Guyana, incorporating a school, hospital, and landing strip as a means of prophetic inducement–to bring these things into being. This also recalls the *lidana* of the Baniwa. It is noteworthy that Thomas Gregor mentions a category of representational forms, or *patalapiri,* that exists among the

42. Bartolomé de las Casas, *Historia de las Indias,* 3 vols. (Hollywood, Fla.: Ediciones del Continente, 1985), 1:324-25.

43. Yves d'Évreux, *Voyage dans le nord du Brésil fait durant les années 1613 et 1614,* ed. Ferdinand Denis (Leipzig: A. Franck, 1864), 70–71.

44. See Alexandre José de Mello Moraes, *Corographia historica, chronographica, genealogica, nobiliaria, e politica do Imperio do Brasil,* 4 vols. (Rio de Janeiro, 1858–63), 2:263–64; William Chandless, "Ascent of the River Purûs," *Journal of the Royal Geographical Society* 36 (1866): 86–118, esp. 106–7; Karl von den Steinen, *Durch Central-Brasilien: Expedition zur Erforschung des Schingú im Jahre 1884* (Leipzig: F. A. Brockhaus, 1886), 247; idem, *Unter den Naturvölkern Zentral- Brasiliens: Reiseschilderung und Ergebnisse der Zweiten Schingú-Expedition, 1887–1888* (Berlin: Dietrich Reimer, 1894), 153; and Theodor Koch-Grünberg, *Anfänge der Kunst im Urwald: Indianer-Handzeichnungen auf seinen Reisen in Brasilien gesammelt* (Berlin: E. Wasmuth, 1905), esp. 55–63.

45. Hugh-Jones, "Pleiades and Scorpius," 187, fig. 2 (note 35), and Koch-Grünberg, *Anfänge der Kunst im Urwald,* pl. 54.

46. Moritz Richard Schomburgk, *Richard Schomburgk's Travels in British Guiana, 1840–1844,* 2 vols., ed. and trans. Walter E. Roth (Georgetown, Guyana, 1922–23), 2:128.

47. Wendell C. Bennett, "Engineering," in *Handbook of South American Indians,* 7 vols., ed. Julian Haynes Steward (Washington, D.C.: United States Government Printing Office, 1949–59), 5:53–65, esp. 58.

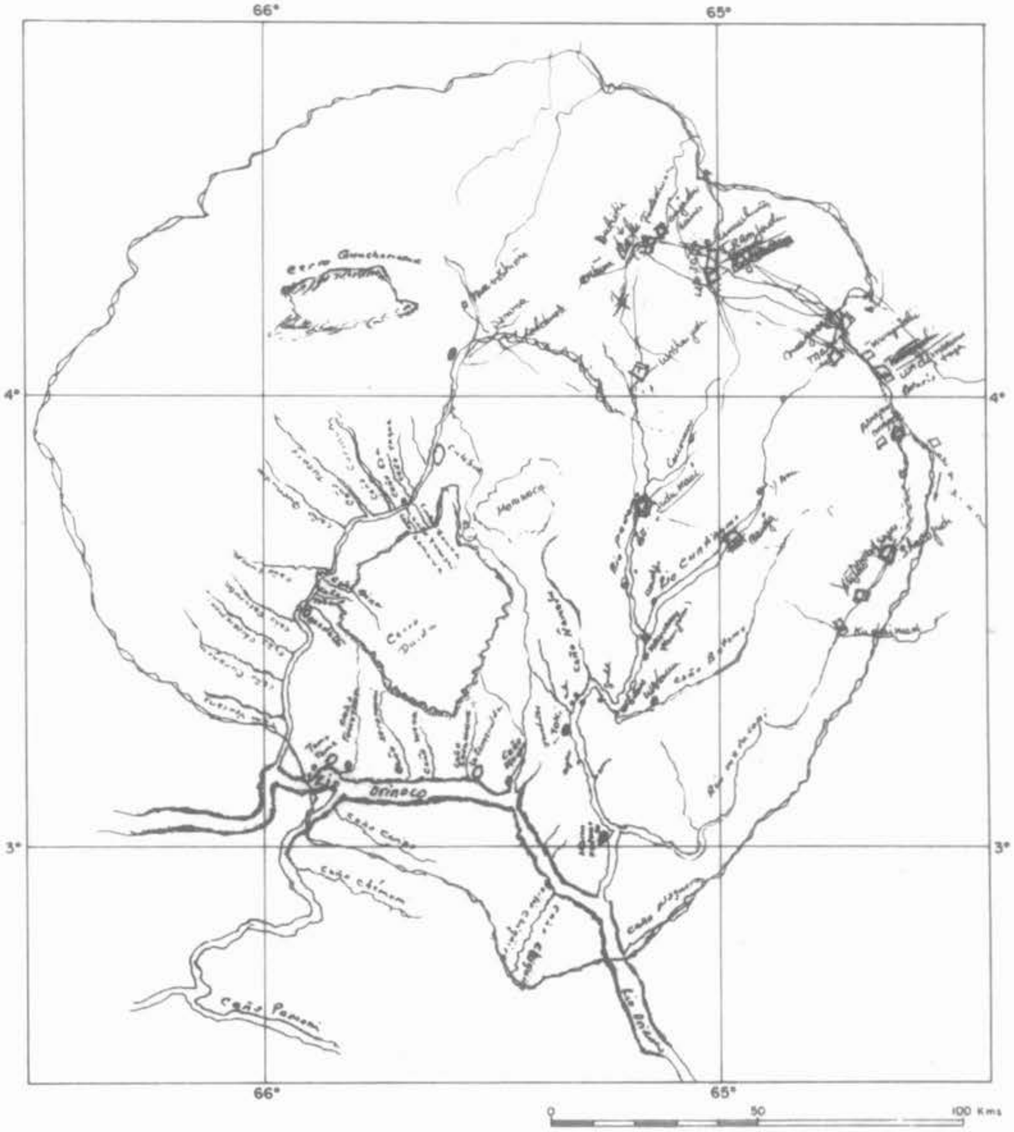


FIG. 7.27. HISTORICAL-CULTURAL MAP MADE BY THE YE'CUANA. This map accurately portrays the upper reaches of the Orinoco River, particularly the Cunucunuma, Padamo, and Matacuni tributaries. It also indicates the sites of ancestral significance for the Ye'cuana. The map was originally printed on transparent paper so that it could be easily superimposed on standard government maps of the region. The accuracy of the native map is thereby emphasized.

From Simeón Jiménez Turón and Abel Perozo, eds., *Esperando a Kuyujani: Tierras, leyes y autodemarcación. Encuentro de comunidades Ye'kuanas del Alto Orinoco* (Caracas: Instituto Venezolano de Investigaciones Cientificas, 1994), 21. By permission of Dra. Nelly Arvelo, Instituto Venezolano de Investigaciones Cientificas, Caracas, Venezuela.

Mehinaku, such that "a *patalapiri* is a representation of something that is real, but the representation also has a reality of its own." [48] This separate reality refers to the role of the representation in realizing prophecy, as in the Patamona case, and alerts us to a wider cultural value present in acts of representation.

In the modern era, the advent of professional anthropology has led to more sensitive attempts to represent native ideas, although the graphic production of spatial information seems particularly important to Western culture, where seeing is knowing and picturing is power.[49] The importance of using Western forms of cartographic

48. Gregor, *Mehinaku*, 41 (note 9).

49. The role of European cartography in supporting indigenous land claims, as in the delineation of the Carib reserve on Dominica, makes these external traditions part of modern native political practice. See Peter Hulme and Neil L. Whitehead, eds., *Wild Majesty: Encounters with Caribs from Columbus to the Present Day, an Anthology* (Oxford: Clarendon Press, 1992), 257 (fig. 24, "Plan of Proposed Boundaries of the Carib Reserve [1901]").

visualization is not lost on contemporary Amerindian leaders, and in the case of the Venezuelan Ye'cuana such an exercise in "autodemarcation" has resulted in a most impressive map (fig. 7.27). The form of presentation most effectively exploits the geographic sensibilities of the Venezuelan government–not least because this region is often "invaded" by miners from Brazil. The presentation of Ye'cuana ancestral claims in such a form is a token of the Ye'cuana's power in their own homeland, even as the occasion of its execution is an imminent threat of the loss of *kuyujani*.[50] The notion of *kuyujani,* like that of *guayupia,* is a form of *lidana* and an example of a *patalapiri* (see fig. 7.26 above). This suggests that it is less cartographic form than cartographic intent that is the key to understanding cultural difference in mapmaking. It now remains to consider how these various forms of native representation contributed to European cartography of lowland South America.

Europeans' Inclusion of Native Information

In discussing the incorporation of native spatial ideas into European maps, it is important to appreciate that geographical information may be transmitted in many ways other than graphic representation, such as gestures, words, songs, and so on. Given the complexity and intricacy of native mapping revealed by the ethnographic reports, one might think there was little possibility for Europeans and indigenous South Americans to understand each other's space-time concepts. In fact, the social context for gathering geographical information from the native population was such that these cultural differences varied in significance. For example, rivers were ostensibly enumerated by name, as were prominent landscape features. However, the gestures Europeans used to attain such identification would have been ambiguous at best; pointing at something with a questioning look does not automatically elicit a particular response. A pointing gesture may be interpreted as applying to almost anything within the field of vision or as having no immediate referent at all. Europeans' inquiries about topography and location beyond the field of view, as in the search for the courses of major rivers or the city of El Dorado, were indeed problematic. Yet it is easy to overwork this cultural contrast and infer that all such information so gathered was the product of native parochialism and nonnative credulity. This certainly happened, but more usually, bilingual native informants were a staple element of European cartographic efforts; for even if geographical knowledge was encoded by differing conceptual schemata, native people were perfectly able to recodify this spatial knowledge in forms intelligible to the Europeans. Indeed, where mutually advantageous endeavors were being contemplated, as in military campaigns against enemy sections of the native population, it was partly in natives' self-interest to do so. That native peoples had geographical intelligence or shared enemies with their would-be conquerors does not mean they did not also deceive the colonizers, or that such misinformation reflected poverty of geographical understanding, as those deceived might assume.[51]

I should also emphasize that such cartographic activities were usually the preserve of indigenous political or religious leaders. Within native societies, managing external relationships with persons or with the divinities that constituted cosmological space was the responsibility of shamans and chiefs. In turn, this elite control of external relations made geographical identification and location an issue of high political and spiritual significance, for which not all individuals were fitted. Consequently and not surprisingly, interest in matters cartographic was restricted to certain classes of persons rather than being a matter of general knowledge. Spatial conceptions were thoroughly infused with a range of cultural attributes whose interpretation was a key characteristic of the art of shamanism or the practice of chieftaincy and not restricted to a particular form of cartography.

A good example of the complex process of translating native geographical concepts into Euclidean space is the "Bericht" (report) of the Arawak native evangelist Jeptha.[52] This report was elicited by Moravian missionaries in the 1740s to aid their work among the unknown indigenous groups of the interior. Their informant, Jeptha, a convert to Christianity, described the major populations, something of their history, and their political relations with the Arawak (Lokono) of the Corantijn River in Suriname. The surviving result, recorded in the diary of the Moravian missionary Felix Staehelin, is not a drawn

50. Simeón Jiménez Turón and Abel Perozo, eds., *Esperando a Kuyujani: Tierras, leyes y autodemarcación. Encuentro de comunidades Ye'kuanas del Alto Orinoco* (Caracas: Instituto Venezolano de Investigaciones Cientificas, 1994).

51. For example, in Walter Ralegh's account of his journey through the Orinoco delta, he records: "When it grew towardes night . . . he tolde us but fower reaches more: when we had rowed fower and fower, we saw no signe. . . . At the last we determined to hang the Pilot, and if we had well knowen the way backe againe by night, he had surely gone. . . . but whether it was best to returne or go on, we began to doubt, suspecting treason in the Pilot more and more: but the poore old Indian ever assured us that it was but a little farther . . . and at last . . . we saw a light, and rowing towards it, we heard the dogs of the village" (Ralegh, *Discoverie*, 161–62 [note 40]). See also John Hemming, *The Search for El Dorado* (London: Joseph, 1978), for comments on the geographical information about El Dorado given to various explorers.

52. Felix Staehelin, *Die Mission der Brüdergemeine in Suriname und Berbice im achtzehnten Jahrhundert,* 3 vols. in 1 (Herrnhut, Germany: Vereins für Brüdergeschichte in Kommission der Unitätsbuchhandlung in Gnadau, [1914]), pt. 2, sec. 2, 173–81. In the original diary, dated 26 May 1751, Jeptha's "Bericht" is on p. 64.

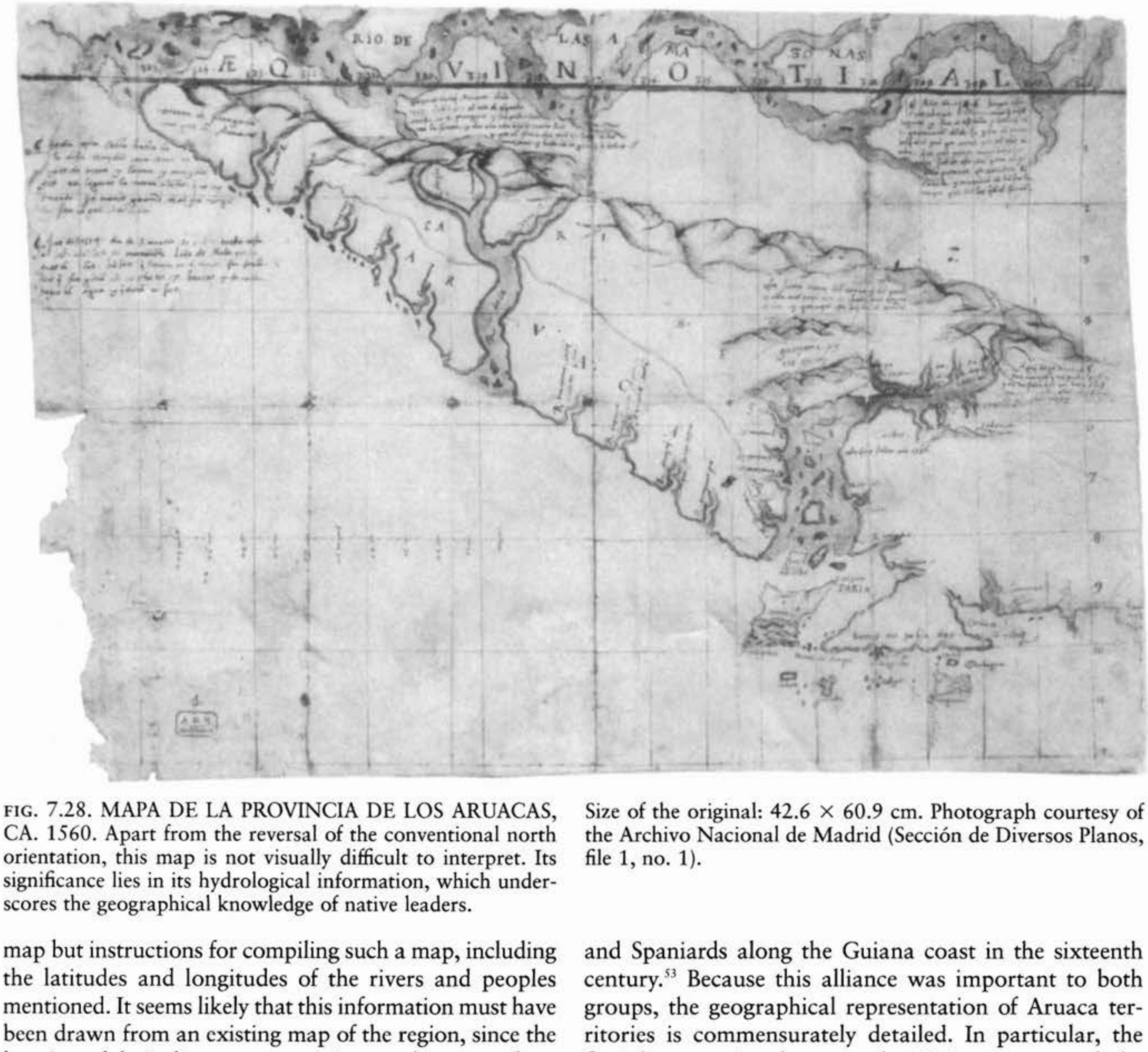


FIG. 7.28. MAPA DE LA PROVINCIA DE LOS ARUACAS, CA. 1560. Apart from the reversal of the conventional north orientation, this map is not visually difficult to interpret. Its significance lies in its hydrological information, which underscores the geographical knowledge of native leaders. Size of the original: 42.6 × 60.9 cm. Photograph courtesy of the Archivo Nacional de Madrid (Sección de Diversos Planos, file 1, no. 1).

map but instructions for compiling such a map, including the latitudes and longitudes of the rivers and peoples mentioned. It seems likely that this information must have been drawn from an existing map of the region, since the location of the indigenous groups is a combination of native sociocultural categories and European geography. It is unusual in that the information pertains to the whole northern part of the continent and indicates that the Pacific Ocean was known to the Arawak, a group inhabiting the Atlantic coast. Jeptha's "Bericht" is therefore a striking piece of evidence illustrating that indigenous groups had knowledge of continental-scale geography through the long trauma of colonial occupation. That this tradition was maintained by the Arawak (Lokono) is perhaps less surprising when one considers that the Mapa de la Provincia de los Aruacas (ca. 1560) is one of the best examples of the inclusion of native information in a European chart (fig. 7.28).

The Mapa de la Provincia de los Aruacas reflects the close alliance of Aruaca (Arawak of the Lokono group) and Spaniards along the Guiana coast in the sixteenth century.[53] Because this alliance was important to both groups, the geographical representation of Aruaca territories is commensurately detailed. In particular, the fluvial connection between the Guiana coast and the Amazon basin is clearly marked at top center, as is the native source for this data. A translation of the inscription reads: "Yayua Arawak chief, in the year 1553, ascended the Essequibo River to its upper region with four canoes and carried these across the mountain ridge, and came upon another river on the other side, and traveled through it to come upon the great river of the Amazons, and found so many people that he returned." This route apparently utilized the Rupununi River, which Ralegh was to associate with El Dorado (see fig. 7.29 below). The connection was well known to the Amerindians, and through them to the Spanish. However, this important

53. Joel Benjamin, "The Naming of the Essequibo River," *Archaeology and Anthropology* 5 (1982): 29–66, esp. 31–33.

fluvial highway became properly known to the Dutch, English, and Portuguese only in the early eighteenth century. That such an important artery of native commerce could have remained enigmatic to the Europeans for so long after its early revelation to the Spanish is directly related to the changing alliances of Europeans and Amerindians.

From the moment Columbus reached the New World, geographical information was critical to further exploration and exploitation. Such knowledge was required not only to identify the location of critical resources or plunder, but also because the enlargement of the world that the event implied upset the European worldview; an unknown region needed to be incorporated into existing European cosmography. Certainly Columbus's diary is filled with geographical observations, as well as reports containing native information on the position of the continental mass, sources of gold, and the location of fearsome *caníba,* thought to be the troops of the Great Khan.[54] But the diary also contains information on various marvels and monstrosities, such as Amazon women inhabiting the island of Matinino and the anthropophagy of the Carib, as well as being infused with an acute cosmological awareness. The naming of the Caribbean Islands, for example, is replete with religious iconography, while the names the Spanish gave to the sea passages between the Gulf of Paria and the Atlantic–Boca del Serpe and Boca del Dragos–recall the serpentine imagery the Amerindians also employed to describe the Orinoco and Amazon.

It is also evident that both Europeans and Americans of the fifteenth century were preoccupied with the spiritual significance of landforms and not just with their physical location. For the native inhabitants of the northern Caribbean at the time of contact with Columbus, the most important places were the endemic caves, the steep mountains rising precipitously from the sea, and the routes by which the magical alloy *guanín* traveled to and from the great encircling continent.[55]

European ideas of geography and of cosmography developed separately over the following centuries. This did not mean that European mapping became any less dependent on native information, merely that its cosmological aspects were codified or excised. This codification of cosmological notions according to geographical criteria is best exemplified by the mapping of El Dorado and particularly the lake of Parime. Although the ostentatious use of goldwork by Amerindian kings in the manner recounted in the reports of El Dorado was verified in a number of cultural contexts, preeminently that of the Colombian Chibcha, Tairona, and Sinú,[56] the general significance of goldwork as a symbol of prestige and authority throughout northern South America meant there were many possible locations where this legend could be grounded.[57] Accordingly, after the plunder of the Colombian gold-using cultures, attention turned to the upper Amazon, where the lake of Parime became Paytiti, and El Dorado was assimilated to a chieftain of the Omagua polity. However, the failure to locate one centralized source of gold meant that the putative location of El Dorado moved once again, this time to its final cartographic placement at the headwaters of the Rio Branco, where a portage is formed in the rainy season to the headwaters of the Rupununi River, a tributary of the Essequibo. This flooded savanna, positioned at the intersection of ancient trade routes between the Amazon and Orinoco basins, was eliminated from Western maps only in the 1840s, after the expeditions into the interior by Robert Schomburgk, an emissary of the Royal Geographical Society.[58] Indigenous political geography had given such significance to this region that it was preserved in nonnative mapping.

The El Dorado legend might not have become so firmly attached to this region had it not been for the efforts of Walter Ralegh, whose voyage and description of the Orinoco region contains a wealth of geographical information collected directly from native informants. Certainly Ralegh also relied on prior Spanish intelligence, but native informants had been paramount in producing these first outlines of the geography of the area.[59] Taken together, these native sources represented a substantive digest of native conceptions, and it is by no means certain that either Ralegh or his Spanish predecessors fully understood the objects of native discourse.[60] Nonetheless, Ralegh's map gave cartographic form to native ideas concerning the units of cultural and geographical significance in the region (fig. 7.29). According to *A Relation of the Second Voyage to Guiana,* by Lawrence Keymis, Ralegh's lieutenant, this chart "invented" the lake of Parime, also

54. Hulme and Whitehead, *Wild Majesty,* 17–28 (note 49).

55. Robiou Lamarche, "Ida y Vuelta a Guanín," 489–90 (note 33), and Antonio M. Stevens Arroyo, *Cave of the Jagua: The Mythological World of the Taínos* (Albuquerque: University of New Mexico Press, 1988), esp. 54, 151.

56. See Warwick Bray, *The Gold of El Dorado,* exhibition catalog (London: Times Newspapers, 1978), and Gerardo Reichel-Dolmatoff, *Orfebreria y chamanismo: Un estudio iconográfico del Museo del Oro* (Medellín: Editorial Colina, 1988).

57. Neil L. Whitehead, "El Dorado, Cannibalism and the Amazons–European Myth and Amerindian Praxis in the Conquest of South America," in *Beeld en Verbeelding van Amerika,* ed. Wil G. Pansters and J. Weerdenberg (Utrecht: University of Utrecht Press, 1992), 53–69.

58. Catherine Alès and Michel Pouyllau, "La conquête de l'inutile: Les géographies imaginaires de l'Eldorado," *L'Homme* 122–24 (1992): 271–308.

59. Ralegh, *Discoverie* (note 40).

60. Neil L. Whitehead, "The Historical Anthropology of Text: The Interpretation of Ralegh's *Discoverie of Guiana,*" *Current Anthropology* 36 (1995): 53–74.

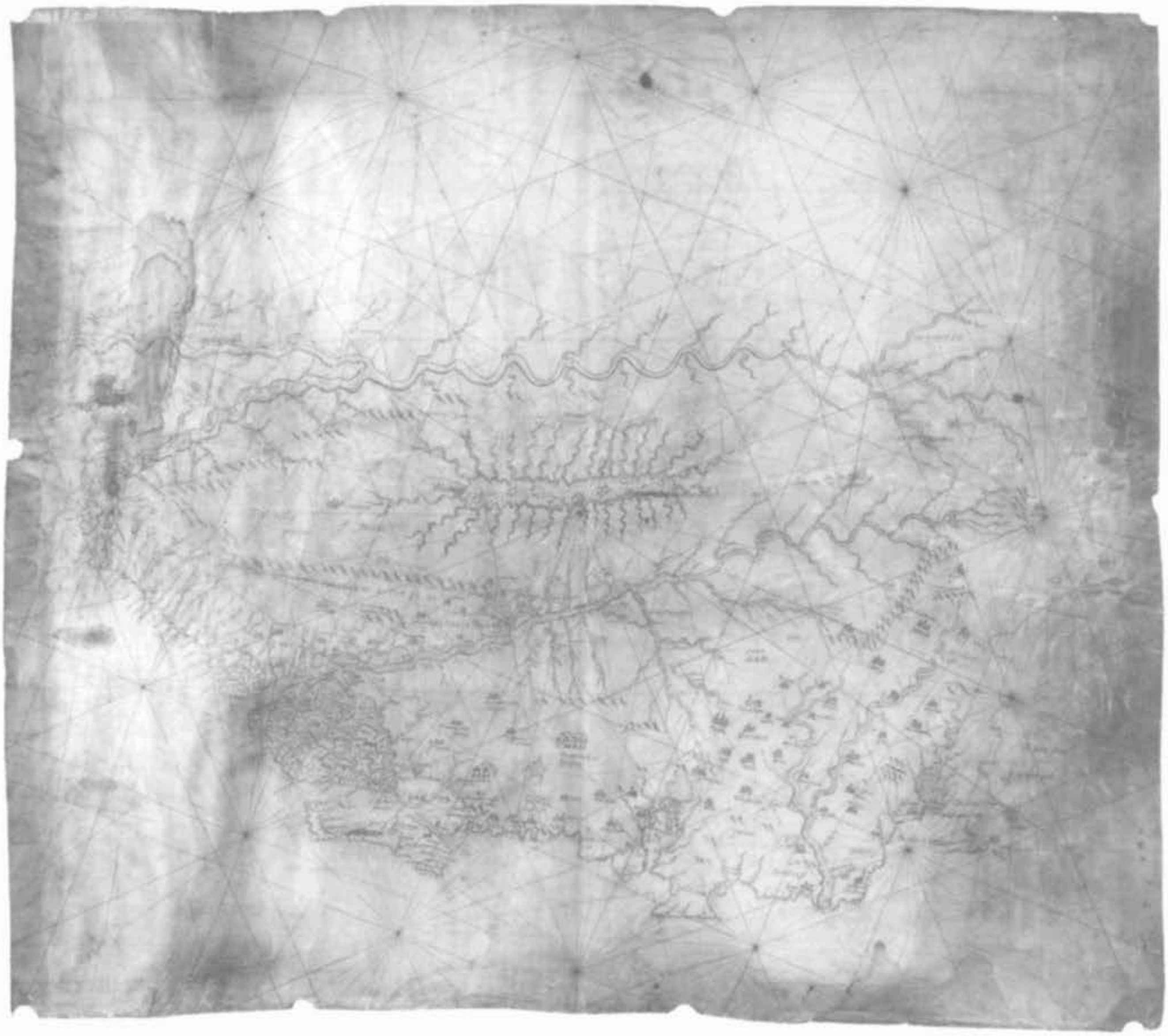


FIG. 7.29. MAP OF GUIANA PREPARED FOR WALTER RALEGH, CA. 1599. It was on the shores of the lake of Parime that Manoa, the fabled city of El Dorado, was supposed to lie. However, the information on El Dorado that Ralegh and his companions collected was not false but misinterpreted. The mapping of the lower Orinoco region was essentially accurate and, as with the Spanish Mapa de la Provincias de los Aruacas (fig. 7.28), effectively illustrates native knowledge rather than European geographical survey. It was Amerindian notions of spatial relationships and not European measurement of them that informed Ralegh's map. South is at the top.
Size of the original: 71.7 × 80.7 cm. By permission of the British Library, London (Add. MS. 17,940A).

termed Roponononowini.[61] It also successfully plots the locations of important Amerindian settlements.

Conclusion

Many native cartographic traditions, especially those in nonvisual mediums, would have been lost without the careful work of ethnographers. Yet the diagrams and figures that result from ethnographic enquiry necessarily conform to nonnative visual conventions. Moreover, where a map does not exist as an independent physical object, the way geographical or cosmological information is communicated is still very much part of the cartographic act. The performance of a song, the experience of hallucinatory trance, the observation of the night sky, and the decision to make a garden are all part of knowing a

61. Lawrence Keymis [Kemys], *A Relation of the Second Voyage to Guiana* (1596; facsimile, Amsterdam: Theatrum Orbis Terrarum, 1968), B4v.

participatory universe; each activity charts that universe in a different way. Knowledge of geographic location alone is only occasionally expressed in abstract cartographic forms, and those forms in turn are often unfamiliar to those of us accustomed to Western graphic representations.

It is therefore the epistemological contrast between the participating individual and the possessing individual that defines the source of difference between indigenous and nonindigenous cartography of South America. Although it was once part of the European tradition to participate more directly in the formulation of the cosmos, it is only our recent journeying to outer space that has returned us once again to the appreciation that the cosmos that we would objectively map is at the same time being subjectively created by us. In visualizing the world, we also locate and define ourselves. This was and is the meaning of the indigenous cartography of lowland South America and the Caribbean.

Traditional Cartography in Arctic and Subarctic Eurasia

8 • Traditional Cartography in Arctic and Subarctic Eurasia

ELENA OKLADNIKOVA

Peoples with traditional cultural characteristics still live along the coast, on the tundra, around the bogs and mountains, and in the taiga to the south of the Arctic Ocean–an almost five-thousand-mile belt extending from northern Scandinavia to the Bering and Chukchi Seas, with an average width of more than five hundred miles. Between the Sami people in the west and the Asian Eskimos in the east there are dozens of ethnic groups, each continuing to practice much of its traditional culture (fig. 8.1).[1] There are fewer than 250,000 people, with an average density of well below one per square mile, but in reality they occupy riverine belts and scattered exclaves. These are separated by vast empty spaces, long unknown except to seasoned travelers and serving to preserve long-standing cultural differences. Nevertheless, these peoples share three important characteristics: environment, economy, and belief system.

Long, cold winters and generally harsh terrain present many hazards and offer relatively few economic resources. The traditional economies are a mix of fishing, hunting, and whaling on the Arctic coast and collecting, freshwater fishing, hunting, and reindeer herding inland. These tasks usually involve seasonal migrations, often over considerable distances and between contrasting environments. Hence the geographical knowledge of many individuals and the shared geographical knowledge of all groups is extensive. Likewise, an intimate knowledge of nature is normal. Indeed, the attitude of Arctic and Subarctic peoples to the world around them is deeply spiritual. "The practice of shamanism is so central all over the Arctic region . . . that it may well be one of the . . . original elements in the northern view of life."[2]

Among other things, shamanism is concerned with the balance between the microcosm of an individual and the macrocosm of nature or the universe. The shaman is the authority on myths, including those telling how life began, how clans developed, and how peoples were given their lands, and detailing totemic links between peoples and animals. Not surprisingly, therefore, myth infuses ideas about nature, and together the two dominate worldviews. Nevertheless, most maps can be placed in one of two classes: cosmographical or geographical. Most of the maps supposedly identified in rock art and many of those incorporated in early modern artifacts are cosmographical or have strong cosmographical components. Conversely, most of those made for Europeans (mainly Russians) in the postcontact period and many made by nonshamans are essentially geographical.

Compared with North America, relatively little of northern Eurasia was covered by permanent ice during the last glaciation. But periglacial conditions were too harsh for humans in what is now the Arctic and much of the Subarctic. Not until approximately five thousand years ago did hunting, fishing, gathering, and somewhat later, reindeer-herding peoples begin to enter from the south. By about three thousand years ago, other peoples, with an Eskimo type of economy, were beginning to colonize favorable areas to the north, especially on the coast.[3] Some of these first Eurasian northerners carved and painted on rocks, or they soon began to do so. The

1. Although connections exist throughout the entire circumpolar region, the Arctic and Subarctic regions of North America are discussed elsewhere in this volume (pp. 135–70). For an example of a work that examines the cosmographic significance of many early North American and Siberian artifacts, especially petroglyphs and masks, see Ye. A. [Elena] Okladnikova, *Model' vselennoy v sisteme obrazov naskal'nogo iskusstva Tikhookeanskogo poberezh'ya Severnoy Ameriki: Problema etnokul'turnykh kontaktov aborigenov Sibiri i korennogo naseleniya Severnoy Ameriki* (Model of the universe in the system of images of rock engravings of North America's Pacific shore: The problem of ethnocultural contacts of the populations of Siberia and North America) (St. Petersburg: MAE RAN, 1995). The diversity of and interrelation between Siberian and American culture is explored through artifacts in William W. Fitzhugh and Aron Crowell, eds., *Crossroads of Continents: Cultures of Siberia and Alaska* (Washington, D.C.: Smithsonian Institution Press, 1988), an exhibition catalog focusing on the remarkable collections of the American Museum of Natural History, New York, the Museum of Anthropology and Ethnography, St. Petersburg, and the National Museum of Natural History, Washington, D.C.

2. Juha Pentikäinen, "Northern Ethnography–Exploring the Fourth World," *Universitas Helsingiensis: The Quarterly of the University of Helsinki*, no. 1 (1993): 20–29, esp. 26.

3. Geoffrey Barraclough, ed., *The Times Atlas of World History*, 4th ed., ed. Geoffrey Parker (Maplewood, N.J.: Hammond, 1993), 36–38, and Christopher Scarre, ed., *Past Worlds: The Times Atlas of Archaeology* (London: Times Books, 1988), 272–73, esp. pl. 1. See also Janusz Kozlowski and Hans-Georg Bandi, "The Paleohistory of Circumpolar Arctic Colonization," in *Unveiling the Arctic*, ed. Louis Rey (Fairbanks: University of Alaska Press for the Arctic Institute of North America, 1984), 359–72.

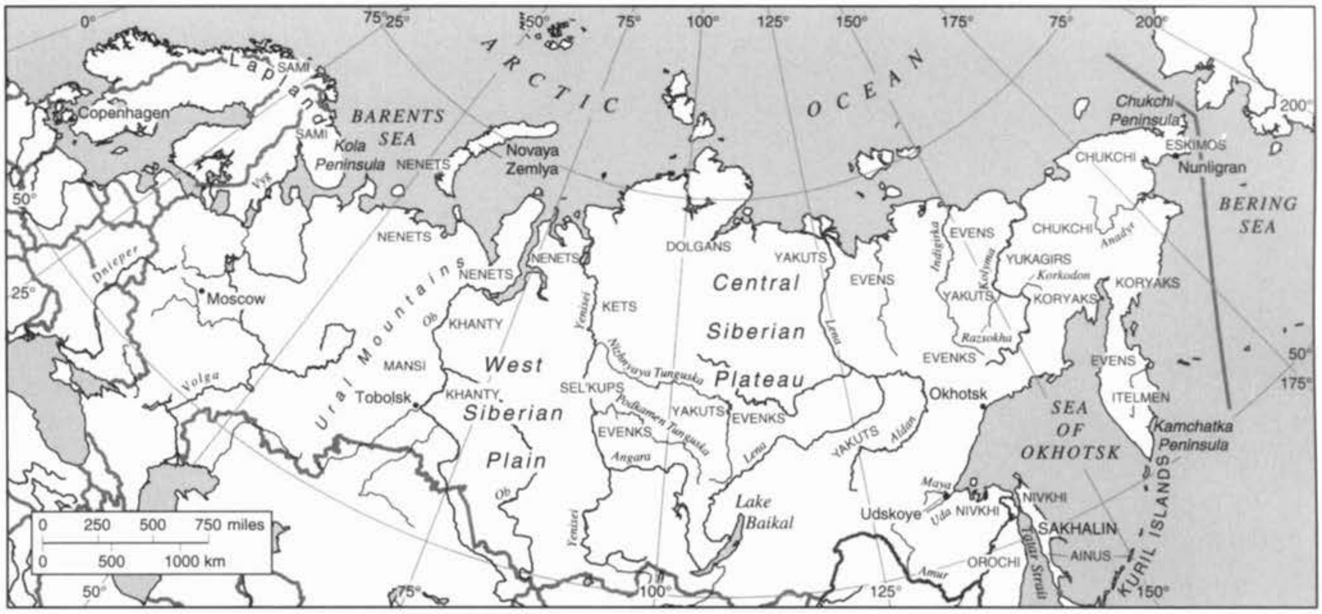


FIG. 8.1. REFERENCE MAP OF THE EURASIAN ARCTIC AND SUBARCTIC.

surviving examples of this rock art provide the earliest indications that they had and could represent spatial understanding of things both mythical and nonmythical.

From the perspective of the civilizations of Europe, the eastern Mediterranean, the Middle East, and China, the Eurasian Arctic and Subarctic were essentially unknown until the fifteenth century.[4] In essence its peoples were still prehistoric. By the end of the fifteenth century, Russia controlled the relatively small part of the region to the west of the Urals. During the next two centuries Cossacks extended the control eastward to the shores of the north Pacific. They were traders rather than hunters, seeking contacts with the indigenous peoples in order to compel them to pay tribute to Russia in furs.[5] They established very few permanent posts, and their records of routes were almost always itineraries; lists of toponyms, with distances between them in travel time but with no indication of direction. They were thus of little use as data from which to compile maps. The Cossacks did, however, sometimes bring back maps made by native peoples.[6] Nicolaas Witsen, in the preface to the second edition (1705) of the book containing his map of north and east Tartary, acknowledged that he had "used a great many imperfect geographical designs of each country or river, particularly those, which, drawn without art, the inhabitants of the said regions themselves or their neighbours have made."[7] Witsen also possessed wooden boards, made in Siberia, engraved with a "description of the country, and which were brought to me with great difficulty."[8] During his brief visit to Moscow in 1665, he had met "Samoyeds, Tartars, Persians, etc." who had laid the foundation for making his map and for writing the book in which it was to be included.[9] There must have been far more use of such cartographic borrowings than has generally been realized.

With the exception of artifacts and records relating to the Sami people of northern Scandinavia, most pertinent materials are held in Russian collections and are inadequately known elsewhere. Likewise, almost all the important secondary literature is in Russian. Even in Russia there has been little attempt to review and draw conclusions about indigenous maps and mapping from the several types of evidence: artifacts, rock art, folklore, shamanism, and printed and archival records.[10] A deeper understanding is still achievable, however, not least because the region's geographical remoteness and the former Soviet Union's constraints on Christian missions to the northern peoples have tended to preserve cultural traditions better than in other regions such as North America.[11] Several tasks still remain: collecting pertinent ethnographic material, recording folklore, visiting key sites, and searching museums, archives, and libraries. Meanwhile, the following is an attempt to review current knowledge about northern peoples' past and recent maps and mapping.

Evidence of Mapping in Prehistory

Some prehistoric rock art resembles the Western idea of a map, though proofs of cartographic function and establishment of terrestrial or mythical referents are never beyond doubt. There are several reasons for uncertainty.

4. For reviews of myths, conjectures, and possible factual knowledge, see Edmond Pognon, "Cosmology and Cartography," Raymond Chevallier, "The Greco-Roman Conception of the North from Pytheas to Tacitus," O. A. W. Dilke, "Geographical Perceptions of the North in Pomponius Mela and Ptolemy," and Piergiorgio Parroni, "Surviving Sources of the Classical Geographers through Late Antiquity and the Medieval Period," all in *Unveiling the Arctic,* ed. Louis Rey (Fairbanks: University of Alaska Press for the Arctic Institute of North America, 1984), 334–40, 341–46, 347–51, and 352–58.

5. The Cossacks operated mainly from Tobolsk, and most of their routes followed major rivers or coastlines, so they probably experienced very little of the vast intervening areas of the West Siberian Plain, Central Siberian Plateau, and the mountainous regions to the east of the Lena River. Felipe Fernández-Armesto, ed., *The Times Atlas of World Exploration: 3,000 Years of Exploring, Explorers, and Mapmaking* (New York: HarperCollins, 1991), 158–59, esp. pl. 2.

6. In most cases it is not clear whether geographical intelligence received from the indigenous population was in graphic or narrative form. "Until well into the eighteenth century . . . Russian cartography [of Siberia] consisted only of manuscript maps, called *chertezhi* [drafts]. . . . Distances were measured mainly in days of travel. The information on which they were based was provided by the reports of cossacks and *promyshlenniki* [traders] who roamed new areas of Siberia in search of sable pelts and the natives to supply them. Their reports contained their own observations as well as information obtained from natives. Often they were accompanied by *chertezhi* made by the informants." Raymond H. Fisher, "The Early Cartography of the Bering Strait Region," in *Unveiling the Arctic,* ed. Louis Rey (Fairbanks: University of Alaska Press for the Arctic Institute of North America, 1984), 574–89, esp. 574–75.

7. Johannes Keuning, "Nicolaas Witsen as a Cartographer," *Imago Mundi* 11 (1954): 95–110, esp. 99.

8. Keuning, "Nicolaas Witsen," 100 (quoted from Witsen, 2d ed. [1705], translated by Keuning). Sometime after 1601 the Dutch merchant Isaac Massa likewise based his engraved 1612 map of the Russian Arctic in part on maps obtained from Samoyeds, probably Nentsy. Leo Bagrow, *History of Cartography,* rev. and enl. R. A. Skelton, trans. D. L. Paisey (London: Watts, 1964; reprinted and enl., Chicago: Precedent, 1985), 172.

9. Keuning, "Nicolaas Witsen," 95–96.

10. Though not exclusively concerned with the Eurasian Arctic and Subarctic, Bruno F. Adler's "Karty pervobytnykh narodov" (Maps of primitive peoples), *Izvestiya Imperatorskago Obshchestva Lyubiteley Yestestvoznaniya, Antropologii i Etnografii: Trudy Geograficheskago Otdeleniya* (Proceedings of the Imperial Society of the Devotees of National Sciences, Anthropology and Ethnography: Transactions of the Division of Geography) 119, no. 2 (1910), is the one partial exception to this statement. Published almost ninety years ago, however, it is conceptually outmoded. Furthermore, there are no published translations of the Russian edition, and among historians of cartography the work is known by repute rather than content.

11. Pentikäinen, "Northern Ethnography," 26 (note 2).

Physical and chemical techniques for dating glyphs and paintings are still in the developmental stage and have rarely been applied. Hence, even where the archaeological record is clear, linking rock art to the culture in which it originated always involves assumptions and speculations. Furthermore, some rock art is polygenetic; later content has been added, often by people possessing little or no knowledge of the earlier culture or cultures and manifesting different cognitive styles. In addition, much of this region's rock art was probably inscribed and painted by spiritual leaders with esoteric knowledge and mystical perspective, and there was certainly a dual meaning for many of their figurative representations.[12]

The most convincing examples of terrestrial cartography in Arctic and Subarctic Eurasian rock art are plans of hunting expeditions. Primary or natural subject matter is manifest, though the engravers may also have intended to convey secondary content, or even intrinsic meaning, to initiated contemporaries. Although topographic features may not be represented, routes or tracks typically provide a nexus, often linking humans and animals involved in an event. Although hunters and prey are represented in profile, their behavior toward each other is meaningful only when perceived in plan.

The Vyg River region in Karelia is rich in petroglyphs, supposedly dating from between 3000 and 1000 B.C.[13] Hunting and fishing scenes are characteristic of these rock drawings. One interesting example was discovered at Zalavruga II in 1963 in the course of excavations by Savvateev. It contained more than 120 depictions of animals and people. The left side of this very large petroglyph represents in plan three men on skis hunting three elk (fig. 8.2). The route the elk have taken is represented by directionally oriented prints of cloven hoofs, followed by the tracks of the hunters.[14]

Rock art of this kind has aspects in common with maps made in other media in postcontact times, some with exclusively mundane functions. But all the authorities on the Karelia petroglyphs–Ravdonikas, Laushkin, Bryusov, Linevskiy, and Savvateev–recognize their mystical character. There is, however, disagreement about what kind of mysticism it was.[15]

Even in as convincing an example of prehistoric cartography as figure 8.2, the artist(s) may have represented secondary content or intended implicit meaning that can rarely be retrieved with any reasonable certainty. The converse is equally problematic–rock art that apparently lacks primary or natural content and is not perceived retrospectively as a map may have embodied spatial representations at a secondary or conventional level. Such possibilities can only be anticipated through indirect evidence embodied in traditions that have persisted into postcontact times or that are found and have been convincingly interpreted in adjacent regions, especially those with early written records. The labyrinth is an example of the latter.

Widely accepted in the Old World as having cosmological connotations, labyrinth signs are also among the most common motifs in Asian prehistoric art.[16] Such signs are generally believed to be associated with the passage of the human soul after death to an afterlife or otherworld. In the Eurasian Arctic and Subarctic, labyrinths occur both as constructions on the ground and as engraved patterns on tombstones or, more commonly, on small tiles found in graves (ca. 100–200 B.C.).[17] Among the most northerly examples is a labyrinth constructed on the ground in stones on the coast of the Kola Peninsula. Ritual structures like this one have been interpreted as models of the universe.[18]

12. The inherent danger in retrospective interpretation in rock art is discussed in the Introduction, p. 7. However, for an interesting cosmographic interpretation of Arctic and Subarctic rock art, see Okladnikova, *Model' vselennoy v sisteme obrazov* (note 1).

13. N. N. Gurina, *Mir glazami drevnego khudozhnika Karelii* (The world through the eyes of an ancient Karelian artist) (Leningrad, 1967), 16 and 18.

14. Yu. A. Savvateev, *Zalavruga: Arkheologicheskie pamyatniki nizov'ya reki Vyg* (Zalavruga: Archaeological monuments of the lower Vyg River), 2 vols. (Leningrad: Nauka, 1970–77), 1:202–13.

15. V. I. Ravdonikas, "Elementy kosmicheskikh predstavleniy v obrazakh naskal'nykh izobrazheniy" (Elements of the notions of cosmos in the images of rock engravings), *Sovetskaya Arkheologiya* (Soviet archeology), no. 4 (1937): 11–32; K. D. Laushkin, "Onezhskoe svyatilishche" (The Onega sanctuary), *Skandinavskiy Sbornik* (Scandinavian collection) 4 (1959): 83–111; A. Ya. Bryusov, *Istoriya drevney Karelii* (The history of ancient Karelia) (Moscow, 1940); A. M. Linevskiy, *Petroglify Karelii* (The petroglyphs of Karelia) (Petrozavodsk, 1939); and Yu. A. Savvateev, *Risunki na skalakh* (Drawings on the rocks) (Petrozavodsk: Karelskoe Knizhnoe Izdatelstvo, 1967). Ravdonikas and Laushkin believe the petroglyphs represent a cosmogonic cult of a solar deity; Linevskiy, Bryusov, and Savvateev interpret them as representations of local hunting-fishing cults.

16. Catherine Delano Smith, "Cartography in the Prehistoric Period in the Old World: Europe, the Middle East, and North Africa," and "Prehistoric Cartography in Asia," both in *The History of Cartography*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:54–101, esp. 87–88, and 2.2 (1994): 1–22, esp. 13. According to Purce, the first spiral known in the history of art is a Paleolithic talisman from a ritual cave burial in the Lake Baikal region, just south of the focus of this chapter. See Jill Purce, *The Mystic Spiral: Journey of the Soul* (New York: Avon, 1974), 100–101, figs. 13–14.

17. D. G. Savinov, "Tesinskie 'labirinty'–K istorii poyavleniya personifitsirovannogo shamanstva v yuzhnoy Sibiri" (The Tesinsk "labyrinths"–To the history of personalized shamanism in southern Siberia), *Kunstkamera: Etnograficheskie tetradi* (Kunstkamera: The ethnographic notebooks) 1 (1993): 35–48, esp. 36. Although they are thought to be part of magic rituals, the exact purpose of the small engraved tiles, often slabs of red stone, is not clear. Savinov hypothesizes that the tiles could be ideographic recordings of shamanistic performances and, specifically, of the ritual of shamans' travel.

18. N. Vinogradov, *Solovetskiye labirinty: Ikh proiskhozhdeniye i mesto v ryadu odnorodnykh doistoricheskikh pamyatnikov* (Labyrinths

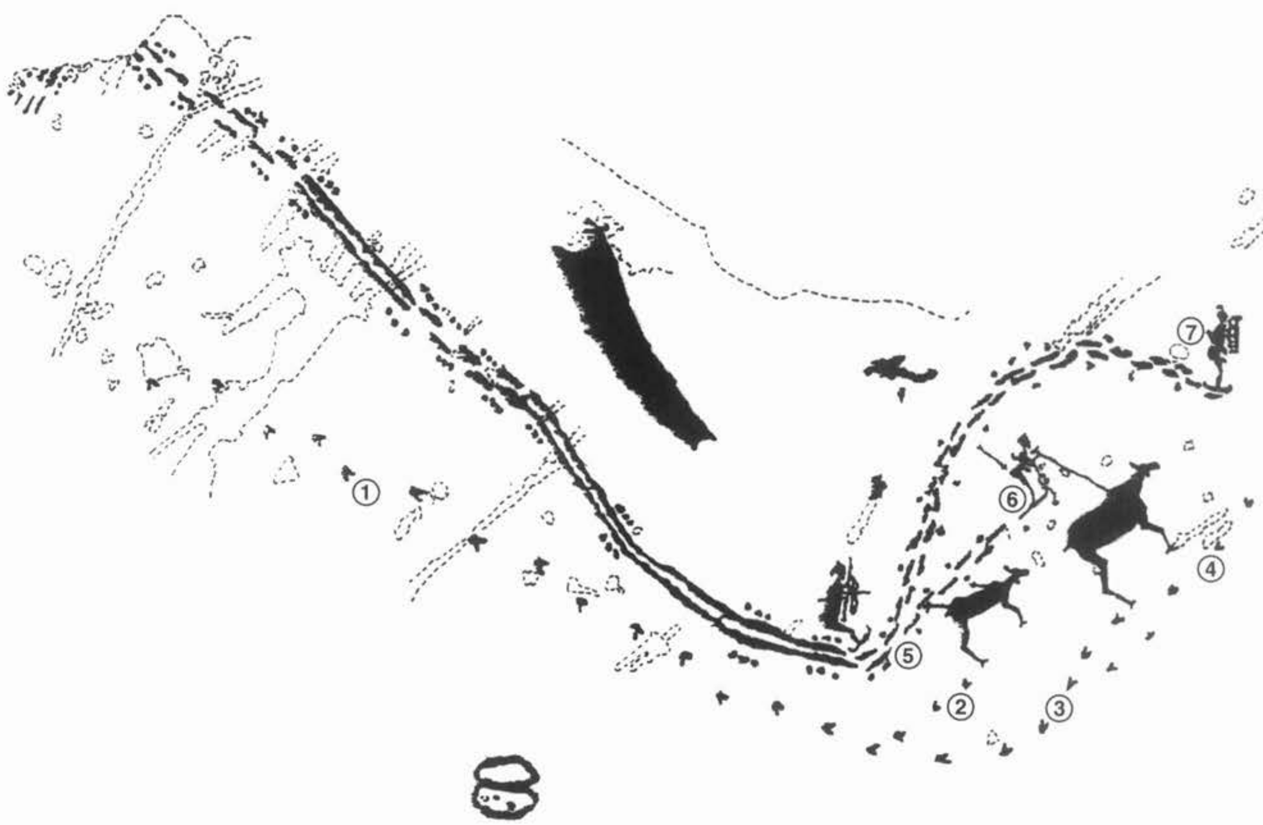


FIG. 8.2. PETROGLYPH FROM KARELIA. The elk's routes are shown: one bold set (1) dividing into three (2, 3, 4), the last of which apparently leads beyond the edge of the glyph and was probably that of a third elk that escaped. The track of the elk is closely followed by that of the hunters–alternating stretches of continuous parallel lines and broken lines positioned in echelon formation. The former almost certainly represents downhill sections of the route, where the skis remained on the snow, while the latter shows level sections where ski trekking was necessary. The latter sections have more dots on each side, perhaps symbolizing the more frequent use of ski poles. The dots occur in groups of three, indicating the number of skiers who passed that way. This is confirmed beyond the bifurcation of the route (at 5) where use by only one skier (6 and 7 respectively) is shown by single dots. One hunter (7), bow in hand, has reached the far end of the ski track; perhaps still pursuing a third elk that had followed track (4) to the edge of the glyph. Another hunter (6) appears to have successfully hit the larger of the two elk represented, but with a spearlike weapon rather than an arrow.
Size of the original: ca. 1.5 × 2.5 m. Designated Zalavruga II (VI). Drawing after Yu. A. Savvateev, *Zalavruga: Arkheologicheskie pamyatniki nizov'ya reki Vyg* (Zalavruga: Archaeological monuments of the lower Vyg River), 2 vols. (Leningrad: Nauka, 1970–77), vol. 1, between 200 and 201.

Labyrinth designs on tombstones and on tiles in graves have been interpreted as representing roads that the souls of the dead must travel to achieve reincarnation or portraying the theme of shamans' travel to the netherworld. They are said to reflect one common theme: the "search for a road, a quest for spiritual destination."[19] The labyrinths in figure 8.3 are from the sepulcher of Esino (Khakasiya), which has more than forty tombstones with labyrinth drawings. They have a spiral pattern that symbolizes the netherworld. Each entire composition could therefore serve the dead as a map for their travels in the lower world.[20]

Cosmographical and Celestial Maps

Many cosmographical maps are incorporated in traditional artifacts associated with shamanism. Parts of the shaman's costume symbolized a three-part world–most often the upper and lower worlds were depicted (some-

of Solovki: Their origins and place among homogeneous prehistoric monuments) (Petrozavodsk, 1947); N. N. Gurina, "Kamennyye labirinty Belomor'ya" (Stone labyrinths of Belomor'ye), *Sovetskaya Arkheologiya* (Soviet archaeology) 10 (1948): 125–42; and A. A. Kuratov, "O kamennykh labirintakh Severnoy Yevropy (Opyt klassifikatsii)" (Stone labyrinths of northern Europe [classification experiment]), *Sovetskaya Arkheologiya* (Soviet archaeology), 1970, no. 1, 34–48.

19. Savinov, "Tesinskie 'labirinty,'" 39 (note 17).

20. Savinov, "Tesinskie 'labirinty,'" 37–40. Another example of similar labyrinth patterns is the sepulchre of Tustukh Kel'; see Yu. S. Khudyakov, "Raboty khakasskogo otryada v 1975 g." (Activities of the Khakass division in 1975), in *Istochniki po arkheologii severnoy Azii (1935–1976 gg.)* (Sources on archaeology of northern Asia, 1935–1976) (Novosibirsk, 1980).

times the middle world). Braids (*kosy*), for example, were attached to tall metallic headdresses, the shamanist crown, or to the suede hats of the Sel'kup shamans. The outer side of the headdress, facing the audience, was decorated with images of spirit helpers, and the braids or fringe symbolized the road by which the spirits rose from the lower world to the upper world (fig. 8.4).[21] Strips of fabric and plaits on a shaman's costume symbolized the same road from the lower world and the roads by which the shaman completed his mystical journey through the various parts of the cosmographical world. One Evenk shaman costume, now in the Yakutsk Museum, Eastern Siberia, provides specific topographic information about a shaman's travels. The costume has stripes of different colors sewn over its ribbons. The archival description of the costume indicates that red stripes mean places "with fire," green stripes represent lush greenery, and blue stripes mean burned-out or swampy areas. The sequence of stripes is also important: each stripe signifies one day of travel and a night stop; space between stripes denotes the length of a day's travel; and stripes made of twisted hair represent turns on the shaman's road where he has to go around obstacles.[22]

Whereas linear ribbons, strips of fabric, and plaits symbolized routes, other decorations symbolized the structure of the universe. Sewn-on depictions of trees with birds in their upper branches symbolized the axis of the universe, the *tura* (world tree), which occupied a central place in many mythologies (fig. 8.5). Horizontal beams connected separate trees or poles making up a *tura,* and thus the entire *tura* represented a "ladder to the heavens." A shaman ascended the ladder during the rituals, and the beams designated resting places. The top of the tree represented the heavenly sphere where spirits favorably disposed to humans lived.[23] According to Shirokogoroff, writing about the Evenks, the *tura* was always on the shaman's apron, the most important part of the Evenk shaman's dress. His description of the *tura* includes a larch tree above which is situated the upper world, *ugidunda.* The upper part contains anthropomorphic symbols representing great shamans (there may be two, four, or eight); the middle part of the design represents the earth, *jorko;* and the lower part represents the lower world.[24] A similar theme is used on sleigh boards and boat cabin doors throughout Siberia (fig. 8.6).

Another decoration of the shaman dress is called *tyngirin* (pendant). The example in figure 8.7 from the shaman costume of the Nerchinsk Evenks depicts the starry sky, with the firmament shown by small dots of stars around the edge. The sun is in the middle, with four stripes of stars radiating out from it. This divides the disk symmetrically into the "four parts of the world."[25]

In northeastern Siberia, the constellations and celestial bodies are important in shamanic tradition. In Chukchi

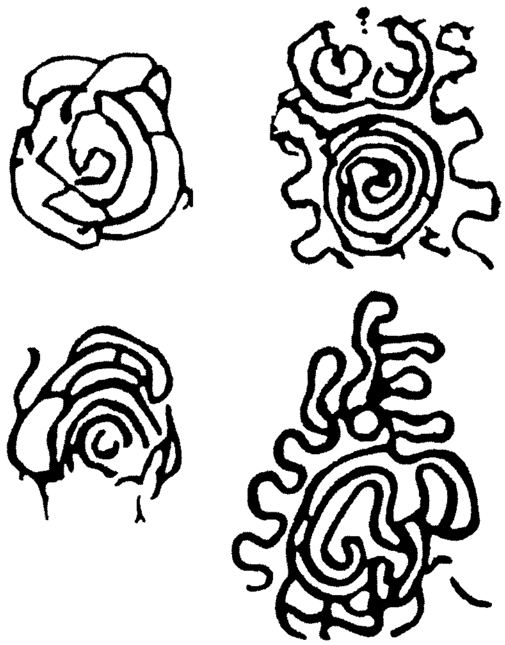


FIG. 8.3. LABYRINTH PATTERNS FROM THE SEPULCHER OF ESINO. The labyrinth spiral patterns represent the netherworld, and the spirals themselves could depict the mythic serpents–masters of the netherworld.
After D. G. Savinov, "Tesinskie 'labirinty'–K istorii poyavleniya personifitsirovannogo shamanstva v yuzhnoy Sibiri" (The Tesinsk "labyrinths"–To the history of personalized shamanism in southern Siberia), *Kunstkamera: Etnograficheskie tetradi* (Kunstkamera: The ethnographic notebooks) 1 (1993): 35–48, esp. fig. 4.

cosmology, shamans going from one world to another have to pass through celestial holes under the Pole Star. Among the Yakuts, stars mark the ways to the upper worlds and are frequently depicted on shamans' clothing. The principal attribute of Koryak shamans was the ability to pass from one world to another. A Koryak shaman's coat collected almost one hundred years ago has recently been shown to incorporate a celestial map (plate 14).

21. S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 66–67; although S. Ia. Serov notes there was no headdress among the maritime shamans ("Guardians and Spirit-Masters of Siberia," in *Crossroads of Continents: Cultures of Siberia and Alaska,* ed. William W. Fitzhugh and Aron Crowell [Washington, D.C.: Smithsonian Institution Press, 1988], 241–55, esp. 246).

Ivanov's encyclopedic work is frequently cited in this chapter. It is a massive collection of sources and information, unparalleled in its comprehensive nature and extensively and accurately footnoted.

22. Ivanov, *Materialy po izobrazitel'nomu,* 134. The description of the costume was made by V. N. Vasiliev, an ethnographer who acquired it in 1926.

23. Ivanov, *Materialy po izobrazitel'nomu,* 141–42.

24. S. M. Shirokogoroff, *Psychomental Complex of the Tungus* (London: Kegan Paul, Trench, Trubner, 1935), 289.

25. Ivanov, *Materialy po izobrazitel'nomu,* 150.

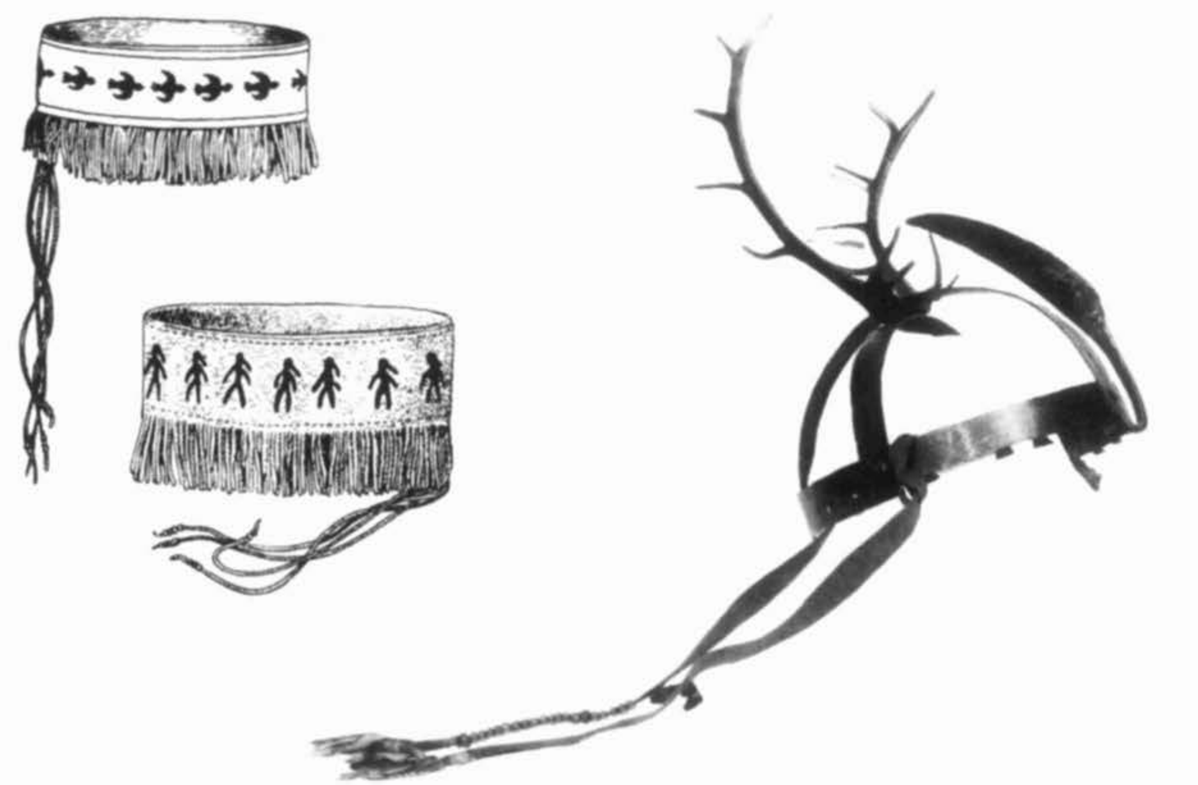


FIG. 8.4. SHAMAN HEADDRESSES. On the left are examples of suede headdresses or headbands with depictions of the spirit helpers on the outside, and on the right is a metal headdress. Braids and fringe represent the roads the spirits traveled to the upper world. The antlers found on some headdresses, especially those of Evens and Evenks, symbolize the protector spirit of the wild reindeer.

Left, from S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 67 (fig. 49). Right, photograph courtesy of the Museum of Anthropology and Ethnography of Peter the Great, St. Petersburg (1048-65).

Made of softened reindeer skin, the coat is decorated with what was long assumed to be a random scatter of bleached hide disks sewn onto its surface. Quite recently the pattern of disks on the front of the coat has been tentatively interpreted as representing the constellations of the Koryaks in the summer and winter skies, with the belt of the coat representing the summer Milky Way (fig. 8.8). Disk diameter is assumed to be proportional to star brightness. A less complicated pattern on the back of the garment is perhaps a winter depiction of the Milky Way and associated constellations. "Significantly, these constellations–if that is indeed what they are–are oriented toward the wearer rather than the viewer and may thus provide the shaman with a star map for his celestial travels."[26]

Shaman drums offer one of the best visual representations of cosmogonic beliefs of the indigenous inhabitants of the Subarctic. The drums were in many cases conceived as cosmographic models. The vast majority that are decorated depict part or all of the universe (figs. 8.9 and 8.10), and despite variations in details, this is a remarkable continuity across the various ethnic groups inhabiting the circumpolar regions.[27] The drums may have the world tree in the middle or other representations of the tripartite (upper, middle, and lower) or bipartite (upper and lower) world, and often the sun and moon are shown. The pictures served as symbolic maps illustrating the mystical shamanic travels in the upper and lower

26. Valérie Chaussonnet and Bernadette Driscoll, "The Bleeding Coat: The Art of North Pacific Ritual Clothing," in *Anthropology of the North Pacific Rim,* ed. William W. Fitzhugh and Valérie Chaussonnet (Washington, D.C.: Smithsonian Institution Press, 1994), 109–31, esp. 117.

27. There is a vast literature on shaman drums in the Arctic and Subarctic. On drums of northern Eurasia, for example, see Ivanov, *Materialy po izobrazitel'nomu,* 70–74, 80–81, 92–96, 104–5, 163–81, 208, 212–13, 316, 368–75, 380–83, and 385 (note 21); M. Jankovics, "Cosmic Models and Siberian Shaman Drums," in *Shamanism in Eurasia,* part 1, ed. Mihály Hoppál (Göttingen: Edition Herodot, 1984), 149–73; Shirokogoroff, *Psychomental Complex,* 297–99 (on Evenk drums) (note 24); and Ye. D. Prokof'eva, "Kostyum sel'kupskogo (ostyako-samoedskogo) shamana" (Costume of Sel'kup shaman), *Sbornik Muzeya Antropologii i Etnografii (Leningrad–St. Petersburg)* (Yearbook of the Museum of Anthropology and Ethnography, Leningrad–St. Petersburg) 11 (1949): 335–75, esp. 343–54 (on Sel'kup drums).

FIG. 8.5. WORLD TREE ON EVENK SHAMAN COSTUME. The world tree, or axis of the universe, is sometimes sewn onto the shaman costume. The upper, middle, and lower worlds are represented.
From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 144 (fig. 41a).

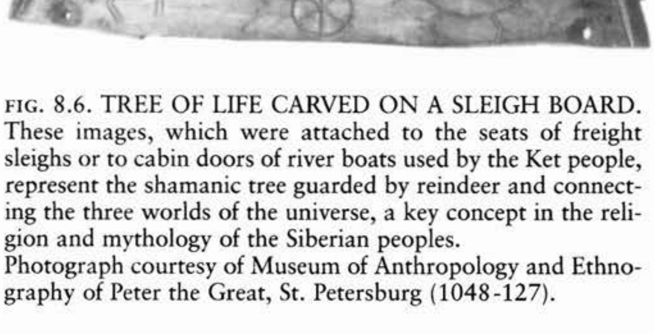


FIG. 8.6. TREE OF LIFE CARVED ON A SLEIGH BOARD. These images, which were attached to the seats of freight sleighs or to cabin doors of river boats used by the Ket people, represent the shamanic tree guarded by reindeer and connecting the three worlds of the universe, a key concept in the religion and mythology of the Siberian peoples.
Photograph courtesy of Museum of Anthropology and Ethnography of Peter the Great, St. Petersburg (1048-127).

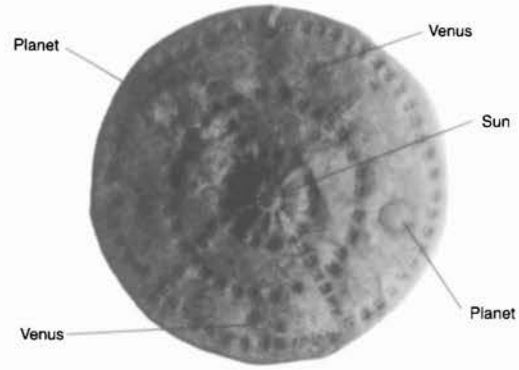


FIG. 8.7. NERCHINSK EVENK *TYNGIRIN*. The celestial components of this pendant worn by shamans are partly stamped and partly engraved. The sun is in the middle, and the disk is said to represent a typical Evenk's "map of the sky" (Ivanov, *Materialy po izobrazitel'nomy*, 150). Venus, in the form of two separate small open circles is shown, along with planets. The plate was acquired by the museum in 1911.
Diameter of the original: 13 cm. Photograph courtesy of the Museum of Anthropology and Ethnography of Peter the Great, St. Petersburg (1859-8).

worlds. Sometimes the surface of the drum represents the earthly world, and other parts of the drum (the sides or back) represent the upper and lower worlds. There are some who believe that particular drums were used for practical topographic orientation during nonshamanic travels, but the evidence for this is strictly anecdotal.[28]

Lapp drums, like those of many other Arctic and Subarctic peoples, were used to call up and enter the spirit world (fig. 8.11). During the seventeenth and eighteenth centuries the Lapps were Christianized. Their "magic" drums, which were considered rare and valuable, were collected by missionaries, travelers, and collectors and were scattered in public and private institutions throughout Europe. Thomas von Westen, a Danish-Norwegian missionary, brought together over one hundred of the drums in 1723 and sent them to Copenhagen, where seventy were tragically destroyed by fire and many of the rest became further scattered. In the early twentieth century there was a concerted effort to inventory all the existing drums, and by the middle of the century, eighty-one had been identified, seventy-one of which were considered complete and authentic. This group of "magic" drums was studied in detail by Ernst Manker.[29]

28. Jankovics, "Cosmic Models," 152, believes that some drums could be used for practical orientation, for example, using small holes symbolizing the Pleiades.

29. Ernst Manker, *Die lappische Zaubertrommel*, 2 vols. (Stockholm, 1938–50); see also idem, *Samefolkets konst* (Stockholm: Askild and Karnekull, 1971). *Die lappische Zaubertrommel* provides extensive documentation on the drums' physical attributes and an in-depth study of the symbols on them.

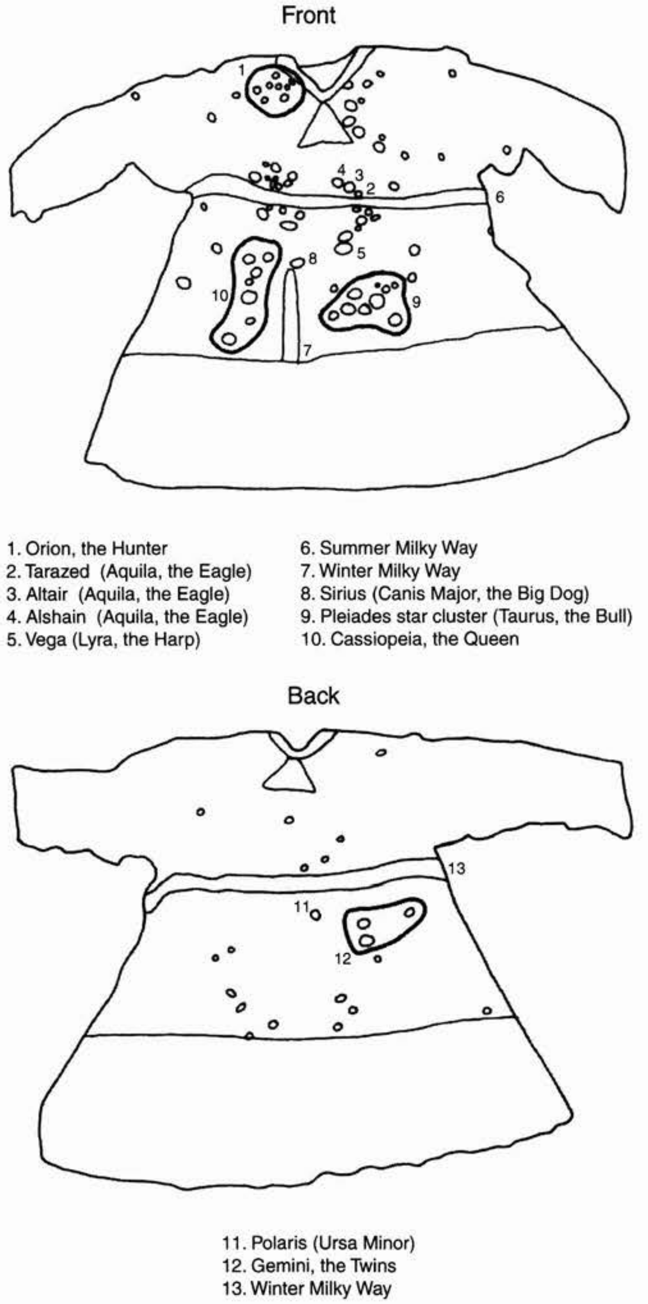


FIG. 8.8. INTERPRETATION OF KORYAK DANCING COAT (PLATE 14). Assuming the false belt is the summer Milky Way on the front, several stars and constellations are identified. On the back the belt represents the winter Milky Way.
Identification by Tom Callen, Air and Space Museum, Smithsonian Institution. After Valérie Chaussonnet and Bernadette Driscoll, "The Bleeding Coat: The Art of North Pacific Ritual Clothing," in *Anthropology of the North Pacific Rim,* ed. William W. Fitzhugh and Valérie Chaussonnet (Washington, D.C.: Smithsonian Institution Press, 1994), 109–31, fig. 7-7.

FIG. 8.9. DOLGAN SHAMAN DRUM. Dots and parallel lines surround this Dolgan drum and make a cross in the middle that divides the drum into four parts. Other drums have a cross in the middle with three short extensions at its ends, symbolizing the "seams of the sky" (Ivanov, *Materialy po izobrazitel'nomy,* 105), and many drums have circles and pictures of reindeer.
Photograph courtesy of the Museum of Anthropology and Ethnography of Peter the Great, St. Petersburg (5658-51).

Models of the universe were drawn at the request of ethnographers. One was made by an Oroch shaman Saveliy and a number of young helpers in 1929 at the request of ethnographers Avrorin and Koz'minskiy.[30] The late date of the map and the extensive dialogue between ethnographers and the Orochi who made it certainly heavily influenced the resulting complex map. Nevertheless, it is an interesting extant artifact that shows the en-

30. V. A. Avrorin and I. I. Koz'minskiy, "Predstavleniya Orochey o vselennoy, o pereselenii dush i puteshestviyakh shamanov, izobrazhennye na 'karte'" (The Orochi's notions of universe, reincarnation of souls, and shamans' travels as depicted in "maps"), *Sbornik Muzeya Antropologii i Etnografii (Leningrad–St. Petersburg)* (Yearbook of the Museum of Anthropology and Ethnography, Leningrad–St. Petersburg) 11 (1949): 324–34.

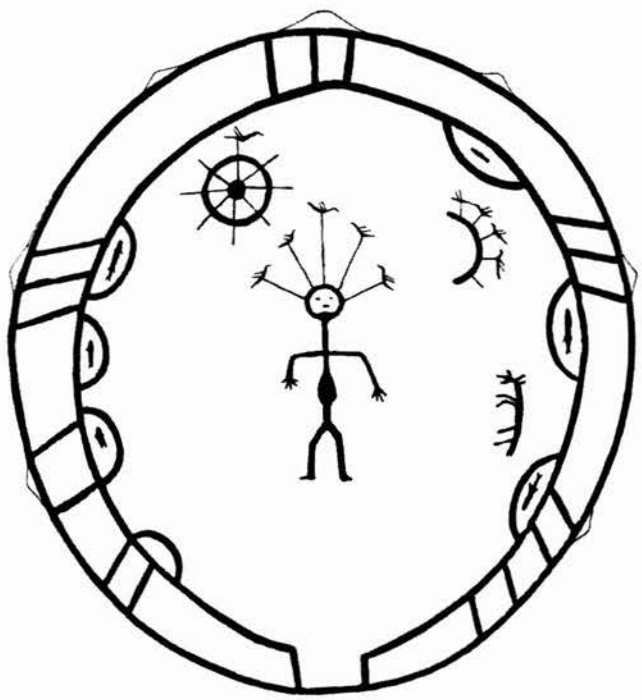


FIG. 8.10. DRAWING OF KET SHAMAN DRUM. In this model of the universe, the edge of the drum has two curved lines with short straight branches representing the supports of the world. The break in the border at the bottom indicates the entrance into the lower world. The seven half circles around the drum represent seven seas; six of them are full of fish, indicated by the depictions of fish inside the half circles (the seventh is a "bad," or empty sea). In the upper part of the drum the sun and moon are drawn. In the center is a large figure of a human with rays emanating from his head, which represent the shaman's thoughts. Along the rim of the drum (not shown here) are anthropomorphic figures, deer, the shaman's tent and staff, a nomad camp, and dogs–possibly scenes from the middle (earthly) world.
Description and drawing from V. I. Anuchin, "Ocherk shamanstva u eniseyskikh ostyakov" (An outline of the Yenisey Ostiaks' shamanism), *Sbornik Muzeya po Antropologii i Etnografii pri Imperatorskoy Akademii Nauk* (Publications of the Museum of Anthropology and Ethnography of the Imperial Academy of Science), 17, pt. 2, no. 2 (1914), esp. 50–51.

tire universe enclosed within an oval (figs. 8.12 and 8.13). The drawing took about fifteen to twenty hours over three or four days. All of the men in Saveliy's clan were present and participated in the drawing sessions, although Saveliy did most of the drawing. As they drew the map, the ethnographers recorded a detailed legend (which was destroyed during World War II but which they later restored). The map depicts the lower, middle, and upper worlds according to Oroch cosmography and describes various mystical journeys of shamans and souls of the dead.

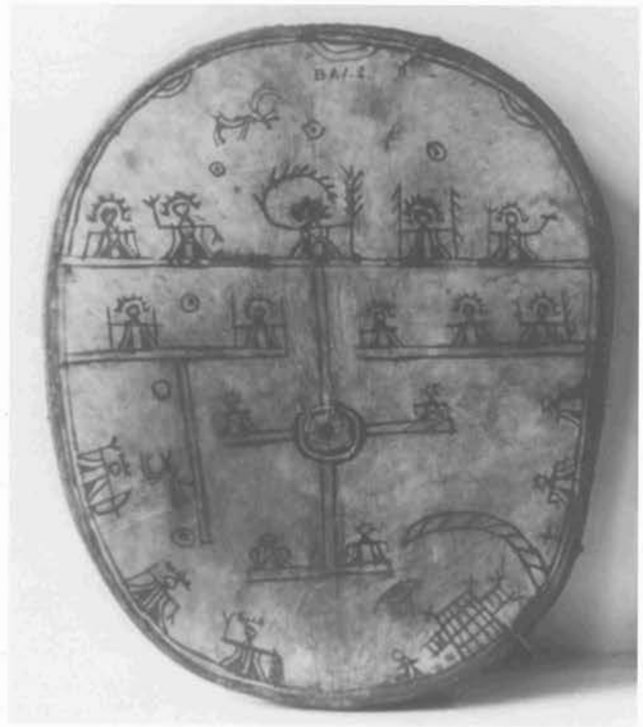


FIG. 8.11. SAMI SHAMAN "MAGIC" DRUM. This pine drum is covered with hardened reindeer skin and painted with reddish brown color from alder bark. It was acquired in 1710; nothing is known of its early history, but it was probably collected by missionaries at the beginning of the eighteenth century. The drum is divided into upper and lower regions by the horizontal line. Above the line in the upper world (the top third of the drum) is a row of five gods often depicted (identified by the position of their arms and the objects they hold). Above the gods are three circles with dots in them, which may represent stars. The reindeer near the circles symbolizes an offering, and the three sets of double-bowed lines at the top of the drum are thought to represent the morning sun, evening sun, and midday or midnight sun. The central figure in the lower two-thirds of the drum is the sun, with one ray connecting the lower region to the upper region. Four human figures are shown on the other sun rays. The three figures in the upper right of this region have been interpreted as Christ and the apostles and as the Holy Trinity; the two figures just below them and standing on the rim of the drum have been seen as human figures, lower-level gods, or "ordinary mortals." The gridded figure decorated with crosses (lower right) signifies a church and churchyard–possibly *jabmeaimo,* the realm of the dead. The three figures at lower left have straight halos, as opposed to the curved halos on some of the other figures, and they represent three goddesses: Sarakka, Juksakka, and Saelgeaedne. The T form on the left is a holy region: it includes two gods, an animal for an offering, and three circles, probably representing stars. Interpretation after Ernst Manker, *Die lappische Zaubertrommel,* 2 vols. (Stockholm, 1938–50), 1: 732–37 and 2:387–89.
Size of the drum: 42.7 × 36.3 × 9.9 cm. Photograph by Kit Weiss. Courtesy of the National Museum of Denmark, Department of Ethnography, Copenhagen.

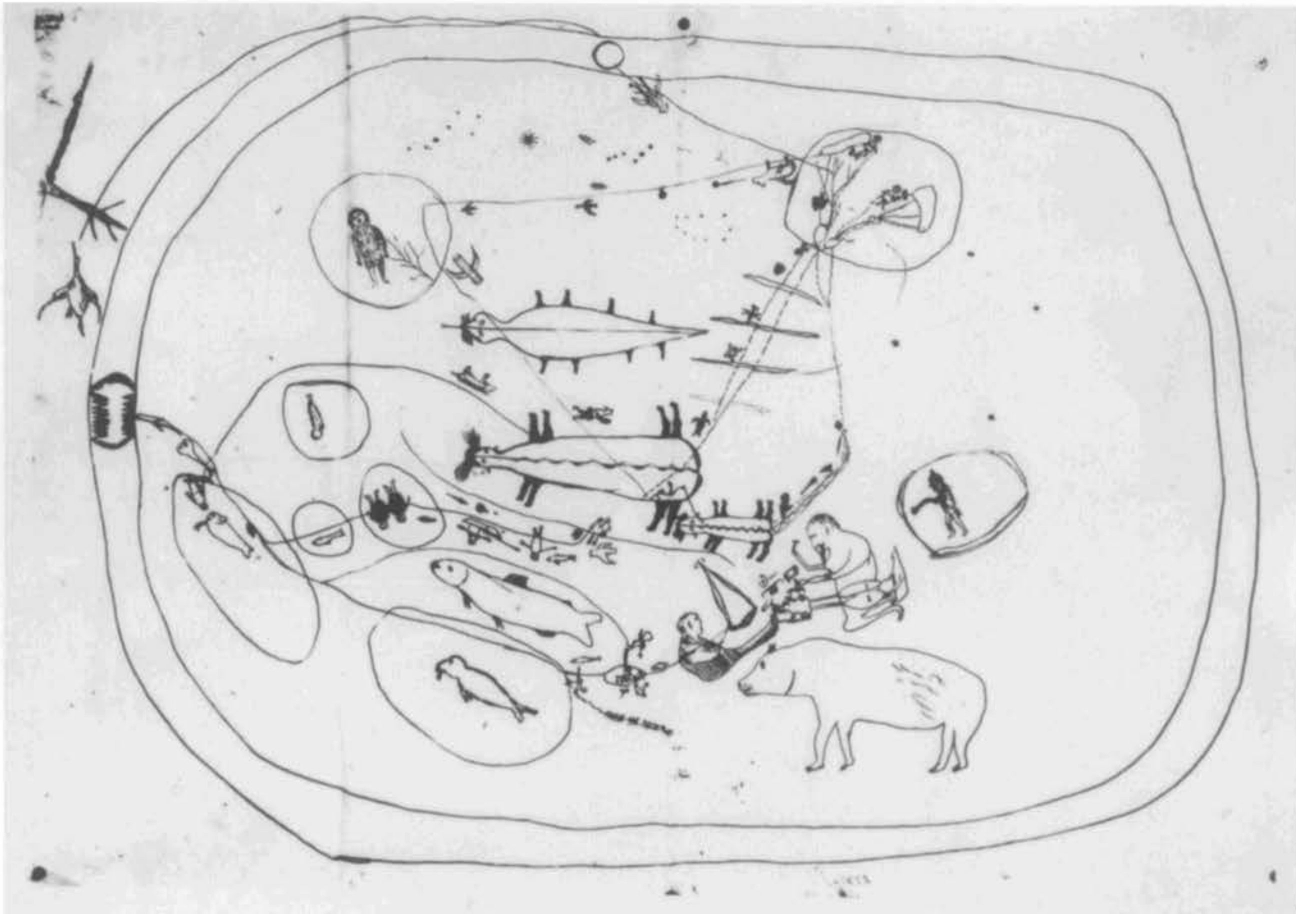


FIG. 8.12. THE UNIVERSE DRAWN FOR ETHNOGRAPHERS BY OROCHI, 1929. Pencil on paper. Photograph courtesy of Museum of Anthropology and Ethnography of Peter the Great, St. Petersburg.

Terrestrial Mapmaking and Maps

Historical Accounts of Mapmaking

With Boris Polevoy

We have several reports of terrestrial maps being made by Arctic and Subarctic peoples after contact. Some maps and accounts of mapping are described in the section on North American cartography above.[31] In the late eighteenth century, members of the La Pérouse expedition asked the inhabitants of Sakhalin

> to outline the shape of their country and that of the Manchus; then one of the old men rose and with the end of his pike drew the coast of Tartary on the west, trending roughly north and south, on the east facing it and in approximately the same direction he drew his island and placing several times his hand on his chest he made us understand that he had just drawn his own country; he had left a strait between Tartary and his island and turning towards our ships which could be seen from the shore he showed by a line that it was passable. To the south of his island he had shown another place and left a strait between them, indicating that it was a route for our vessels. His ability to guess all our questions was very great, but not as considerable as that of a second islander of about thirty years of age who, seeing that the outlines drawn on the sand were disappearing, took one of our pencils with some paper; he drew his island, which he called Tapschoka [a local name for the Kurils or Sakhalin] and, by means of a line, the small river on the banks of which we were standing, which he showed at two-thirds of its length from north to south [possibly the Ilinka River]. . . . All the other islanders were present during this conversation and endorsed their compatriot's comments by their gestures.[32]

A few years later in 1811, Golovnin was surprised at the ability of the local Ainus to interpret Russian maps of the middle Kuril Islands. "Upon seeing our maps of their islands, immediately recognized them . . . [and] told us their

31. For the North American examples, see pp. 135–70.

32. Jean-François de Galaup, comte de La Pérouse, *The Journal of Jean-François de Galaup de la Pérouse, 1785–1788,* 2 vols., ed. and trans. John Dunmore, Publications of the Hakluyt Society, 2d ser., nos. 179–80 (London: Hakluyt Society, 1994–95), 2:289–91.

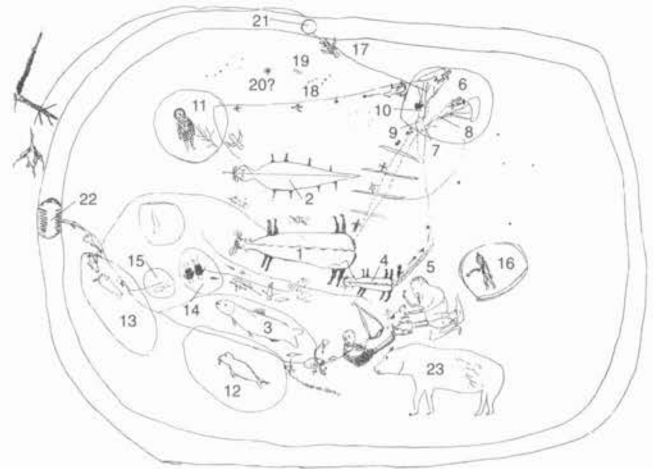


FIG. 8.13. INTERPRETATION OF THE OROCH MAP OF THE UNIVERSE (FIG. 8.12). Ethnographers Avrorin and Koz'minskiy recorded the legend to the map and identified 113 items. The big elk in the center represents the earth or, more specifically, "our [Eurasian] continent" (1). The elk's spine represents a ridge of nine mountains and divides the earth into two parts: the eastern part (populated by the Orochi and related people) and the western part (populated by Russians and the "others"). China is in the elk's head. America and the island of Sakhalin are drawn separately, as a dragon (2) and a fish (3). A smaller elk (4), below the large one, represents the lower world from which one can follow a river (5) to the upper "lunar" world (6). In the upper world are several unnamed lakes and rivers, a "Bear Sea" with a "Bear River" (7 and 8), and a "Tiger Sea" with a "Tiger River" (9 and 10). The image of the "solar world" (11) is to the left of the lunar world and is much less detailed. Around the earth are several seas: walrus sea (12); whale sea (13); sea of the "master of waters" (14); sea of the drowned (15); and cold iced sea (16). Above the earth is "a heaven of monkeys" (17). The monkeys are evil spirits symbolizing smallpox. Celestial phenomena are depicted (tentatively identified as Orion [18], Pleiades [19], and Venus [20?]). The entire universe is confined in a spherical shell: the inside is blue and hard–it is the sky we see. The outside is soft and like cotton wool. There are two openings in the shell: one is straight above the earth (the Pole Star, 21) and the other is underneath (22). The huge bear at 23 is the earthly master of all the animals, even though it was drawn outside the depiction of the earth (1). The other images on the map describe several Oroch legends about cosmogonic travels of souls of the dead and of famous shamans.
Based on V. A. Avrorin and I. I. Koz'minskiy, "Predstavleniya Orochey o vselennoy, o pereselenii dush i puteshestviyakh shamanov, izobrazhennye na 'karte'" (The Orochi's notions of universe, reincarnation of souls, and shamans' travels as depicted in "maps"), *Sbornik Muzeya Antropologii i Etnografii (Leningrad–St. Petersburg)* (Yearbook of the Museum of Anthropology and Ethnography, Leningrad–St. Petersburg) 11 (1949): 324–34.

real names, that is, the Ainu names of the islands."[33] In 1849 Nevel'skoy met with the Nivkhi on northwest Sakhalin. One drew for him in pencil on paper a map of the Amur estuary with names of the regions, another indicated by signs the depth of its channel, and a third drew in sand the borders of the Gilyak (Nivkhi) kingdom.[34]

Very little is known about the procedures and processes involved in mapmaking by natives of the Arctic and Subarctic. German naturalist and traveler Jacob Georgi, who traveled in Siberia in the late eighteenth century, noted that ephemeral maps were drawn by Evenks: "When [Evenks] want to meet at the other places . . . they draw charts with their fingers on snow or on the ground and would meet where they wanted without fail."[35] In the mid-nineteenth century, Sverbeev was surprised by the cartographic speed of the Evenks, even though he had already been told of their cartographic skills. Somewhere near Udskoye, in the Uda Valley, he was visited by four Evenks and decided to test their ability to make maps. Having first named the regions for which he wanted maps drawn,

> I gave each of them a pencil and a piece of paper. To my great amazement, all four did not even think, and not even saying a word they began their work: in an hour the maps were ready, and before me opened up the whole region of Ud up to the smallest details. In these drawings proportions were not observed, but the flow of the main rivers and the direction of mountain ranges coincided with the same meager geographical information that was given to us by Pozdnyakov's general map of Asiatic Russia but with one difference, that the Tungus [Evenks] introduced me to rivers and brooks that were not shown on that map.[36]

33. V. M. Golovnin, *Sokrashchennye zapiski flota kapitana Golovnina o plavanii ego na shlyupe "Diana" dlya opisi Kuril'skikh ostrovov v 1811 g.* (Brief memoirs written by the fleet captain Golovnin about his sailing on the bark "Diana" for an inventory of the Kuril Islands, 1811) (St. Petersburg, 1819), 81–82.

34. B. P. Polevoy, "Podrobnyy otchet G. I. Nevel'skogo o yego istoricheskoy ekspeditsii 1849 g. k ostrovu Sakhalin i ust'yu Amura" (A detailed report by G. I. Nevel'skoy about his historic expedition of 1849 to the island of Sakhalin and the mouth of the Amur), *Strany i narody Vostoka* (Countries and peoples of the East), vol. 8, bk. 2 (1972): 114–49, esp. 134; the ethnographer L. Ia. Shternberg told Adler about the great cartographic abilities of the Nivkhi and delivered to St. Petersburg a "quite accurate" pencil on paper map of southern Sakhalin completed by one of the Nivkhi ("Gilyaki"); see Adler, "Karty pervobytnykh narodov," 154–55 (note 10). Adler provides many examples of "relatively accurate" maps drawn by natives for ethnographers and explorers.

35. Ivanov, *Materialy po izobrazitel'nomu*, 125 (note 21), quoting Georgi.

36. N. Sverbeev, "Proezd s Urchenskoy yarmarki do Udskogo ostroga" (The road from the Urchen Fair to the Udskii Fort), *Vestnik Russkago Geograficheskago Obshchestva* (Herald of the Russian Geographic Society) 4 (1853): 95–109, esp. 108–9. Struve makes cursory mention of Evenk (Tungus) maps, in particular a map of the upper reaches of the Maya River and the system of rivers that flow into the Sea of Okhotsk (B. V. Struve, *Vospominaniya o Sibiri* [Memoirs about Siberia] [St. Petersburg, 1889], 146–47), and Pekarskiy and Tsvetkov

By the late nineteenth century, it was thought that Evenks were outstanding in their ability to express their geographical knowledge on paper, though according to what criteria and on what evidence is not clear,[37] and according to Siberian ethnographers, Evenks knew the complicated system of the taiga rivers well and were clearly able to show this graphically on a birchbark plan, outline, or map. Podgorbunskiy described mapmaking by Evenk Vasiliy Antonov in 1919.

> The method of drawing, used by Antonov, was as follows: first he always indicated the main artery of a region–the River Maya, which was drawn according to direction of flow from upstream to downstream. Then lateral tributaries were drawn from the source of the main river to its estuary, together with other features located along its course. While drawing the maps, which was done with quick and sure movements, as if the draftsman saw the whole complex picture of the hydrographic system right before his eyes, Vasiliy Antonov indicated separate titles [place-names, toponyms] and explained the conventional symbols that he marked on the map.[38]

Rectangles indicated houses because Yakut and Russian houses had four corners (Evenks lived in tipis). Zigzags indicated mountains, but not all mountains were drawn because to do so would leave no room on the map for the rivers. Areas of haymaking were indicated by short parallel lines.[39]

In another example involving the Yukagirs, astronomer E. F. Skvortsov, a participant in I. P. Tolmachev's Arctic expedition of 1908, described how the Yukagir Nicolai Enkachan responded to a request from the expedition's topographer to sketch a geographical outline of the area of the Indigirka and Alazeya. "We simply gasped . . . so outstanding had he drawn everything: rivers, mountains, the directions of all the ranges, supported by the cardinal points, the North was even at the top of his map. We were surprised at such a completely clear presentation of a large region of hundreds of square versts . . . moreover, he had probably never seen a geographic map, and likewise had no understanding of reading."[40]

There is evidence that at least some of these peoples used celestial orientation when making and using maps. Arsen'ev describes, with some amazement, how well Evenks could orient in taiga and tundra, primarily by the stars and the sun.[41] Such celestial orientation in conjunction with mapmaking and map use is exceptional in traditional cultures. How it functioned when the maps were structured topologically is not clear.

It is apparent that well into the twentieth century, European (mainly Russian) explorers and field scientists were surprised and impressed by the facility with which Arctic and Subarctic peoples made maps in the course of contact with Europeans–almost certainly stemming from a vernacular tradition of terrestrial mapmaking.[42] Examples of terrestrial mapmaking survive in several forms and contexts: on bark and wood as a means of communicating spatial information, especially to persons not present; as decorations on vernacular artifacts, where they may or may not have functioned as symbols; and after contact with Europeans and North Americans, perhaps as trade items.

MAPS ON WOOD AND BARK

The wooden boards made in Siberia that Nicolaas Witsen wrote about in 1705 were engraved with a "description of the country," and the "descriptions" were

brought maps drawn by Evenks (Tungus) of the seacoast of Okhotsk (E. K. Pekarskiy and V. P. Tsvetkov, "Ocherki byta priayanskikh Tungusov" [An outline of daily life of the Tungus in the Ayan area], *Sbornik Muzeya po Antropologii i Etnografii pri Imperatorskoy Akademii Nauk* [Publications of the Museum of Anthropology and Ethnography of the Imperial Academy of Sciences], vol. 2, no. 1 [1913], esp. 126). "F. I. Pozdnyakov's Map of Asiatic Russia (1825)" is mentioned in *A Short History of Geographical Science in the Soviet Union,* ed. Innokenty Gerasimov, trans. John Williams (Moscow: Progress, 1976), 90.

37. P. Ye. Ostrovskikh, *Poyezdka na Ozero Yesei* (Journey to Yesei Lake), *Izvestiya Krasnoyarskogo podotdela Vostochno-Sibirskogo otdela Imperatorskogo Geograficheskogo Obshchestva* (Annals of Krasnoyarsk subdivision of the east Siberian division of the department of the Imperial Geographical Society) 1, no. 6 (1904): 21–32, esp. 23.

38. V. I. Podgorbunskiy, "Dve karty Tungusa s reki Mai" (Two maps belonging to a Tungus from the Maia River), *Izvestiya Vostochno-Sibirskogo otdeleniya Russkogo Geograficheskogo Obshchestva* (Annals of the Eastern Siberian chapter of the Russian Geographic Society), 1924, 138–48.

39. Podgorbunskiy, "Dve karty Tungusa s reki Mai."

40. D. A. Shirina, *Ekspeditsionnaya deyatel'nost' Akademii Nauk na Severovostoke Azii, 1861–1917 gg.* (Expeditionary activity of the Academy of Science in Northeast Asia, 1861–1917) (Novosibirsk: Nauka, 1993), 136–37.

41. V. K. Arsen'ev, "V tundre: Iz vospominaniy o pyteshestvii po Vostochnoy Sibiri" (In the tundra: From recollections of the travel in Eastern Siberia), *Novyy Mir* (New world) 11 (1928): 258–66, esp. 264–65.

42. There are also examples of an ability to comprehend in vertical perspective the shapes and patterns of large topographic features. For example, in the middle of the seventeenth century, the Chukchi and Eskimos called the thirty-thousand-square-mile Chukchi Peninsula "the big stone nose" (*bolshoy kamennyy nos*); see B. P. Polevoy, "O tochnom tekste dvukh otpisok Semena Dezhneva 1655 g." (On the accurate text of two of Semyen Dezhnev's reports dated by 1655), *Izvestiya Akademii Nauk SSSR: Seriia geograficheskaia* (Annals of the USSR Academy of Sciences: Geography series) 6 (1965): 101–11.

Although not central to our focus here, there are some well-known examples of Europeans' using native cartographic images for compiling their maps. See, for example, G. M. Vasilevich, "Drevniye geograficheskiye predstavleniya evenkov i risunki kart" (Ancient geographical ideas and map sketches of the Evenk people), *Izvestiya Vsesoyuznogo Geograficheskogo Obshchestva* (Annals of the All-Union Geographical Society) 95, no. 4 (1963): 306–19, and A. V. Postnikov, "Kartografiya v tvorchestve P. A. Kropotkina" (Cartography in P. A. Kropotkin's studies), in *P. A. Kropotkin i sovremennost* (P. A. Kropotkin and modernity) (Moscow, 1993), 80–92.

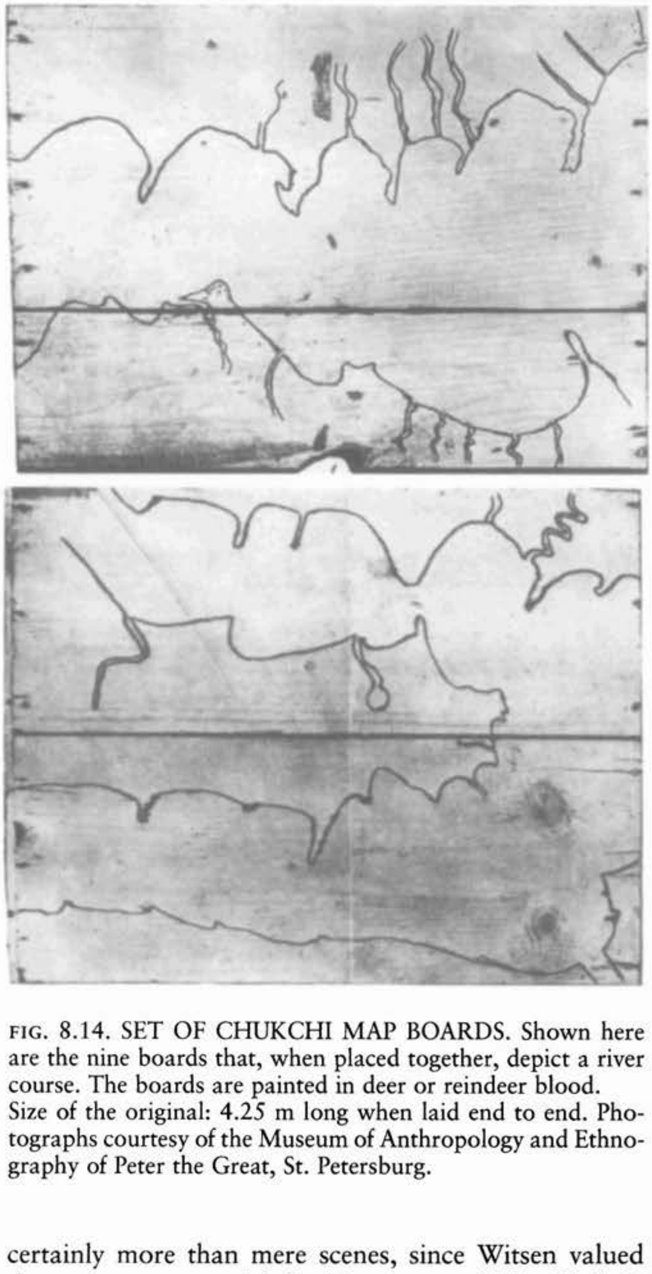


FIG. 8.14. SET OF CHUKCHI MAP BOARDS. Shown here are the nine boards that, when placed together, depict a river course. The boards are painted in deer or reindeer blood. Size of the original: 4.25 m long when laid end to end. Photographs courtesy of the Museum of Anthropology and Ethnography of Peter the Great, St. Petersburg.

certainly more than mere scenes, since Witsen valued them as source materials for his own map.[43] The Chukchi made maps on large wooden boards (*derevyannye planshety*), and two nearly identical sets, with nine boards in each set, are extant. Each of the boards contains a detailed section of a river. One set, at the Museum of Anthropology and Ethnography of Peter the Great, was brought to St. Petersburg in 1898 by the Russian ethnographer N. L. Gondatti (fig. 8.14).[44] The second set was brought to the Anthropological Museum of Moscow State University. The boards depict the flow of a river, and when they are laid end to end they fit together in a large double curve (see fig. 8.15).[45] Gondatti did not provide any description or discussion of them, and we do not know in what circumstances any of them were made or the exact relation between the two sets (whether they

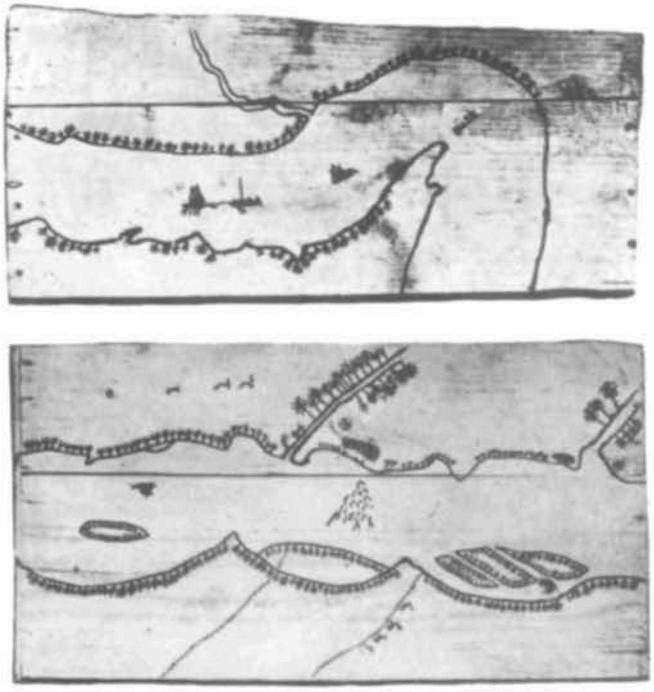


FIG. 8.14. (*continued*)

were made by the same person, and whether one was a copy of the other).

How the maps on boards were used is still not known, but their total length when put together is 4.25 meters, indicating that they were not intended to be portable. As a unified composition, the map depicts everyday life along the river. The largest of the boards shows the mouth of the river with an irregular shoreline and smallish coves with tributaries entering them. Upstream the river makes a tight turn and narrows. Shrubs are shown along the bank, and farther upriver there are bushes and trees, islands and sandbars, deer paths and deer approaching the banks from all directions. In the river itself are boats, deer, and deer hunters. Four hunters' cabins are depicted along the shoreline on the last board.[46]

The Chukchi maps on boards, acquired in the late nineteenth century, appear remarkably sophisticated. After more than one hundred years of Russian activity in the

43. See above, p. 330.

44. Briefly mentioned by V. G. Bogoraz, "Ocherk material'nago byta olennykh Chukchey" (An outline of daily life of the reindeer Chukchi), *Sbornik Muzeya po Antropologii i Etnografii pri Imperatorskoy Akademii Nauk* (Publications of the Museum of Anthropology and Ethnography of the Imperial Academy of Sciences) 2 (1901), esp. 55. The most detailed discussion of this set of maps is provided by Adler, "Karty pervobytnykh narodov," 61–62 (note 10).

45. Adler, "Karty pervobytnykh narodov," 62–63, identifies the river as the Anadyr and provides a comparison of the boards to a modern map of the region; Ivanov, *Materialy po izobrazitel'nomu* (note 21), does not specify what river is depicted.

46. Ivanov, *Materialy po izobrazitel'nomu,* 454–56.

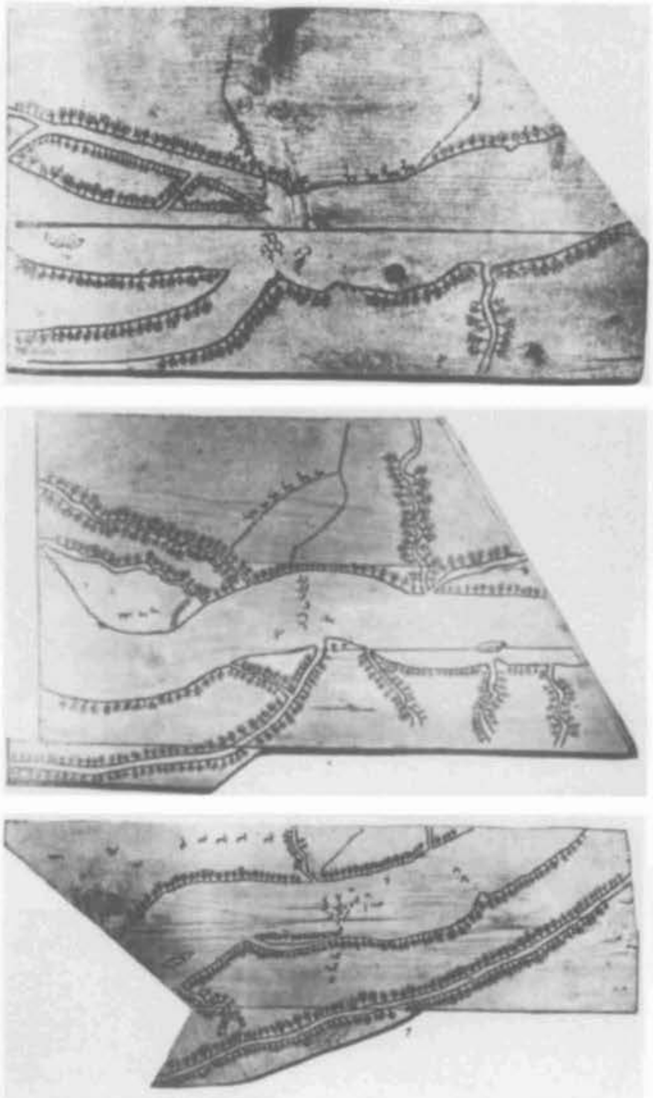


FIG. 8.14. (*continued*)

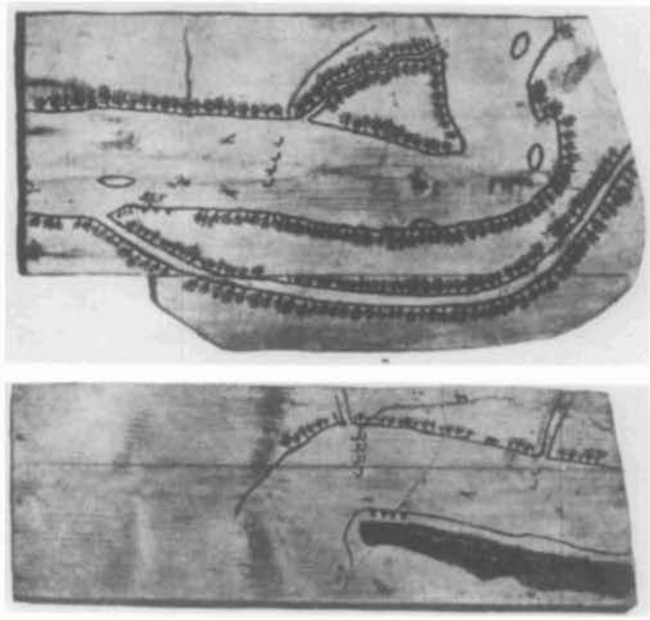


FIG. 8.14. (*continued*)

region, some recent acculturation is a distinct possibility, but the tradition of making maps on wooden boards is probably much older; Witsen's reference was made nearly two hundred years earlier.

In 1887 several wooden boards engraved with pictographs were sent to the Imperial Russian Geographical Society. Made by Mansi hunters from the taiga of the West Siberian Plain, who called them beast signs (*zverinye znaki*), they are small boards (approximately 8×11 cm), usually carved on both sides, and abstract in content (to the extent of being virtually unintelligible to the uninitiated) (fig. 8.16). The boards were probably made relatively close to the time they were obtained in the late nineteenth century. They have been interpreted as showing squirrels, dogs, people, boats, wolverines, otters, and hunters and hunting scenes–including Mansi hunters telling who went where and what kind of beasts they killed.[47] In some examples, directionality is indicated by animal tracks. The function of the boards is not known.[48]

The boards made by the Mansi are related in style to pictographs on two other wooden media that at least in some cases are maps: messages inscribed on birchbark and paintings on blazed tree trunks. Whereas in North America there are no equivalents of maps on boards, inscribing on birchbark and painting on trees seem to be circumpolar traits.[49] We know that birchbark was used for household items.[50]

Inscribing maps on birchbark was probably widespread but is particularly associated with the Evenks and Yukagirs in the Arctic and Subarctic regions. Especially on hunting expeditions, birchbark pictographic messages would be inserted in conspicuously placed cleft sticks that were intended to be seen by persons coming along later. Important information included modes and directions of travel, routes already followed and those proposed, topographic and hydrographic features, and events associated with the hunt. Hence they tended to be maps in both form and function. Placing birchbark messages in this way is almost identical to the widespread practice of Indians in northeast North America.[51]

47. K. Nosilov, *U vogulov* (Among the Voguls) (St. Petersburg, 1904), 231.

48. Ivanov, *Materialy po izobrazitel'nomu,* 18–19 (note 21).

49. See above, pp. 135–36, 142–43, for example.

50. Ye. N. Orlova, "Naselenye po r.r. Keti i Tymu, yego sostav, khozyaystvo i byt" (The population of the river basins of Ket' and Tym, its composition, economy, and daily life), *Raboty Nauchno-Promyslovoy Ekspeditsii po Izucheniyu Reki Obi i Yeye Basseyna* (Transactions of the scientific and economic expedition for exploration of the river Ob' and its basin) (Krasnoyarsk) 1, no. 4 (1928).

51. In the Arctic and Subarctic, there were both men's and women's

Birchbark messages were collected from the Yukagirs by the ethnographers S. Shargorodskiy and V. I. Iokhel'son. The originals, which are not known to exist, were carved with a knife tip on birchbark; however, those shown here (figs. 8.17–8.19) were drawn and published by Iokhel'son.[52] One example, figure 8.17, is akin in many respects to the Vyg River petroglyph described above (fig. 8.2). Another birchbark message collected at the same time is much less ambiguous concerning the nature of the routes being followed (fig. 8.18). Its map quality derives from its representing a complex part of a river system, one tributary of which has a weir or rapid on it. Anyone who knew the region's drainage system could have identified these locations with considerable precision. In this respect it has much in common with the map inscribed on birchbark that was found in 1841 on the watershed between the Ottawa River and Lake Huron (see above, pp. 84–85 and fig. 4.24). In both cases the representation of the hydrology is realistic, tents mark settlements or temporary camps, and the orientation and occupants of boats and canoes may indicate direction of movement. One final example, collected at the same time, is perhaps the most clearly cartographic depiction of a river system (fig. 8.19).

Painting and drawing maps on blazed tree trunks was a more conspicuous way of leaving messages for persons expected to pass by. The archaeologist E. D. Strelov reported that in following Evenk paths between the upper reaches of the Lena and Aldan Rivers, he frequently found blazed trees bearing drawings filled in with coal.[53] In 1903 A. A. Makarenko found drawings on hewn portions of pine trees in the valley of the Podkamen Tunguska, near the southwest edge of the Central Siberian Plateau.[54] At least some of these were topographic (fig. 8.20).

Khant signs were found between 1934 and 1938 in the upper reaches of the Amnya River and in the area of Num Lake (fig. 8.21).[55] The original signs were carved on birch trees with hunting knives; their size is unknown. The drawings reproduced here were made by ethnographer I. S. Gudkova. Gudkova left no written account of her work, and therefore the descriptions of these drawings, published after her death, are sparse.[56] Common depictions in the birch tree carvings include animals, hunting scenes, human figures, and water arteries. In this swampy region near the northern edge of the taiga, where freshwater fish are an important part of the diet, many of the signs depict fishing in plan view. Such plans are evidently part of a wider regional tradition.

Though done in pencil on paper–not painted or engraved on a blazed tree–a very similar plan of a fishing

birchbark messages; see Ivanov, *Materialy po izobrazitel'nomu*, 519–20 (note 21).

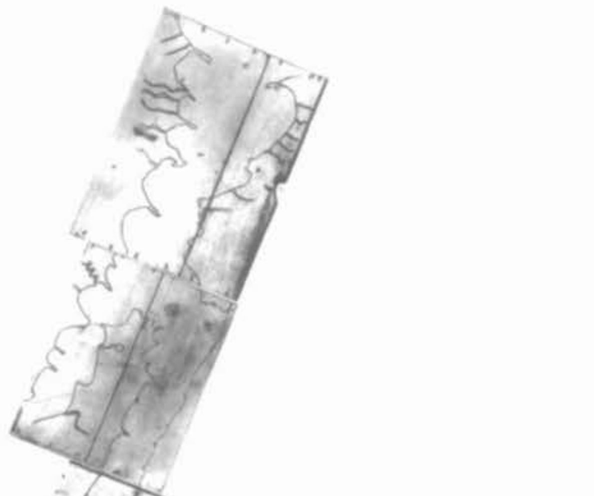


FIG. 8.15. CHUKCHI MAP BOARDS JOINED TOGETHER. The nine boards fit together to show a river course.

52. V. I. Iokhel'son, "Po rekam Yasachnoy i Korkodonu" (Along the rivers Yasachnia and Korkodon), *Izvestiya Imperatorskago Russago Geograficheskago Obshchestva* (Proceedings of the Russian Geographical Society) 34, no. 3 (1898): 255–90.

53. Strelov's letter is cited by N. N. Gribanovskiy, "Svedeniya o pisanitsakh Yakutii" (Information about Yakut petroglyphs), *Sovetskaya Arkheologiya* (Soviet archaeology) 8 (1946): 281–84.

54. Ivanov, *Materialy po izobrazitel'nomu*, 124–25 (note 21) (no reference to Makarenko is provided).

55. Ivanov, *Materialy po izobrazitel'nomu*, 21–22.

56. The drawings were published by V. V. Senkevich-Gudkova, "K voprosu o piktograficheskom pis'me u kazymskikh khantov" (To the question of a picture language of the Kazym Khanty), *Sbornik Muzeya Antropologii i Etnografii (Leningrad–St. Petersburg)* (Yearbook of the Museum of Anthropology and Ethnography, Leningrad–St. Petersburg) 11 (1949): 171–74.

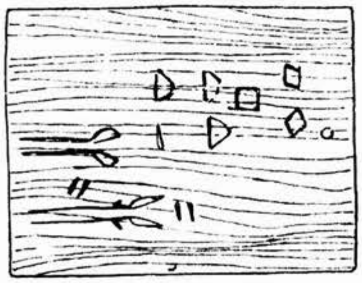


FIG. 8.16. MANSI PICTOGRAPHS ON BOARD, PROBABLY LATE NINETEENTH CENTURY. On this side of the board are carved the legs of two elk, the paw marks of a bear, and two pairs of short strokes indicating two hunters and, probably, two dogs.
Size of the original: ca. 8 × 11 cm. From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izdvo Akademii Nauk SSSR, 1954), 19 (fig. 1, no. 1).

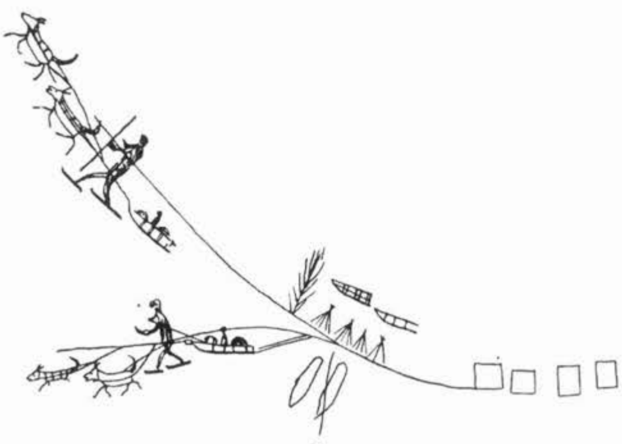


FIG. 8.17. YUKAGIR MESSAGE ON BIRCHBARK. This redrawing by the ethnographer V. I. Iokhel'son, who collected the original message, shows four tents and two loaded dog-drawn sleds, each accompanied by one man on skis. Whether the continuous lines might have been intended to mark routes or a bifurcating river system up whose two branches the men were traveling is not known.
From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 522 (fig. 83, no. 1).

scene was drawn in 1901 by a Sel'kup from the region immediately to the east (fig. 8.22). The drawing was made with several other drawings at an ethnographer's request and shows in plan a stream and a fish trap and scoop.[57] In the 1930s the originals were in P. Ye. Ostrovskikh's private collection.

Whether engraved on bark or drawn on blazed tree trunks, these spatial messages of northern peoples almost always represent small areas and as such are comparable

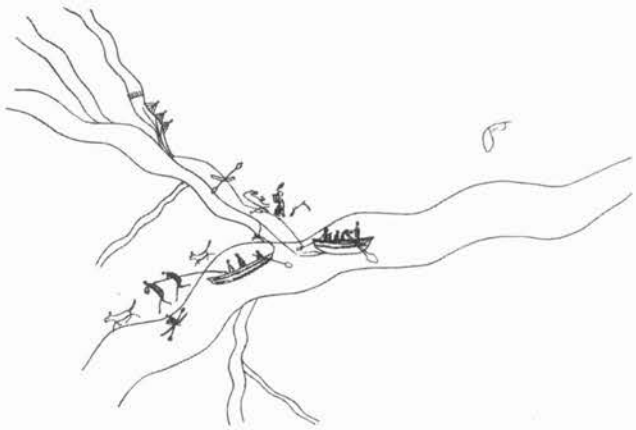


FIG. 8.18. YUKAGIR BIRCHBARK MESSAGE MAP OF GROUP TRAVELING ON RIVER. This redrawing by the ethnographer V. I. Iokhel'son, who collected the original message, shows a large boat, a smaller boat pulled by two people, and a canoe. The larger boat and the boat being pulled appear to be going in opposite directions.
From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 523 (fig. 83, no. 3).

to plans or large-scale maps. Furthermore, because they were intended to inform persons not present, they emphasize distinctive locative characteristics, such as shapes of lakes, and unique patterns, such as drainage networks. Because they represent small areas, it is now difficult to relate them to their ground referents unless they were carefully documented when collected.

DECORATIVE AND TRADE MAPS

Maps were sometimes used to decorate ceremonial items. Among the Nivkhi, an Amur River culture, bear hunting was very prestigious and was accompanied by elaborate ritual.[58] Handles of ritual vessels used during the annual winter bear festival were carved with map elements depicting events in the hunters' chronicle: the bear, the lair from which the bear was chased, footprints, pawprints, and paths. Ritual spoons were decorated with bears, sun, and moon, linked by spiral bands.[59] Each vessel belonged to a certain Nivkh clan, and they were preserved between holidays in a special shed with bear skulls and other objects associated with the bear hunting holidays.

57. Ostrovskikh, *Poezdka na Yenisey* (note 37), and Ivanov, *Materialy po izobrazitel'nomu,* 63–64 (note 21).

58. Lydia T. Black, "Peoples of the Amur and Maritime Regions," in *Crossroads of Continents: Cultures of Siberia and Alaska,* ed. William W. Fitzhugh and Aron Crowell (Washington, D.C.: Smithsonian Institution Press, 1988), 24–31, esp. 27 and 29–30.

59. Ivanov, *Materialy po izobrazitel'nomu,* 393–96 (note 21), and Black, "Amur and Maritime Regions," 29 (figs. 26 and 27).

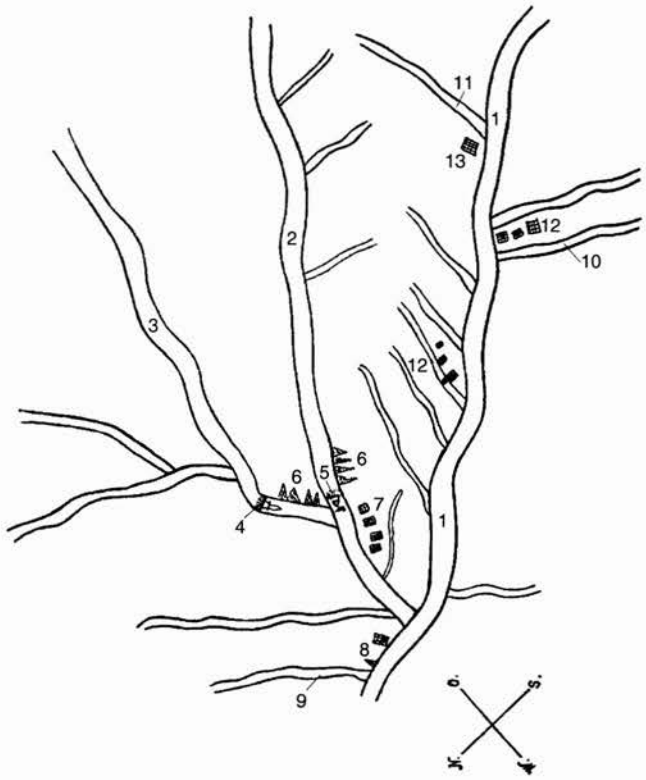


FIG. 8.19. YUKAGIR BIRCHBARK MAP SHOWING RIVERS AND LODGINGS. This redrawing by V. I. Iokhel'son shows the following features: (1) Kolyma River; (2) Korkodon River; (3) Razsokha River; (4, 5) fish traps; (6) summer camps of the Korkodon Yukagir; (7) winter camp of Korkodon Yukagir; (8) summer and winter residences of Mr. Shadrin; (9) Stolbovaia River; (10) Balygychen River; (11) Buynda River; (12) Yakut yurts; and (13) house of an agent of the Amur trading company.
After V. I. Iokhel'son, "Po rekam Yasachnoy i Korkodonu" (Along the rivers Yasachnia and Korkodon), *Izvestiya Imperatorskago Russago Geograficheskago Obshchestva* (Proceedings of the Russian Geographical Society) 34, no. 3 (1898): 255–90, esp. pl. IV.

FIG. 8.20. TOPOGRAPHIC DRAWING ON HEWN WOOD. The drawing is in coal on a hewn area of a pine tree. This sample of the Evenks' pictographic writings shows four triangles depicting tents on the upper part of the composition; below, a river is represented by a wide stripe. Above it are images of boats and three anthropomorphic figures (Ivanov, *Materialy po izobrazitel'nomy,* 124–25).
Size of the original: 28 × 22 cm. From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 124 (fig. 26).

Ritual vessels held either the hearts or, by other accounts, the meat, fat, or heads of killed animals. They were carved from birch or aspen and vary in size, the largest being up to 1.5 meters long. The vessels comprised three distinct parts: the handle, an elongated cup, and a long, flat front tip. Each vessel was carved as a chronicle of a specific hunt, which was narrated in the series of carvings on its handle and tip. The progress of the hunt was portrayed in the bear's and the hunter's tracks, and local topographic features that could serve as points of orientation, such as forests, rivers, and clumps of trees, were also portrayed (fig. 8.23).

Chukchi and Eskimos had a tradition of decorating the blades of paddles for ceremonial occasions, such as catching a whale. In 1945 a Chukchi named Ranautagin drew on paper with red paint several of the scenes that decorated the blades (the decorated paddles no longer exist). Typically a coastline was depicted with land activities on one side juxtaposed to sea activities on the other. Humans, dwellings, terrestrial and marine animals, and various boats were represented in profile, and informants claim that the scenes are from dreams. The drawing shown here, figure 8.24, is a copy of one of the paintings on paper by Ranautagin. The line extending out to sea is said to be a sandbar, with sea hunting associated with it.[60]

60. Ivanov, *Materialy po izobrazitel'nomu,* 423–26. In the Alaskan Eskimos' tradition of oar painting, the themes were more general than the depictions of hunting scenes such as figure 8.24. See, for example, the simple cross inside two concentric circles with a thunderbird and sea otter depicted just beyond the circles on the Alaskan Eskimo oar illustrated in William W. Fitzhugh, "Eskimos: Hunters of the Frozen Coasts," in *Crossroads of Continents: Cultures of Siberia and Alaska,* ed. William W. Fitzhugh and Aron Crowell (Washington, D.C.: Smithsonian Institution Press, 1988), 42–51, esp. fig. 51.

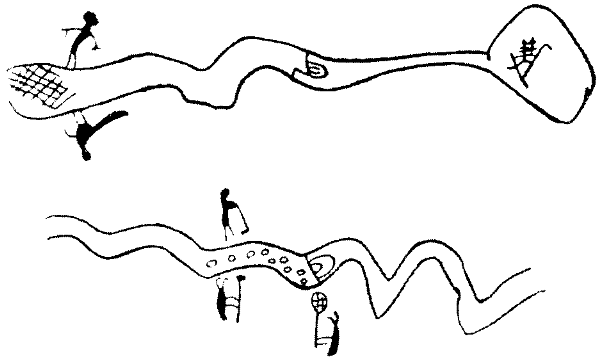


FIG. 8.21. COPIES OF KHANT DRAWINGS CARVED ON BIRCH TREES. The top scene depicts catching fish in the summer. In the center of the river is the fish trap, and to the left are a net and two fishermen on the shore. The bottom scene shows people ice fishing. On the ice is a row of ice holes through which fishermen, armed with hooks, pull a seine. From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 23 (fig. 3, nos. 1–2).

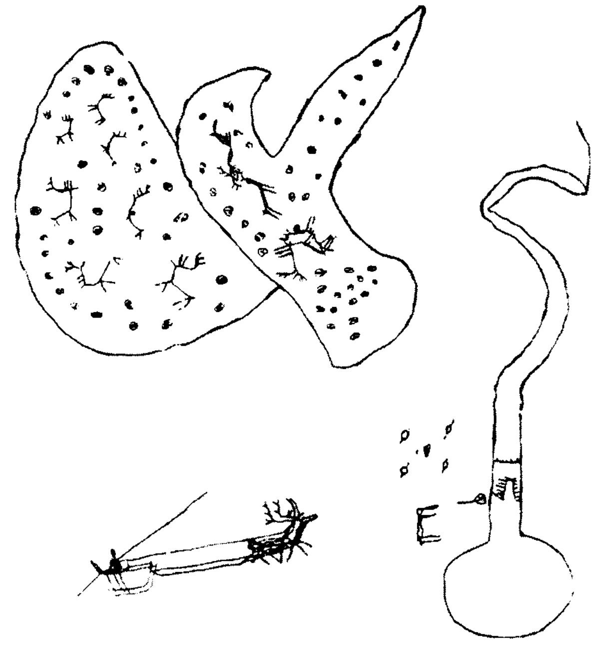


FIG. 8.22. SEL'KUP DRAWING OF RIVER AND FISH TRAP, 1901. The original was made at the request of ethnographer P. Ye. Ostrovskikh in pencil on paper. This copy depicts a stream flowing into a small enclosure or lake with a fish trap or scoop, a warehouse or storage shed, and though much less obvious, four fox traps placed around a pile of fish. On the same drawing, but unrelated, are two enclosures apparently separating domesticated stags, two of which appear to be fighting. Both enclosures contain many small marks, supposedly representing holes in the snow dug by the deer to obtain moss. Below the two enclosures is a profile drawing of a man approaching the fish trap in a reindeer-drawn sleigh. From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 63 (fig. 45, no. 2).

The Chukchi and Eskimos also decorated canoe or umiak benches with a similar design. Done at the time of annual ritual celebration, the design incorporates fairly obvious pictures of people and animals, but there is almost certainly secondary content and probably intrinsic meaning for the initiated. Ivanov suggests they were picture chronicles of symbolic hunting rituals performed during the holidays. The goals of the celebration were to make a sacrifice to the spirit masters, to attract good souls, to propitiate those animals killed on the hunt, and to ensure prosperity through a successful hunt in the future.[61] Figure 8.25 is a drawing on paper of a canoe bench made at Ivanov's request by Kasyga during Ivanov's expedition in Siberia in 1940. Ivanov, however, was informed that drawings on benches do not represent any real hunting stories.[62]

The trapezoidal bench is divided by a horizontal line representing the coastline separating the terrestrial and maritime worlds. At a primary level of interpretation, much of the pictographic content is transparent. On land are dwellings, hunters, and mammals. Along the coast are depicted scenes related to sea hunting. Offshore are a variety of sea mammals and canoes pulling a whale.[63]

A similar pictographic tradition, but sometimes with a stronger cartographic component, appears to have developed in the second half of the nineteenth century in the course of trade contacts with North American and European whalers in the Arctic Ocean.[64] A pictograph drawn on a bleached sealskin (*mandarka*) and covered with depictions of people, animals, and scenes of whale hunting was seen by Hooper in 1848–49 at Uurel'.[65] An extant example, now in Oxford, was obtained from the Chukchi by the crew of an American whaler in the late 1860s or 1870s (fig. 8.26). The skin has been studied by several scholars, one of whom considers it to be a calendar of the events of one year on the Chukchi Peninsula coast, while others see it as a simple collection of scenes from Chukchi everyday life.[66] In addition to the terrestrial and maritime

61. Ivanov, *Materialy po izobrazitel'nomu,* 427–43.

62. Ivanov, *Materialy po izobrazitel'nomu,* 431. Ivanov presumes that the drawings are somehow related to hunting magic, especially to the belief in reincarnation of the hunted animals.

63. Ivanov, *Materialy po izobrazitel'nomu,* 428.

64. Ivanov, *Materialy po izobrazitel'nomu,* 448.

65. W. Hooper, *The Month among the Tents of Chukchi* (London, 1853), 65.

66. Hoffman based his opinion of the skin as an annual calendar on Carlos Bovallius, who believed that the record on the skin "refers to the avocations and hunts of an entire year." See Walter James Hoffman, "The Graphic Art of the Eskimos," in *Annual Report of the Board of Regents of the Smithsonian Institution . . . for the Year Ending June 30,*

FIG. 8.23. BEAR FESTIVAL RITUAL VESSEL. On the right is the vessel, and on the left is a drawing of the decoration. In the center at the bottom the small depression is the bear's den. Around it are carved the pawprints of the bear, the footprints of the hunter, and small circles depicting the traces of ski poles. Next to the paw prints, human footprints surround the bear's den. When reading the pictograph, the condition of the hunt, engraved on the board, becomes clear. One or two hunters approached the den, surrounded it, and flushed the bear; then they began to follow the beast.
Museum of Anthropology and Ethnography of Peter the Great, St. Petersburg. From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 393 (fig. 245) and 397 (fig. 247, no. 1).

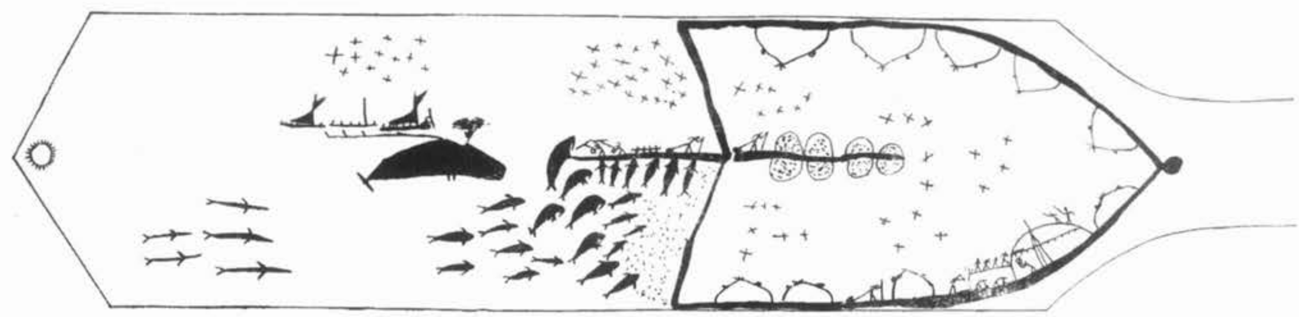


FIG. 8.24. PAINTING ON PAPER OF A DECORATED PADDLE BLADE, 1945. This was painted by Ranautagin from the village of Nunligran. On the left are two flocks of birds, a large harpooned whale, and two umiaks with sails, carrying hunters; below are sea animals including seals, walruses, and grampuses or killer whales, with dots representing smaller fish. At the end of the sandbar a large walrus has been pulled in; across the top of the sandbar, hunters cast harpoons at the walrus and a third hunter, supported by a stick, drags a piece of meat behind him toward shore. On shore, another hunter drags a piece of meat, and a line inland leads to several pits filled with meat. Along the outside edge of land are depicted yarangas (portable framed dwellings covered with reindeer hides). At the lower right a celebration is shown, organized for the successful hunt, with one man holding a tambourine (drum). At the far end of the blade is a radiant sun. From S. V. Ivanov, *Materialy po izobrazitel'nomu iskusstvu narodov Sibiri XIX–nachala XX v.* (Materials on the fine arts of the Siberian people, nineteenth to early twentieth century) (Moscow: Izd-vo Akademii Nauk SSSR, 1954), 424 (fig. 9, no. 1).

1895, including the Report of the U.S. National Museum (Washington, D.C.: United States Government Printing Office, 1897), 739–968, esp. 938– 44 (however, no reference for Bovallius is provided). The skin is also discussed and illustrated by Hans Hildebrand, "De lägre naturfolkens knost," in *Studier och forskningar föranledda af mina resor i höga Norden,* by A. E. Nordenskiöld (Stockholm: F. och G. Beijer, 1883), translated as "Beiträge zur Kenntniss der Kunst der niedern Naturvölker," in *Studien und Forschungen,* ed. A. E. Nordenskiöld (Leipzig: F. A. Brockhaus, 1885), 289–386, esp. 316–22; Bogoraz, "Ocherk material'nago byta olennykh Chukchey" (note 44); J. G. Noppen, "A Unique Chukhi Drawing," *Burlington Magazine for Connoisseurs* 70 (1937): 34; Ivanov, *Materialy po izobrazitel'nomu,* 449–54 (note 21); and William W. Fitzhugh, "Comparative Art of the North Pacific Rim," in *Crossroads of Continents: Cultures of Siberia and Alaska,* ed. William W. Fitzhugh and Aron Crowell (Washington, D.C.: Smithsonian Institution Press, 1988), 294–312, esp. 308–9, fig. 443.

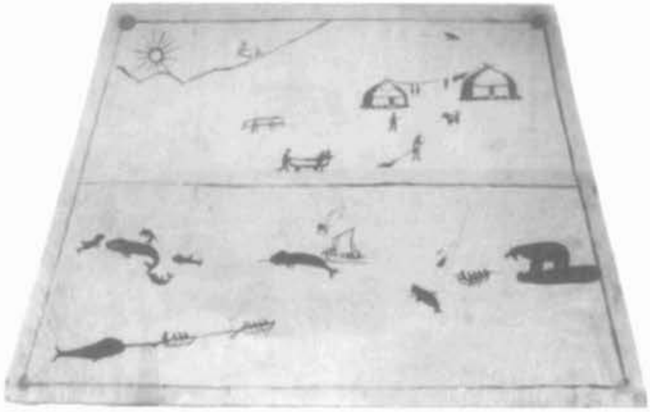


FIG. 8.25. DRAWING OF RITUAL CANOE BENCH DESIGN. Wooden canoe seat painted by the Eskimo Kasyga. The painting represents various hunting activities on land (the upper part) and on sea (lower). The holes in each corner were used to attach the seat to the canoe. The origin and meaning of the Eskimo canoe seat paintings is unclear, but they appear to have been used in association with hunting rites. One Eskimo reported that it was not proper to produce them more than once a year, that is, during the holidays, when they were apparently used in incantations along with other magical artifacts such as oars.
Photograph courtesy of the Museum of Anthropology and Ethnography of Peter the Great, St. Petersburg (70-24-1).

scenes depicted, some geographic locations on the Chukchi Peninsula have also been identified, including Plover Bay, Chaplino, Michigme, and St. Lawrence Bay.[67] Both Hoffman and Ivanov consider the skin unusual in its size, the number of individual pictures, and the overall sophistication of the composition. There are no parallels to this skin in Chukchi art, which is much less sophisticated and never contains the large number of characters found on the extant skin, and Ivanov suggests that the skin could have been designed expressly to be sold to European or American traders.[68]

Conclusion

The environment, economy, and belief system of peoples living in the five-thousand-mile belt in Eurasia south of the Arctic Ocean have given rise to distinctive traditional cartographies. The seasonal migrations associated with fishing, hunting, whaling, and reindeer herding have required extensive geographical knowledge that has been expressed using a wide variety of graphic media.

This geographical knowledge is inseparable from the spiritual knowledge of shamanism, so central to the northern view of the lifeworld. The sources for the shamanistic models of the world originated in the Stone Age culture of Eurasia. Together, the myths of the shaman relating to the origin of peoples and lands and ideas about nature dominate worldviews. Nevertheless, we have discussed two major categories of maps–cosmographical and geographical. Maps in the former group are largely precontact and supposedly can be identified in rock art and early modern artifacts. Most of the geographical examples were made after contact with Europeans (mainly Russians).

Except for those of the Sami people of northern Scandinavia, most of the artifacts discussed here are held in Russian collections, and much work still remains in discovering, recording, and analyzing ethnographical material of cartographic significance. This work will need to proceed with caution, particularly when it comes to dating, interpreting, and unraveling the mystical and mundane elements in prehistoric rock art. Likewise with cosmographical and celestial maps associated with shamanism, such as those seen on shamans' coats or drums, which often portray the three-level world so characteristic of some of the cultures described in this book.

Historical accounts of mapmaking provide another window on indigenous practices. There is the characteristic surprise at the speed and skill with which native informants were able to sketch ephemeral maps of large areas, particularly among the Evenk people of Siberia.

Examples of terrestrial mapmaking survive in several media: from our limited examples, maps on wood are found particularly among the Chukchi, while maps on birchbark tend to be associated with the Evenks and Yukagirs. Painting and drawing maps on blazed tree trunks to leave messages was a circumpolar trait. Maps decorate ritual vessels used during the annual winter bear festivals and stored with other ritual elements between holidays. Paddle blades, canoes, and canoe benches were also decorated with maps for ceremonial occasions.

The variety of materials used in making maps may speak of their ancient use. Certainly as trade ties progressed among representatives of the indigenous population of Eurasia and Russian and European traders, manufacturers, and travelers, expressions in map form

67. Redrawings of this skin are reproduced with items numbered and identified in Hoffman, "Graphic Art of the Eskimos," pl. 81 (fifty-two items), and Ivanov, *Materialy po izobrazitel'nomu*, fig. 28 (eighty-one items).

68. Hoffman, "Graphic Art of the Eskimos," and Ivanov, *Materialy po izobrazitel'nomu*, 448. Whether the chart is Eskimo or Chukchi has been debated. When received by the Pitt Rivers Museum, it was mounted and labeled "A CHUKCH Drawing on sealskin brought by the Captain of an Arctic Whaler from the BEHRINGS STRAITS, given by him to the late Edward Goodlake, by Mr Goodlake to Thomas Lord Walsingham and by Lord Walsingham to me Alfred Denison, 1882," signed Beatrice Mary Blackwood. The museum documentation notes an undated pencil note: "Not ESKIMO as described in Reports" (referring to Hoffman, "Graphic Art of the Eskimos"). Most recently, Fitzhugh has stated that "although alleged to be of Chukchi origin, it may be Asian Eskimo, whose style and cultural activities it more closely resembles" (Fitzhugh, "Comparative Art," 308, caption to fig. 443 [note 66]).

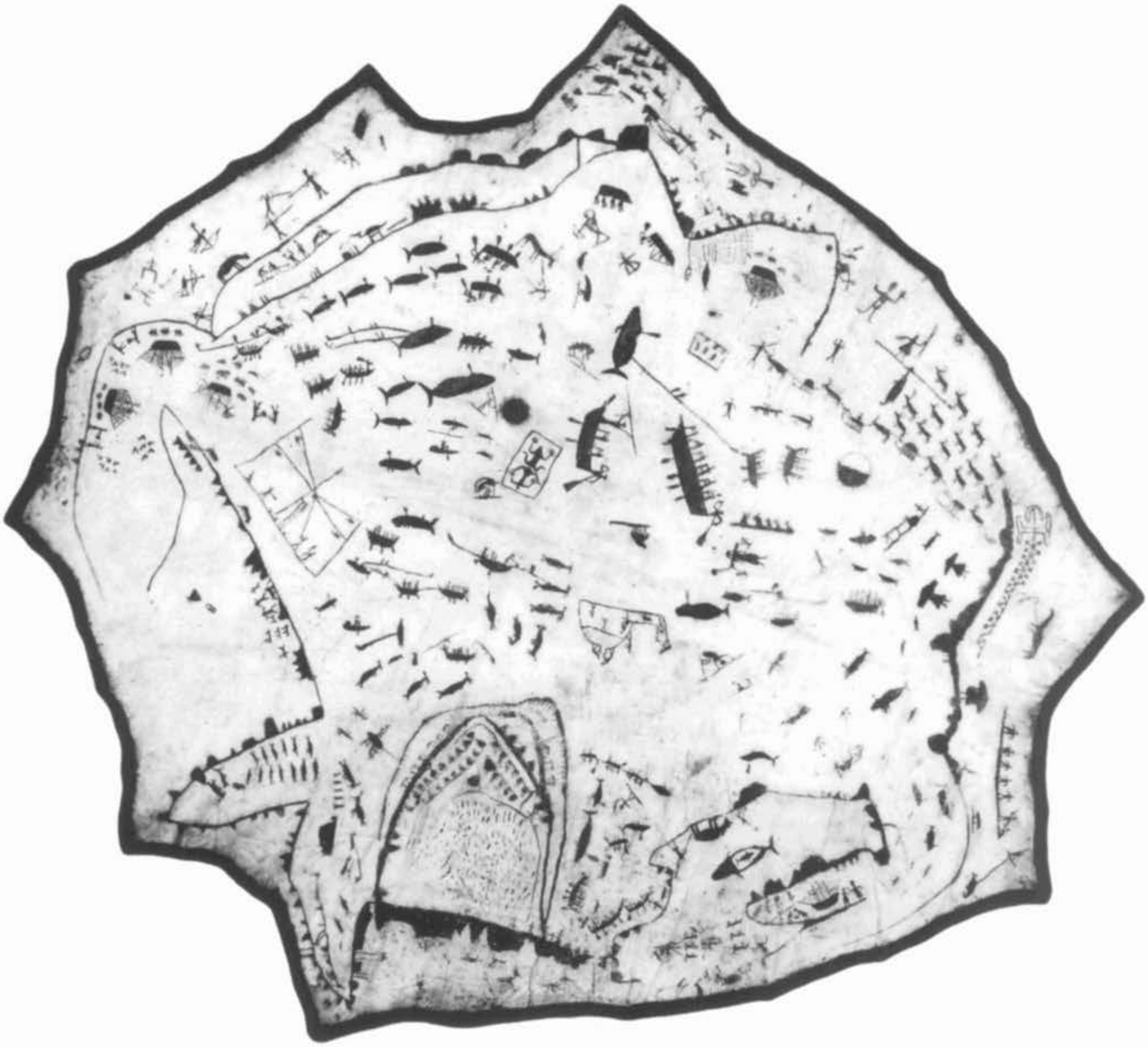


FIG. 8.26. SEALSKIN MAP? Among the things shown are whale, walrus, bear, and seal hunting scenes, deer herds, people, Russians and Europeans, scenes from the daily life of the Chukchi, shamans, villages, dwellings, fighting scenes, whaling schooners, and kayaks. In the shoreline around the edge, Plover Bay, Chaplino, Michigme, and St. Lawrence Bay have been identified.
Size of the original: 114.3 × 119.3 cm. Photograph courtesy of Pitt Rivers Museum, University of Oxford, Oxford, England (1966-19-1).

were adapted and modified. Nevertheless it is still possible to describe–as we have attempted to do here–a distinctive body of artifacts that can shed light on the traditional mystical and geographical worldviews of the hunters and fishers of Arctic and Subarctic Eurasia.

Traditional Cartography in Australia

9 • Icons of Country: Topographic Representations in Classical Aboriginal Traditions

PETER SUTTON

INTRODUCTION

After more than two hundred years of colonial and postcolonial influence from a predominantly Anglo-Celtic culture, Australian Aboriginal people have retained their cultural identity as a group, comprising a large set of subgroups, across the Australian continent (fig. 9.1). At this time they are a small minority of between 2 and 3 percent in a nation of eighteen million people. In most regions their ancient cultural traditions have been partly or heavily modified by a combination of forces, including an early phase of scattered violent conflicts with colonizers, depopulation owing mainly to disease, compulsory school education and institutionalization, and alcohol abuse.

In the more fertile areas of eastern and southwestern Australia, many aspects of these classical cultural traditions have been seriously expunged. But especially in the remoter regions of the north and center of the continent, Aboriginal people continue to practice significant repertoires of visual, musical, and ceremonial representations that are rooted in a more or less continuous cultural past stretching back at least sixty thousand years and possibly longer. A pervasive theme of those representations is the local cultural landscapes known to those who make them.

In the 1990s, Aboriginal youths are still being initiated in ancient ceremonies held at dozens of points across a broad band some hundreds of kilometers wide, from the southern coast on the Great Australian Bight to the northern coasts of the Northern Territory and Western Australia. By contrast, the last such ceremonies performed in the areas of densest non-Aboriginal settlement, in the urbanized regions of Sydney, Melbourne, and Brisbane, were well back in the nineteenth century. In urban centers young Aborigines may be found learning neotraditional dances, words from extinct local languages, and accounts of regional mythology, which their parents and grandparents in many cases may never have known, as part of a widespread movement of cultural revitalization. The term "Aboriginal culture" may thus cover a huge range, making generalizations dangerous. Aboriginal people of all the different regions continue to identify with the content of their classical tradition, however, even where little of it may be known to them through firsthand experience.[1] Indigenous Australian traditions are no more fixed or static than others, but they have been subject to greatly accelerated changes in the colonial and postcolonial period of the past two centuries. For this reason it is useful to distinguish classical traditions from postclassical traditions within contemporary Aboriginal culture.

Classical traditions are those that were practiced at the time the first permanently dwelling non-Aborigines arrived in Australia,[2] and many of them have persisted among certain groups. Postclassical traditions depart significantly from those of the ancient past. The most widely known and internationally acclaimed of the classical traditions is usually subsumed, in English, under the phrase "Aboriginal art." For this category of representations

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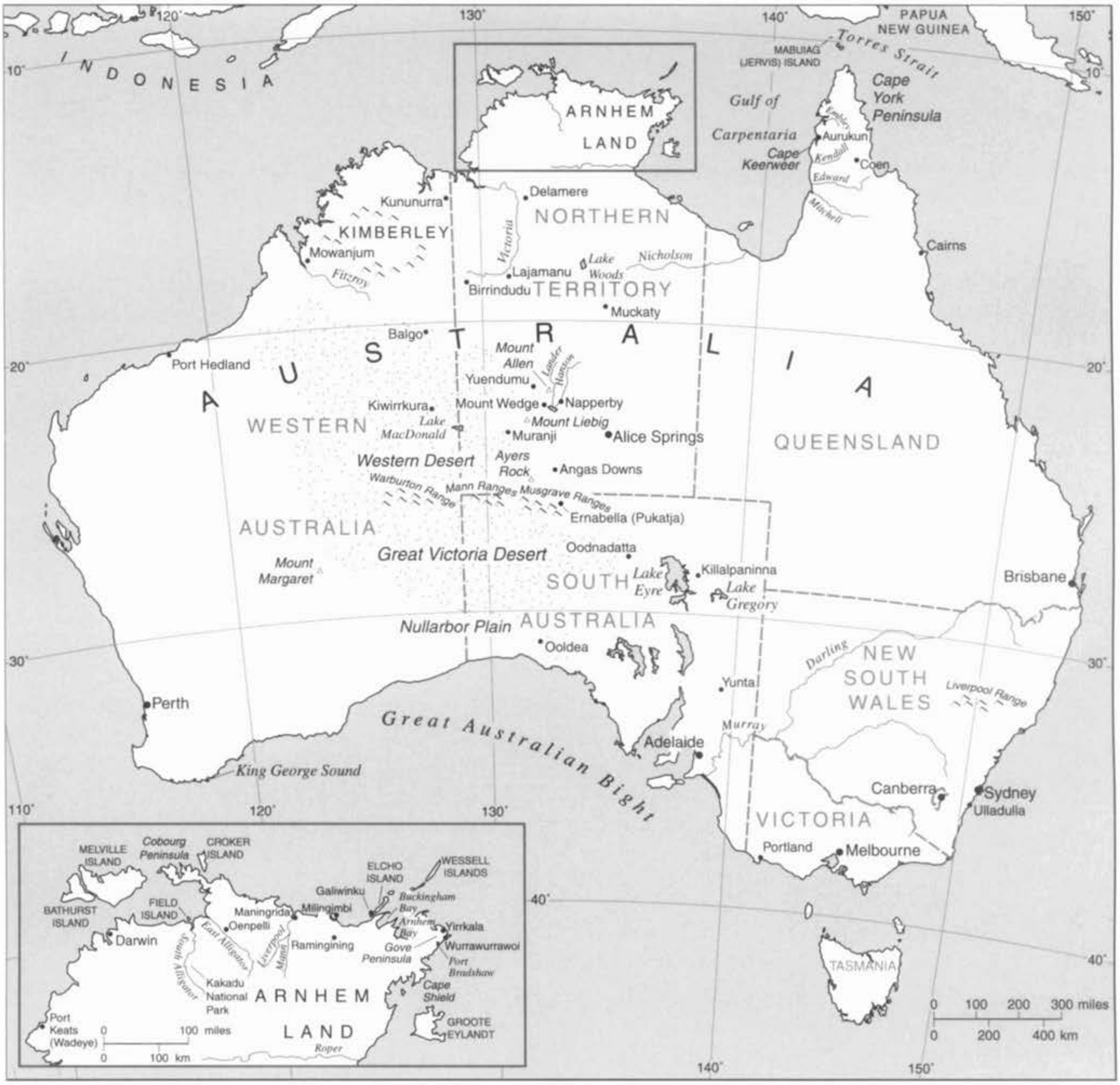
Much helpful assistance with sources for this chapter was provided by John Stanton, Kate Alport, Carol Cooper, and David Nash. Some short passages in this chapter have appeared in other works. For their permission to use these, I thank the South Australian Museum (Philip Jones and Peter Sutton, *Art and Land: Aboriginal Sculptures of the Lake Eyre Region,* 1986), the South Australian Museum and the Asia Society (Peter Sutton, ed., *Dreamings: The Art of Aboriginal Australia,* 1988), and the Queensland Museum (Peter Sutton, "Bark Painting by Angus Namponan of Aurukun," *Memoirs of the Queensland Museum* 30 [1990–91]: 589–98).

1. In this chapter I concentrate for the most part on mainland indigenous Australia and therefore on Aboriginal works. The people of the Torres Strait in Queensland, while indigenous Australians also, come from a Melanesian cultural stock and are far fewer than Aborigines; they are mentioned below, p. 399. Most of the indigenous works of the type I discuss here have been made by Aborigines rather than by Torres Strait Islanders.

2. The influence of European (and in some regions Chinese) colonizers began in the Sydney area in 1788 but did not immediately reach to all parts of the continent. The more arid interior and tropical north of Australia remained lightly explored and largely uncolonized for the first century of British occupation. Seminomadic Aboriginal groups came into contact with the newcomers in a piecemeal and often highly personalized way rather than through mass warfare, even though much of the early phase of such contact was marked by violence, including massacres (mainly of Aborigines). The last Aborigines to abandon a wholly foraging economy and become relatively permanently settled were those of the Western Desert region, the most recent arrivals from that desert being a small group that settled at Kiwirrkura in eastern Western Australia in 1984.



INDONESIA
PAPUA NEW GUINEA
Torres Strait
MABUIAG (JERVIS) ISLAND
Gulf of Carpentaria
Cape York Peninsula
Aurukun
Cape Keerweer
Coen
Cairns
ARNHEM LAND
Delamere
Kununurra
KIMBERLEY
Mowanjum
Fitzroy
NORTHERN TERRITORY
Victoria
Lajamanu
Lake Woods
Nicholson
Birrindudu
Muckaty
Balgo
AUSTRALIA
Port Hedland
Mount Allen
Yuendumu
Kiwirrkura
Mount Wedge
Napperby
Mount Liebig
Lake MacDonald
Muranji
Alice Springs
WESTERN AUSTRALIA
Western Desert
Ayers Rock
Angas Downs
QUEENSLAND
Warburton Range
Mann Ranges
Musgrave Ranges
Ernabella (Pukatja)
Oodnadatta
Great Victoria Desert
Mount Margaret
SOUTH AUSTRALIA
Lake Eyre
Killalpaninna
Lake Gregory
Brisbane
Nullarbor Plain
Ooldea
Darling
NEW SOUTH WALES
Liverpool Range
Yunta
Perth
Murray
Great Australian Bight
Adelaide
King George Sound
Canberra
Sydney
Ulladulla
VICTORIA
Portland
Melbourne
TASMANIA
0 100 200 300 miles
0 200 400 km
MELVILLE ISLAND
Cobourg Peninsula
CROKER ISLAND
ELCHO ISLAND
WESSELL ISLANDS
Galiwinku
Buckingham Bay
BATHURST ISLAND
FIELD ISLAND
Maningrida
Milingimbi
Arnhem Bay
Yirrkala
Oenpelli
Darwin
East Alligator
South Alligator
Liverpool
Mann
Ramingining
Gove Peninsula
Wurrawurrawoi
Port Bradshaw
Kakadu National Park
Cape Shield
Port Keats (Wadeye)
0 100 miles
0 100 km
LAND
Roper
GROOTE EYLANDT

there is now a voluminous literature.[3] Perhaps most visual works that typically fall under this heading in the literature have as their subject matter the cultural landscapes locally significant to the artists who produce them. These are representations not only of known physiographic features at specific sites and the spatial relationships that hold between them, but also of the religious, proprietary, political, and other meanings attached to them. Indeed, it is the latter, not the former, that constitute the foreground of the works' significance for those who make them, although the two are intimately integrated.

One reason for distinguishing a "classical" phase of culture in this case is the necessity to recognize the difference between recent, sometimes rather abrupt, cultural transformations and the great continuities that preceded them. The archaeological evidence suggests clearly that precolonial indigenous cultures in Australia enjoyed a very long and comparatively stable period.[4] The impact of the events of the past two hundred years has dramatically wiped out classical traditions in many areas, while in others they survive more or less intact amid other practices that evince rapid social and cultural change. This chapter focuses on Aboriginal representations of place that lie more or less securely within the iconographic systems and cultural purposes of classical types. The next chapter, "Aboriginal Maps and Plans," focuses on topographic representations, mainly of recent provenance, whose iconographic systems and cultural purposes constitute a significant departure from past practices.

The Range of Artifacts

A wide range of media were, and in some regions still are, used by indigenous Australians in representing sites and landscapes and their totemic and mythic figures.[5] For many examples of such media all that has survived in the record is their outward form or a general description suggesting they had sacred significance. It is a solid assumption, but an assumption nevertheless, that by and large the symbolisms of such poorly documented past works were frequently, perhaps predominantly, focused on land-based themes such as site-specific totemic beings and traveling Dreaming narratives.

Precolonial and Early Colonial Works

Into this category fall most of the parietal art (rock paintings and engravings) and stone arrangements that are widespread across the Australian continent, as well as the more ephemeral southeast Australian ceremonial earth sculptures.[6] Here also belong the decorated tumuli sighted by the early colonizers of New South Wales and other constructions such as the elaborately geometric sand and vegetation "monument" François Péron saw in southwestern Australia in 1801.[7] Into this category would fall as well the bark paintings or drawings sighted in Tasmania in the first years of the nineteenth century, in Victoria in 1861, and in New South Wales in 1839–44.[8]

The older Australian museums hold large numbers of

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3. For general works see, for example, Ronald Murray Berndt and Catherine Helen Berndt with John E. Stanton, *Aboriginal Australian Art: A Visual Perspective* (Sydney: Methuen, 1982); Peter Sutton, ed., *Dreamings: The Art of Aboriginal Australia* (New York: George Braziller in association with the Asia Society Galleries, 1988); Wally Caruana, *Aboriginal Art* (London: Thames and Hudson, 1993); Judith Ryan, *Spirit in Land: Bark Paintings from Arnhem Land in the National Gallery of Victoria* (Melbourne: National Gallery of Victoria, [1990]); and idem, *Paint up Big: Warlpiri Women's Art of Lajamanu* (Melbourne: National Gallery of Victoria, [1990]). The major scholarly studies of living Aboriginal iconographic traditions are by anthropologists Nancy D. Munn, *Walbiri Iconography: Graphic Representation and Cultural Symbolism in a Central Australian Society* (Ithaca: Cornell University Press, 1973; reprinted with new afterword, Chicago: University of Chicago Press, 1986); Howard Morphy, *Ancestral Connections: Art and an Aboriginal System of Knowledge* (Chicago: University of Chicago Press, 1991); and Luke Taylor, *Seeing the Inside: Bark Painting in Western Arnhem Land* (Oxford: Clarendon Press, 1996).

4. This is not to say that Australia was free of external cultural influences before the British invasion commencing in 1788. Melanesian cultural influence on Cape York Peninsula, and that of peoples of the Indonesian archipelago on coastal Aborigines across the rest of north Australia, is well documented; see Josephine Flood, *Archaeology of the Dreamtime* (Sydney: Collins, 1983), 220–25, and Tony Swain, *A Place for Strangers: Towards a History of Australian Aboriginal Being* (Cambridge: Cambridge University Press, 1993). On the other hand, stone technology remained basically the same right through the Pleistocene period of occupation; a significant variation occurred in the past five thousand years, with the emergence of the small stone tool tradition, as well as what appears to have been a general population increase, the introduction of the dog, and so on. See J. Peter White and James F. O'Connell, *A Prehistory of Australia, New Guinea and Sahul* (Sydney: Academic Press, 1982), 102–5.

5. Totemic figures are entities that stand in an emblematic relation to structured groups such as clans and moieties, or sometimes to individuals. They may or may not be associated with mythology or sacred sites. There is a vast anthropological literature on Aboriginal totemism. The best introduction to the topic remains W. E. H. Stanner, "Religion, Totemism and Symbolism," in *Aboriginal Man in Australia: Essays in Honour of Emeritus Professor A. P. Elkin*, ed. Ronald Murray Berndt and Catherine Helen Berndt (Sydney: Angus and Robertson, 1965), 207–37.

6. Ronald Murray Berndt, *Australian Aboriginal Religion*, 4 fascs. (Leiden: Brill, 1974), esp. fasc. 1, pp. 27–31, and plates.

7. E. L. Ruhe, "Poetry in the Older Australian Landscape," in *Mapped but Not Known: The Australian Landscape of the Imagination*, ed. P. R. Eaden and F. H. Mares (Netley, South Australia: Wakefield Press, 1986), 20–49, esp. 29–44, and François Péron, *A Voyage of Discovery to the Southern Hemisphere, Performed by Order of the Emperor Napoleon, during the Years 1801, 1802, 1803, and 1804* (London: R. Phillips, 1809), 62–63.

8. Péron, *Voyage of Discovery*, 212; R. Brough Smyth, comp., *The Aborigines of Victoria*, 2 vols. (Melbourne: J. Ferres, Government Printer, 1878), 1:292; and Mrs. Charles Meredith, *Notes and Sketches of New South Wales, during a Residence in That Colony from 1839 to 1844* (London: Murray, 1844), 91–92.

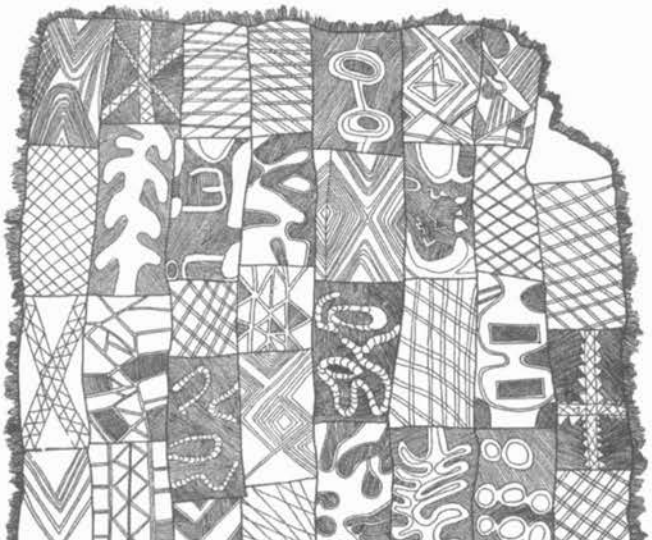

FIG. 9.2. DRAWING OF AN ABORIGINAL SKIN RUG FROM CONDAH, VICTORIA, CA. 1872. From southeastern Australia north of Portland, the original rug is made of opossum skins sewn with kangaroo tail sinews and incised. See Charles Pearcy Mountford, "Decorated Aboriginal Skin Rugs," *Records of the South Australian Museum* 13 (1960): 505–8.
Size of the original: 176 × 123 cm. Photograph courtesy of the Museum of Victoria Council, Melbourne.

geometrically (sometimes figuratively) decorated weapons such as clubs, shields, and spear-throwers, and utensils such as digging sticks and bowls, also from the southeastern part of Australia. Although we know that people in the region linked specific geometric patterns with particular groups, and it is possible that these designs were totemic or territorial in reference, no adequate accounts of their meanings have come down to us.[9] Similar poorly documented types of work include the richly varied geometrically incised trees of New South Wales, a highly decorated skin rug in a similar tradition from Victoria (fig. 9.2), the often engraved cylindroconical stones of the Darling River region, carved sacred objects (including bull-roarers) in southeastern Australia, the animal and human figures made of clay and grass used in ceremonies in southeastern Queensland, similar figures carved in wood in the southwest and in wood or painted bark in the southeast of Australia, and probably even a "stuffed emu" used in an initiation ceremony in New South Wales.[10]

Also largely undocumented but likely to have been part of a land-based religious iconographic tradition were constructions such as the bower containing sacred objects that William Westall saw and painted in 1812 on the shore of the Gulf of Carpentaria, the trees "fantastically crowned at the summit" that John Oxley saw in 1824 at a ceremony ground in southeastern Queensland, and the inverted trees topped with patterned bark lacework that Tom Petrie saw at an initiation ceremony in the same region some years afterward.[11]

Of these works, which were generally found in the now heavily settled parts of the continent, much parietal art and some stone arrangements remain in situ (fig. 9.3),[12]

9. Carol Cooper, "Traditional Visual Culture in South-east Australia," in *Aboriginal Artists of the Nineteenth Century,* by Andrew Sayers (Melbourne: Oxford University Press in association with the National Gallery of Australia, 1994), 91–109, esp. 107–8, and Peter Sutton, Philip Jones, and Steven Hemming, "Survival, Regeneration, and Impact," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 180–212, esp. 185–86.

10. On the incised trees, see Robert Etheridge, *The Dendroglyphs, or "Carved Trees" of New South Wales* (Sydney: W. A. Gullick, 1918), and David Bell, *Aboriginal Carved Trees of Southeastern Australia: A Research Report* (Sydney: National Parks and Wildlife Service, 1982). On rugs (or cloaks) and the engraved cylindroconical stones, see Carol Cooper, "Art of Temperate Southeast Australia," in *Aboriginal Australia,* by Carol Cooper et al. (Sydney: Australian Gallery Directors Council, 1981), 29–40, esp. 34–35, 39–40, and illustrations on 118–20. On carved sacred objects, see W. J. Enright, "Notes on the Aborigines of the North Coast of New South Wales," *Mankind* 2 (1936–40): 88–91, and A. W. Howitt, *The Native Tribes of South-east Australia* (London: Macmillan, 1904), 509–710 passim, and on bull-roarers, see also note 27 below. On the clay and grass figures, see Constance Campbell Petrie, *Tom Petrie's Reminiscences of Early Queensland* (Brisbane: Watson, Ferguson, 1904), 49. On the similar carved wood figures, see Daisy Bates, *The Native Tribes of Western Australia,* ed. Isobel White (Canberra: National Library of Australia, 1985), 329–30. On the painted wood or bark figures, see W. Scott, "Notes on Australian Aborigines," MS. A2376, Mitchell Library, Sydney, ca. 1871–1928, and also Cooper, "Traditional Visual Culture," 96–97 and references. On the stuffed emu, see A. C. McDonald, "The Aborigines of the Page and Isis," *Journal of the Anthropological Institute* 7 (1878): 235–58.

11. On the bower, see Bernard Smith, *European Vision and the South Pacific,* 2d ed. (New Haven: Yale University Press, 1985), 196–97 and pl. 21. On the fantastically crowned trees, see R. H. Cambage and Henry Selkirk, "Early Drawings of an Aboriginal Ceremonial Ground," *Journal and Proceedings of the Royal Society of New South Wales* 54 (1920): 74–78, esp. 76. On the inverted trees, see Petrie, *Tom Petrie's Reminiscences,* 49.

12. F. D. McCarthy, *Rock Art of the Cobar Pediplain in Central Western New South Wales* (Canberra: Australian Institute of Aboriginal Studies, 1976); R. G. Gunn, *Aboriginal Rock Art in the Grampians,* ed. P. J. F. Coutts (Melbourne: Victoria Archaeological Survey, 1983); Charles Pearcy Mountford, "Cave Paintings in the Mount Lofty Ranges,

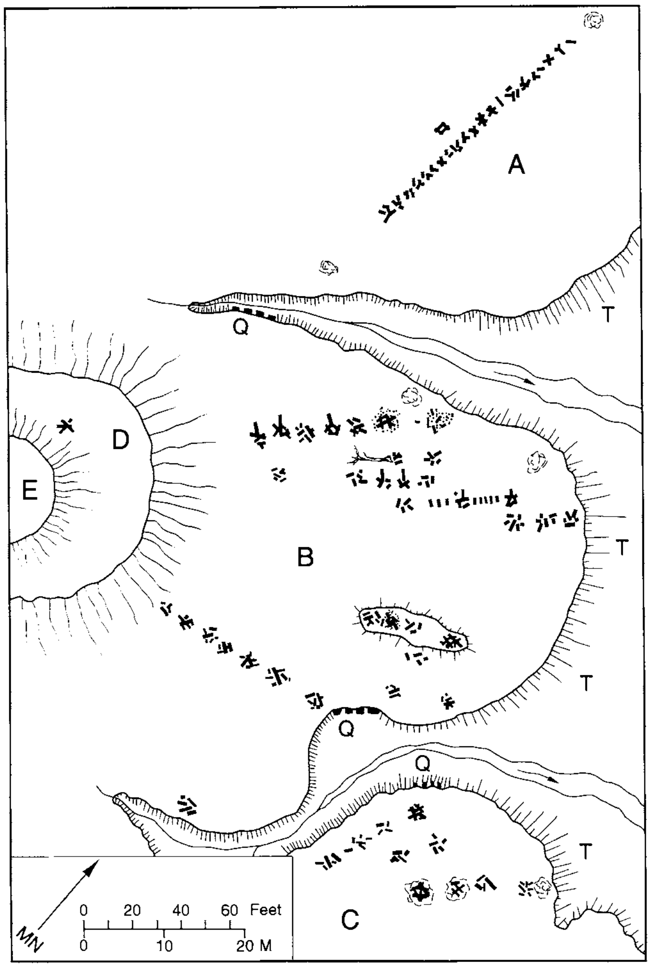

FIG. 9.3. SKETCH PLAN OF ABORIGINAL STONE ARRANGEMENTS, GREAT VICTORIA DESERT. The site in south-central Australia shown in this map is a low terrace divided by two small watercourses or gutters. The resulting three divisions (A, B, and C) are where the stone arrangements made of limestone slabs occur. In the upper part of both watercourses are limestone exposures that were quarried (Q) for the limestone slabs in the stone piles. To the west of section B are two small, higher semicircular shelves (D and E; ca. 1.5 and 1.2 m). A talus slope (T) about two meters high includes broken blocks of similar shape but much smaller than those described above.
After T. D. Campbell and P. S. Hossfeld, "Australian Aboriginal Stone Arrangements in North-west South Australia," *Transactions of the Royal Society of South Australia* 90 (1966): 171–78, esp. 172 (fig. 1).

and a bark drawing, a bark effigy, an incised skin cloak, some sacred objects, many incised weapons and utensils, and many cylindroconical stones survive in museum collections.[13] But the general picture for the earlier and more heavily colonized regions of Australia is one of loss, both of the objects themselves and even more thoroughly of their meanings.

THE TWENTIETH CENTURY

Where similar kinds of works have continued to be made in remoter and more recently colonized parts of the country and during the period when professional anthropologists have been carrying out research among indigenous Australians, careful documentation has frequently shown intimate and detailed relations between such designs and local religious geography. Under classical conditions, and in noncommercial ceremonial contexts of the present day, the "audiences" for such works are correspondingly very localized and drawn from small populations, perhaps a few hundred at the most. Those who make images of country in such circumstances are recruited from small, local groups rather than based on any panregional reputation for excellence. Indeed, there is no category of specialized "mapmaker," any more than there is one of "artist" in the classical traditions of Aboriginal Australians, although the term "artist" and its associated role have come into common usage in this century, particularly now that a flood of painted and carved works has reached museums and art markets since the 1950s. By far the majority of extant Aboriginal works in the classical mode were made in the twentieth century. The major exceptions consist largely of fixed rock art and sacred stone slabs from Central Australia. Very few mobile works, apart from weapons and utensils, are older, although a small number of bark paintings and drawings have survived from the late nineteenth century.[14] The oldest works usually lack documentation and are thus not open to specific interpretations, such as those identifying the parts of the images that refer to particular topographical features.

In the case of Australian rock art, some studies have been carried out with living painters of rock surfaces, but there are also several studies where living Aborigines have worked with anthropologists to pass on their understanding of the engravings and paintings made by their predecessors (fig. 9.4). Such attempts at contemporary interpretation include the work of Hale and Tindale and of Trezise in Cape York Peninsula, Tindale's work in the Port Hedland area of Western Australia, Lewis and Rose's in the Victoria River region, Chaloupka's and Taçon's in

South Australia," *Records of the South Australian Museum* 13 (1957–60): 467–70 and pl. LI; and T. D. Campbell and Charles Pearcy Mountford, "Aboriginal Arrangements of Stones in Central Australia," *Transactions of the Royal Society of South Australia* 63 (1939): 17–21.

13. See Cooper, "Traditional Visual Culture" (note 9), and Cooper, "Art of Temperate Southeast Australia" (note 10).

14. See Philip Jones, "Perceptions of Aboriginal Art: A History," in *Dreamings: The Art of Aboriginal Australia*, ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 143–79, and Andrew Sayers, *Aboriginal Artists of the Nineteenth Century* (Melbourne: Oxford University Press in association with the National Gallery of Australia, 1994).

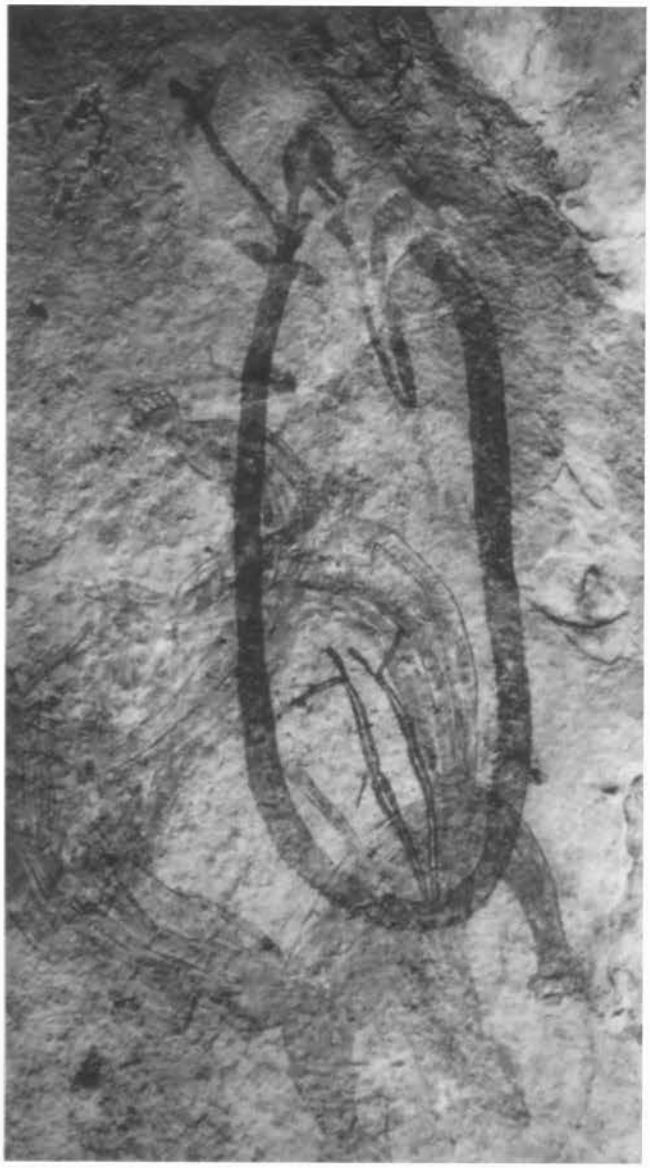

FIG. 9.4. EARLY ROCK ART REPRESENTATION OF ALMUDJ. Superimposed on a turtle, this figure is identified as Almudj, the Rainbow Snake, a mythic figure of the Deaf Adder Creek area, in a state of metamorphosis from its human female form. Ochers on the ceiling of a low overhang in the Djuwen site complex in Kakadu National Park, western Arnhem Land. Size of the original: 111 × 37 cm (snake). Photograph by George Chaloupka, courtesy of the Museum and Art Gallery of the Northern Territory, Darwin (reg. no. 09/MAY87M). By permission of Warlayirti Artists Association, Balgo Hills.

western Arnhem Land, and Layton's studies in the Kimberleys, Central Australia, and Cape York Peninsula.[15] How such contemporary interpretations might themselves be understood by scholars is itself, however, a very complex matter, as Merlan has pointed out in her account of participation in a rock art recording exercise in the Delamere region of the north-central Northern Territory.[16]

As a general rule, where rock paintings or engravings are identified with mythic beings, they are the beings peculiar to the area–and often the very site–where the rock art itself is situated. Images of this kind may be described as self-referential, illustrating a site-specific being and events that occurred at the mythological site itself. Sometimes there are designs indicating routes to related sites in the same locality. Ancient images of this type are frequently regarded as the work of the ancestral beings themselves rather than as those of humans.

In central and northeast Arnhem Land, studies have shown the way sand sculptures used in mortuary ceremonies represent important sites and totemic beings connected with the landowning groups of the deceased (fig. 9.5). Similar sculptures are used in regional cult ceremonies in the same region.[17] The impressive painted carvings and suspended installations of the Aurukun area of Cape York Peninsula have also been shown to have highly specific topographical and narrative reference.[18] Painted shields, ceremonial paddles, boomerangs, and spearthrowers from the Cairns rain forest region of Queensland bore totemic designs connoting specific localities and their people.[19] Wooden carvings from Arnhem Land include those that represent ancestral beings whose

15. Herbert M. Hale and Norman B. Tindale, "Aborigines of Princess Charlotte Bay, North Queensland," *Records of the South Australian Museum* 5 (1933–36): 63–172; P. J. Trezise, *Rock Art of South-east Cape York* (Canberra: Australian Institute of Aboriginal Studies, 1971); Norman B. Tindale, "Kariara Views on Some Rock Engravings at Port Hedland, Western Australia," *Records of the South Australian Museum* 21 (1987): 43–59; D. Lewis and Deborah Bird Rose, *The Shape of the Dreaming: The Cultural Significance of Victoria River Rock Art* (Canberra: Aboriginal Studies Press, 1988); George Chaloupka, *Journey in Time: The World's Longest Continuing Art Tradition* (Chatswood: Reed, 1993); Paul S. C. Taçon, "Contemporary Aboriginal Interpretations of Western Arnhem Land Rock Paintings," in *The Inspired Dream: Life as Art in Aboriginal Australia,* ed. Margie K. C. West (South Brisbane: Queensland Art Gallery, 1988), 20–25; and Robert Layton, *Australian Rock Art: A New Synthesis* (Cambridge: Cambridge University Press, 1992).

16. Francesca Merlan, "The Interpretive Framework of Wardaman Rock Art: A Preliminary Report," *Australian Aboriginal Studies,* 1989, no. 2, 14–24. See also the papers in M. J. Morwood and D. R. Hobbs, eds., *Rock Art and Ethnography: Proceedings of the Ethnography Symposium (H), Australian Rock Art Research Association Congress, Darwin, 1988* (Melbourne: Australian Rock Art Research Association, 1992).

17. Margaret Clunies Ross and L. R. Hiatt, "Sand Sculptures at a Gidjingali Burial Rite," and Ian Keen, "Yolngu Sand Sculptures in Context," both in *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe,* ed. Peter J. Ucko (Canberra: Australian Institute of Aboriginal Studies, 1977), 131–46 and 165–83.

18. Peter Sutton, "Dreamings," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 13–32, esp. 23–29.

19. Ursula H. McConnel, "Inspiration and Design in Aboriginal Art," *Art in Australia* 59 (1935): 49–68; idem, "Native Arts and Industries on the Archer, Kendall and Holroyd Rivers, Cape York Penin-

FIG. 9.5. SAND SCULPTURE, NORTHEAST ARNHEM LAND, 1976. Gupapuyngu clan members, including singers, sit at the sand sculpture. The sculpture is part of mortuary ceremonies and represents the water holes and tracts associated with the sacred being Nowa at Djilwirri, Buckingham Bay.
By permission of Ian Keen.

travels between specific places are implicated, sometimes indicated, by the form of painted decorations on the object.[20] Similar reference to specific country occurs in decorations on dancing poles, memorial posts, and log bone receptacles in the same region.[21]

The monumental carved grave-posts of Bathurst and Melville Islands may have "sculptured elements [that] have specific meanings according to the 'story' chosen for that [carving] commission, the territorial and family affiliations of the dead person, and the relationship and totemic connections of the artist."[22] The "portable scenery" of ceremonial performers in the Mowanjum area of

sula, North Queensland," *Records of the South Australian Museum* 11 (1953–55): 1–42, esp. 36–39; and Norman B. Tindale, Collection Object Documentation, Cairns Rainforest Shields, South Australian Museum, Adelaide, 1938.

20. See examples in Karel Kupka, *Dawn of Art: Painting and Sculpture of Australian Aborigines* (Sydney: Angus and Robertson, 1965), 145–78; idem, *Peintres aborigènes d'Australie* (Paris: Musée de l'Homme, 1972); Louis A. Allen, *Time before Morning: Art and Myth of the Australian Aborigines* (New York: Crowell, 1975); Berndt, Berndt, and Stanton, *Aboriginal Australian Art* (note 3); Peter Cooke and Jon Altman, eds., *Aboriginal Art at the Top: A Regional Exhibition* (Maningrida: Maningrida Arts and Crafts, 1982); John E. Stanton, *Images of Aboriginal Australia,* exhibition catalog (Nedlands: University of Western Australia, Anthropology Research Museum, 1988); Michael A. O'Ferrall, *Keepers of the Secrets: Aboriginal Art from Arnhemland in the Collection of the Art Gallery of Western Australia* (Perth: Art Gallery of Western Australia, 1990).

21. Examples can be found in Berndt, Berndt, and Stanton, *Aboriginal Australian Art,* and Margie K. C. West, ed., *The Inspired Dream: Life as Art in Aboriginal Australia* (South Brisbane: Queensland Art Gallery, 1988).

22. Jennifer Hoff, *Tiwi Graveposts* (Melbourne: National Gallery of Victoria, 1988), 5, and see also Charles Pearcy Mountford, *The Tiwi: Their Art, Myth and Ceremony* (London: Phoenix House, 1958),

Western Australia, consisting of wood, tin, and string constructions depicting mythic themes of certain geographic areas, are among the most spectacular items of paraphernalia to have evolved in Aboriginal tradition.[23] The toas or waymarkers of the Lake Eyre region of south-central Australia, discussed in more detail later in this chapter, contain complex topographical representations in the form of the sculptures themselves, the designs painted on them, and the objects attached to them.[24]

The best documented and most thoroughly analyzed of the relevant iconographic traditions and their cultural complexities, however, are those of the bark paintings of Arnhem Land and the ground designs and acrylic paintings on canvas or linen from the Western Desert region of Central Australia.[25] These are also dealt with in some detail below.

Secret-sacred objects form a major class of Aboriginal artifacts that carry topographic representations. Because of the restrictions placed on them by Aboriginal law, they cannot be illustrated here. They include the sacred clan emblems or *rangga* of northeast Arnhem Land, and in the same region the massive Kunapipi ceremonial poles up to eight meters tall.[26] In Central Australia and the Western Desert, ovate slabs of stone or wood, usually incised with geometric representations of ancestral beings, sacred sites, and mythic events, some of them also functioning as bull-roarers, form a major class of such objects.[27] The early ethnographies for such objects, even where detailed, present little analysis of the iconographic systems involved.[28] Taylor has produced a sophisticated analysis of Pitjantjatjara sacred objects and crayon drawings that builds on the work of Munn.[29] Large collections of these objects were made during the late nineteenth and early twentieth centuries by museums and private collectors, and in 1995 substantial collections continued to be held at such institutions as the South Australian Museum in Adelaide, the Museum of Victoria in Melbourne, the Strehlow Research Centre in Alice Springs, Panorama Guth (a private commercial museum) in Alice Springs, and at other museums in Australia, Europe, and North America.[30] A continuing program of returning such objects to those with traceable customary property rights in them was formalized at the South Australian Museum in 1985.[31]

Secret-sacred artifacts bearing references to topographically focused mythology also include ceremonial paraphernalia frequently fixed to the bodies of ritual performers or carried by them–the boundary between ritual apparel and sculpture is thus often blurred. Such constructions, usually consisting of a wooden base or frame to which hair string, twine, feathers, molded wax or gypsum, and a wide variety of other objects may be attached, are among the most spectacular of Aboriginal religious artifacts. In Central Australia the most notable of these are the *waninga* (or *wanigi*) string crosses and decorated *tnatantja* (or *nurtunja*) poles, objects that are of astonishing beauty and variety but are largely kept from public view for reasons of religious secrecy.[32]

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esp. 107–21, and Margie K. C. West, *Declan: A Tiwi Artist* (Perth: Australian City Properties, 1987), esp. 17–19 and 28–29.

23. Elphine Allen, "Australian Aboriginal Dance," in *The Australian Aboriginal Heritage: An Introduction through the Arts,* ed. Ronald Murray Berndt and E. S. Phillips (Sydney: Australian Society for Education through the Arts in association with Ure Smith, 1973), 275–90, esp. 277.

24. Philip Jones and Peter Sutton, *Art and Land: Aboriginal Sculptures of the Lake Eyre Region* (Adelaide: South Australian Museum, 1986).

25. On the bark paintings, see Morphy, *Ancestral Connections,* and Taylor, *Seeing the Inside* (both note 3). On the ground designs and acrylic paintings see Munn, *Walbiri Iconography* (note 3), and Christopher Anderson and Françoise Dussart, "Dreamings in Acrylic: Western Desert Art," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 89–142.

26. On the *rangga,* see W. Lloyd Warner, *A Black Civilization: A Social Study of an Australian Tribe,* rev. ed. (New York: Harper, 1958), esp. 39–51, and on the ceremonial poles, see Ronald Murray Berndt and Catherine Helen Berndt, *The World of the First Australians,* 4th rev. ed. (Canberra: Aboriginal Studies Press, 1988), 436–38.

27. These objects have become widely known by the Arrernte [Aranda] term *tywerrenge,* earlier spelled *churinga, tjurunga* (see, for example, Helen M. Wallis and Arthur H. Robinson, eds., *Cartographical Innovations: An International Handbook of Mapping Terms to 1900* [Tring, Eng.: Map Collector Publications in association with the International Cartographic Association, 1987], 214 and fig. 19). Bull-roarers are wooden slabs, usually of a highly tapered oval shape, with lengths of string attached. Men hold the end of the string and swing the bull-roarer around their heads. As it circles them it also rotates, creating a roaring sound. This typically happens during moments in ceremonies when secret-sacred objects or designs are being revealed to novices or when men signal that women and children must not approach the ceremonial ground. The "voice" of the bull-roarer is often identified as that of a mythical or totemic entity.

28. See, for example, Baldwin Spencer and F. J. Gillen, *The Native Tribes of Central Australia* (London: Macmillan, 1899), esp. 128–66, and Charles Pearcy Mountford, "Sacred Objects of the Pitjandjara Tribe, Western Central Australia," *Records of the South Australian Museum* 14 (1961–64): 397–411.

29. Luke Taylor, "Ancestors into Art: An Analysis of Pitjantjatjara Kulpidji Designs and Crayon Drawings" (B.A. honors thesis, Department of Prehistory and Anthropology, Australian National University, 1979); Nancy D. Munn, "The Spatial Presentation of Cosmic Order in Walbiri Iconography," in *Primitive Art and Society,* ed. Anthony Forge (London: Oxford University Press, 1973), 193–220; and idem, *Walbiri Iconography* (note 3).

30. For non-Australian collections, see Carol Cooper, *Aboriginal and Torres Strait Islander Collections in Overseas Museums* (Canberra: Aboriginal Studies Press, 1989), and Gerhard Schlatter, *Bumerang und Schwirrholz: Eine Einführung in die traditionelle Kultur australischer Aborigines* (Berlin: Reimer, 1985).

31. Christopher Anderson, "Australian Aborigines and Museums–A New Relationship," *Curator* 33 (1990): 165–79.

32. Spencer and Gillen, *Native Tribes,* esp. 231–37, 306–15, 360–63, and 627 (note 28), and T. G. H. Strehlow, *Aranda Traditions* (Melbourne: Melbourne University Press, 1947), esp. 67–86.

Concepts

Classical Aboriginal topographic representations are essentially religious in content. They depict places and geographical features that have been selected and are shown together based on their occurrence in sacred myths. These myths are a central element in the body of Aboriginal tradition that is founded in the concept of the Dreaming (see below).

The people who make these topographic representations do not do so with cool detachment. In Aboriginal terms, all landscape is someone's home. "Land," "country," "camp," and "home" are encompassed by a single term in Aboriginal languages. The places represented in the works I am discussing here are usually the loci of intense religious, political, familial, and personal emotions.

Many of the myths are centrally concerned with spiritual identification between a set of sites and their people, thus encapsulating and asserting the customary-legal interests of particular human groups in particular areas of land. Customary rights to reproduce sacred topographical designs are frequently built on landownership rights and may be jealously guarded. At a certain crude level it is possible to say that those who own the sacred designs (and songs and dances) own the relevant land. Mythic-topographic designs may also symbolize relationships of alliance or disjunction between distinct land-based groups, especially in the case of far-traveling myths. Nevertheless, the myths and their more or less conventional picturings in both visual and performance modes do lead a life of their own to some extent, not always quite matching current land tenure or the current state of alliance politics.[33]

The paths along which Dreamings (ancestral beings) traveled are commonly known as Dreaming tracks, some passing through the countries of dozens of groups. Over much of Australia, particularly the inland regions, Dreamings typically fall into one of four categories, depending on their pattern of travel: stationary Dreamings that reside at one place and move about only at or near that site; estate-specific Dreamings that travel about from site to site within the local estate of a single low-level land-holding group or clan; regional travelers that pass through several adjacent estates in a certain district but begin and end within the social and ritual ken of their owning members; and continental travelers that pass through dozens of estates and journey for hundreds or thousands of kilometers, linking landowners who, at least until recent times and the advent of modern communications, did not know each other.

The Dreaming and Aboriginal Religion

Anthropologist W. E. H. Stanner gave this account of the efforts of an Aboriginal man to teach him the meaning of the concept usually referred to in English as the Dreaming, in its manifestation as a Dreaming place:

> "My father . . . said this: 'My boy, look! Your Dreaming is there; it is a big thing; you never let it go [pass it by]; all Dreamings [totem entities] come from there; your spirit is there.'" Does the white man now understand? The blackfellow, earnest, friendly, makes a last effort. "Old man, you listen! Something is there; we do not know what; *something*." There is a struggle to find words, and perhaps a lapse into English. "Like engine, like power, plenty of power; it does hard-work; it *pushes*." (Perhaps now the anthropologist begins to understand. . . .)[34]

The foundational concept of the Dreaming, the organizing logic of so much of the symbolism of Aboriginal imagery, is not easily explained partly because it is unlike the foundational concepts of most other religious systems. The Dreaming is not an idealized past, for example, although it is sometimes represented as a "creative period," logically prior if not temporally previous. The Dreaming, and Dreaming beings, are not the products of human dreams. In most Aboriginal languages, though not all, the concepts referred to in English as Dreaming are not in fact referred to by Aboriginal words for dreams or the act of dreaming, even though it may be through dreams that one sometimes gets in touch with the Dreaming. The use of the English word "Dreaming" is more a matter of metaphor than of translation. The same applies to the use of terms based on the verb "to dream" to express the notion of the Dreaming in some Aboriginal languages.[35] The animate beings of the Dreaming, themselves Dreamings (ancestral beings), are not idealized persons. They exhibit all the faces of human virtue, vice, pleasure, and suffering. Images of these beings, their places of travel and habitation and their experiences, make up the greatest single source of Aboriginal imagery. Although most are characterized as the animals and plants of Australia (e.g., Kangaroo, Long Yam), or as heroic individuals (e.g., the Two Women, the Apelech Men), some are less readily grasped as totemic beings by outsiders–Cough Dreaming, for example, or Dead Body

33. Peter Sutton, "Mystery and Change," in *Songs of Aboriginal Australia,* ed. Margaret Clunies Ross, Tamsin Donaldson, and Stephen A. Wild (Sydney: University of Sydney, 1987), 77–96.

34. Stanner, "Religion, Totemism and Symbolism," 231 (note 5); brackets and italic in original.

35. For a critique of the use of the notion of "Dreaming" by non-Aborigines, see Patrick Wolfe, "On Being Woken Up: The Dreamtime in Anthropology and in Australian Settler Culture," *Comparative Studies in Society and History* 33 (1991): 197–224. John Morton has written a rejoinder to Wolfe's position, "Essentially Australian, Essentially Black: Australian Anthropology and Its Uses of Aboriginal Identity" (forthcoming).

or Diarrhea. Dreamings clearly are not just things that are good to eat. As totemic beings they are rather, as Claude Lévi-Strauss has put it, "good to think [with]."[36]

In classical Aboriginal thought, there is no powerful, culturally central dichotomy of the spiritual and material, the sacred and secular, or the natural and supernatural. While the Dreaming beings and their physical counterparts and manifestations (as species, water holes, rock formations, or people) are each distinguished, Dreamings and their visible transformations are also, at a certain level, one.

The centrality of place, particular lands and sites of significance in Aboriginal topographic imagery, enables even the religious sculptures to be regarded as landscapes. For the traditionally minded, paintings, engravings, and sculptures themselves may belong on a continuum of manifestations of the Dreaming, together with those who made them, the natural entities projected in the designs, and the topographic features represented. Landscape features themselves are the marks of the Dreamings, elements of a larger meaning system.

Over much of Australia, Dreaming sites are connected not only in myth but by sequences of verses in long song series. These songs are typically those performed in religious ceremonies. The landscape is thus crisscrossed with what have been called songlines.

SONGLINES

Bruce Chatwin's best-selling popularization *The Songlines* has created an international recognition of the distinctive relationship between traditional Aboriginal songs and the mythic pathways that connect places over vast distances in Australia.[37] Much of the Australian continent is, or used to be, overlain by such pathways or Dreaming tracks.[38] Although not all such lines have songs associated with them, many do.

Paintings and sculptures that depict sites along these mythological tracks, including those that are also songlines, are thus not so much "topographic representations" of whole areas as selective depictions of trackways across them. A map of Dreaming tracks constructed by an ethnologist will normally show a matrix of natural features on which Dreaming sites and their linkages are superimposed. Aboriginal images dealing with the same tracks and songlines tend mainly to show only the linked sites, and to arrange them into a basically symmetrical pattern (fig. 9.6).

There are regions of Australia where the mythological travels of Dreaming beings play a far less structurally important role in land tenure than they do, most notably, in inland and north-central Australia. In Cape York Peninsula, although such travels are recounted in narratives, songs, and performances, the cultural emphasis is not so much on these connections between sites as on the sites themselves. The whole approach is far more atomistic and less network oriented than in the arid hinterland, for example.

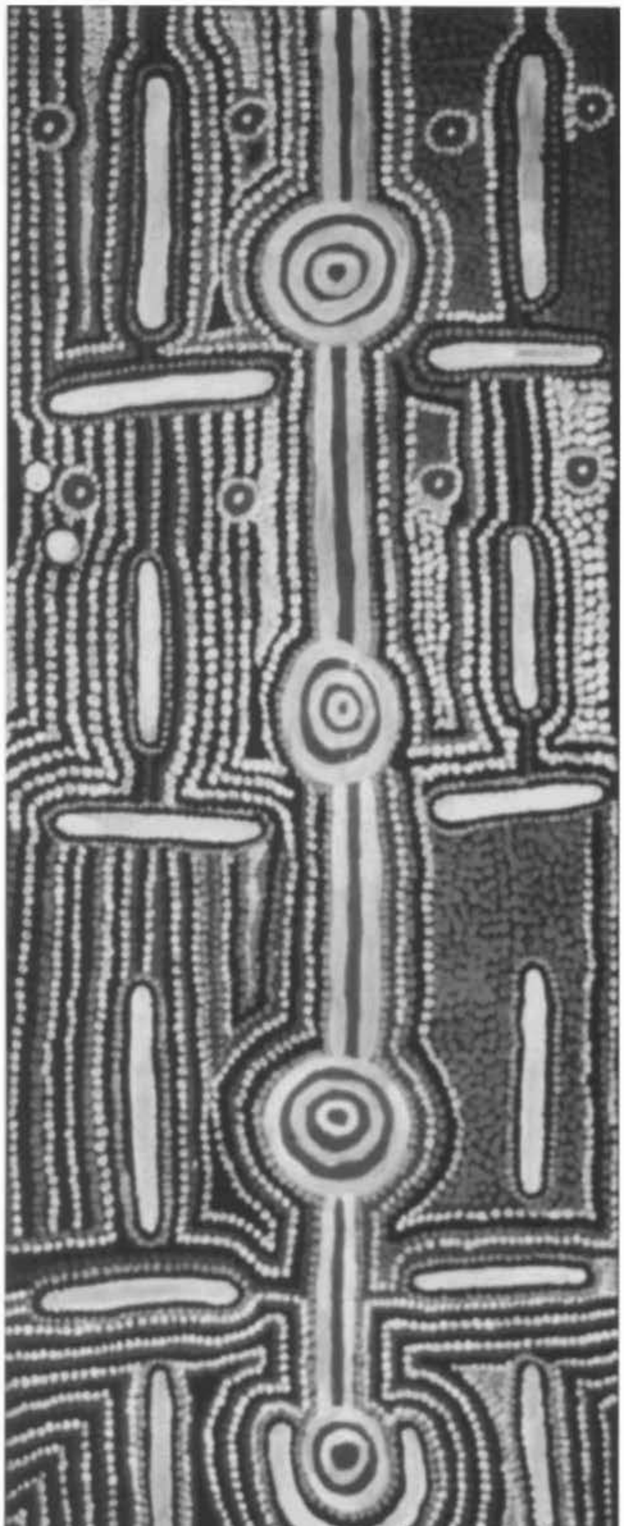
SPATIAL CATEGORIES

It is usually possible to identify the spatial scope of an Aboriginal image, even where it is poorly documented. The spatial scope can usually be included in one of four spatial-cultural categories: (1) a specific tract of country, often one defined by specific episodes of mythic narrative; (2) a broad regional political geography; (3) a cosmological category, such as the earth and sky; or (4) a plan of a residential site and its houses or shelters, or a plan of a vessel, and their contents.

36. Claude Lévi-Strauss, *Totemism*, trans. Rodney Needham (Harmondsworth, Eng.: Penguin, 1969), 162.

37. For authoritative and sophisticated accounts of such songlines, see, e.g., T. G. H. Strehlow, "Geography and the Totemic Landscape in Central Australia: A Functional Study," in *Australian Aboriginal Anthropology: Modern Studies in the Social Anthropology of the Australian Aborigines*, ed. Ronald Murray Berndt (Nedlands: University of Western Australia Press for the Australian Institute of Aboriginal Studies, 1970), 92–140; idem, *Songs of Central Australia* (Sydney: Angus and Robertson, 1971); Richard M. Moyle with Slippery Morton, *Alyawarra Music: Songs and Society in a Central Australian Community* (Canberra: Australian Institute of Aboriginal Studies, 1986); and Francesca Merlan, "Catfish and Alligator: Totemic Songs of the Western Roper River, Northern Territory," in *Songs of Aboriginal Australia*, ed. Margaret Clunies Ross, Tamsin Donaldson, and Stephen A. Wild (Sydney: University of Sydney, 1987), 142–67. Bruce Chatwin's book *The Songlines* (New York: Viking, 1987) contains several amateurish flaws resulting from a very brief and largely vicarious experience of the subject. Nevertheless, some may find it a useful introduction to a difficult subject. It is, however, a fictionalized mix of travel experiences and restatements of conclusions already published by others, especially T. G. H. Strehlow, and is not the simple traveler's account it purports to be.

38. A number of Aboriginal people consider the loss of such Dreaming sites and paths to be reversible. A senior Arrernte man from Alice Springs and, quite independently, Narritjin Maymurru of Arnhem Land have interpreted landscapes in the Canberra region in terms of Dreamings and myths from their own very distant regions; see Peter Sutton, "The Pulsating Heart: Large Scale Cultural and Demographic Processes in Aboriginal Australia," in *Hunter-Gatherer Demography: Past and Present*, ed. Betty Meehan and Neville White (Sydney: University of Sydney, 1990), 71–80, esp. 71, and Howard Morphy, "Landscape and the Reproduction of the Ancestral Past," in *The Anthropology of Landscape: Perspectives on Place and Space*, ed. Eric Hirsch and Michael O'Hanlon (Oxford: Clarendon Press, 1995), 184–209, esp. 184. Canberra lies in a region where earlier local religious interpretations of the landscape were largely, perhaps completely, expunged by the onslaught of colonization. David Mowaljarlai of the Kimberleys considers the Dreaming track fabric of the whole continent to be permanent and immanent, resting latent in those regions where living Aboriginal people no longer know it. See figure 10.34 and David Mowaljarlai and Jutta Malnic, *Yorro Yorro: Everything Standing up Alive: Spirit of the Kimberley* (Broome, Western Australia: Magabala Books, 1993), 190–94 and 205.



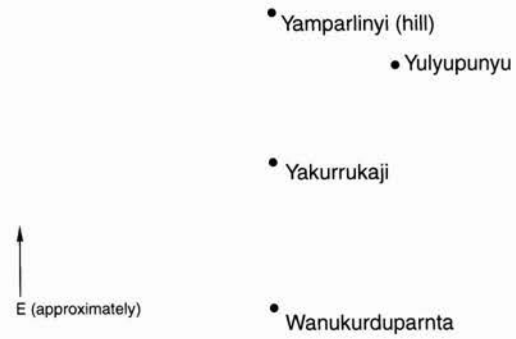


FIG. 9.6. *HONEY ANT DREAMING,* 1983. Acrylic by Paddy Japaljarri Stewart. On the left is one of the thirty wooden school doors at Yuendumu that were painted by local men. The lowest circle is Wanukurduparnta. The three above it are Yulyupunyu, the hill Yamparlinyi, and the well at Yakurrukaji. The relative locations of the sites depicted on the painting are shown above.
Photograph courtesy of the Pictorial Collection, Australian Institute of Aboriginal and Torres Strait Islander Studies, Canberra. By permission of Paddy Japaljarri Stewart, Yuendumu, Australia. Location map after Kay Napaljarri Ross, "Traditional Landscape around Yuendumu," in *Kuruwarri: Yuendumu Doors,* by Warlukurlangu Artists (Canberra: Australian Institute of Aboriginal Studies, 1987), 4–5.

Category 1 probably occurs in all media. Category 2 is generally restricted to maps elicited by ethnographers or drawn by Aboriginal people as part of the land rights struggle (see chapter 10). Category 3 occurs in several media, but astronomy as compared with geography is a rather rare Aboriginal visual topic (see below). Category 4 appears mainly in crayon drawings and stone arrangements (see chapter 10). In the case of classical Aboriginal iconography, we are mainly concerned with categories 1 and 3. Images of types 1 and 3 might be referred to as icons, in the sense that they are typically conventional religious images that emphasize pattern rather than figurative faithfulness to the thing represented. In chapter 10 I refer to images of categories 2 and 4 as "maps" and "plans" respectively.

ICONS OR MAPS?

Although all four types of representation might be considered maps under an extremely broad definition of that term, a closer look at the works themselves reveals a key distinction between iconographies that are aimed principally at showing episodes in localized religious narratives and those that lay out the country as a generalized political or other kind of geography. While both kinds of works aim to represent places and landscapes meaningfully, and both do so using a fundamentally iconic or likeness-based technique, they may differ not only in purpose and cultural content but also in visual conventions, including how completely their makers are committed to iconicity. Individual works, however, may fall somewhere between the two categories. I make the distinction for heuristic purposes.

And yet there is a clear distinction to be made between people's practical knowledge of a topography and what might be called their design knowledge of it. Gell makes a distinction between subject-centered forms of spatial knowledge that are indexical in character and constitute "images" and non-subject-centered forms of spatial knowledge that are nonindexical and constitute "maps." Indexical knowledge (images) is based on nonindexical knowledge (maps). Although this dichotomy is useful, Gell suggests that "images and maps flow one into the other in mutually related ways."[39]

In the case of the Aboriginal artifacts I discuss in this chapter and the following one, I make a similar distinction between icons and maps, but these are not simply equivalents of Gell's terms. Gell's images and maps are kinds of knowledge that may or may not be made manifest in concrete forms. My own distinction between certain kinds of artifacts is based on their peculiar combinations of meanings, visual conventions, and cultural functions. In particular, Aboriginal icons, while they embody spatial and other knowledge, are better described as being constituted by knowledgeable and emotionally rich *performance* rather than simply by a certain kind of knowledge per se. This explains why their analogic mismatch with one's topographic experience of distance and direction is, and perhaps must be, so thorough.

Aboriginal maps, on the other hand, are far better described as attempts to communicate topographic information across a gap of either knowledge or both knowledge and culture. Here the emphasis is not so much on display or ritualistic performance as on conveying practical knowledge in the form of an analogic picture of a topography and its cultural focal points or subdivisions, one that could actually be useful in finding one's way, for example.[40] Its accessibility is also distinctive and important–that is, a map needs to maximally employ conventions known to both creator and consumer. It needs to be, in this sense, "objective" (non-subject-centered, in Gell's terms). An icon, by contrast, is typically obscure, often quite unintelligible, to some of its "consumers" (ceremonial novices, for example), and "readable" by its more senior observers only because they have already been taught its conventions and referents. As I argue in the next chapter, apart from "mud maps" sketched in the sand for temporary explanatory purposes, Aborigines did not create maps before the coming of the Europeans. As they themselves say: "We don't need a paper map–we've got our maps in our heads." They did, however, feel a driving necessity to create religious images of topographies, or what I call icons.

Although the deeper semantic contents of both kinds of work may be aligned or even very similar in detail, and though there is a certain continuous character to any descriptive movement between the two, it is useful to keep them distinct at the level of ideal types. The key import of the icons is ostensibly carried by their mythic associations and the roles their designs play in ritual performance. The key import of the maps is ostensibly carried by their role in transmitting information–they are typically made to help non-Aboriginal people understand the layout of the country or to assert land interests vis-à-vis those of other Aborigines in a European-derived context such as a land claims tribunal. This is an account whose simplicity may be called into question (see chapter 10). What is not in question is that the icons, both those produced for internal Aboriginal consumption and those produced for the fine art and artifact markets, vastly outnumber the maps.

It is the perpendicular viewpoint that perhaps most tempts us to categorize Aboriginal images of country as maps, or at least maplike, rather than simply as landscapes.[41] This is because members of industrial cultures tend to associate the perpendicular representation of geography with knowledge and its horizontal depiction with art.[42] Very few images of landscape features produced within Aboriginal classical traditions are shown horizontally, that is, in section rather than in plan view.[43]

39. See the introduction by Eric Hirsch, "Landscape: Between Place and Space," in *The Anthropology of Landscape: Perspectives on Place and Space,* ed. Eric Hirsch and Michael O'Hanlon (Oxford: Clarendon Press, 1995), 1–30, esp. 18, in which he is summarizing the position of Alfred Gell, "How to Read a Map: Remarks on the Practical Logic of Navigation," *Man,* n.s. 20 (1985): 271–86, esp. 278–80. For further information on the indexical/nonindexical issue, see Michael Silverstein, "Shifters, Linguistic Categories, and Cultural Description," in *Meaning in Anthropology,* ed. Keith H. Basso and Henry A. Selby (Albuquerque: University of New Mexico Press, 1976), 11–55.

40. Maps drawn by Aborigines for land claims, however, may also carry strong performative meanings in what is a highly ritualized forensic context.

41. Barbara Glowczewski, who carried out anthropological research in the Lajamanu area of north-central Australia, found that the aerial view, focusing on the visible world, was complemented by a subterranean view focusing on the virtual and inside world of the Dreaming. (Both views, however, may be said to be in the same perpendicular plane.) She writes: "Most of the desert Aboriginal paintings look like topological maps: they transpose Dreaming myths in the form of circles, ovals or arcs which correspond to geographical sites eventually linked by itineraries (tracks) figured by straight or meandering lines. This apparent aerial vision (from above) is in fact also subterranean, (i.e. looking upwards): a double point of view of the mythical Beings watching the life on earth from the four dimensional space where they live forever, a space where the stars join the inside of the earth." Barbara Glowczewski, ed., *Yapa: Peintres aborigènes de Balgo et Lajamanu* (Paris: Baudoin Lebon, 1991), 166. See also the reviews by Peter Sutton, "From Horizontal to Perpendicular: Two Recent Books on Central Australian Aboriginal Painting," *Records of the South Australian Museum* 21 (1987): 161–65.

42. European maritime explorers long combined both perspectives in their charts, however, a development that may have stimulated the emergence of a figuratively accurate "landscape of fact" in Renaissance and post-Renaissance European painting, particularly among the artists working for the mercantile bourgeoisie in Holland. See Kenneth Clark, *Landscape into Art* (Mitcham, Victoria: Penguin Books, 1949), 31–49.

43. Animals and human beings and trees–which are like human bod-

Classically based Aboriginal icons of country have often been regarded by scholars as maplike, or even considered maps.[44] Anthropologist Nicolas Peterson, for example, referred to the designs on Warlpiri spear-throwers and sacred boards as "schematic maps."[45] Fay Gale, a geographer, has referred to similar images by the phrase "art as a cartographic form," and there she uses a painting by desert artist Tjuburrula as an extended example (see fig. 9.22 below).[46] In a chapter titled "Aboriginal-Australian Maps," Helen Watson describes bark paintings of northeast Arnhem Land as "highly conventional map[s]" that are "also religious icons."[47] This use of the term "map" for such works is highly problematic, however. Morphy, in a major study of traditional designs of the Yolngu people of northeast Arnhem Land, has a section titled "The Painting as a Map," but he does not usually describe bark paintings as maps per se. He points out that the design elements of Yolngu paintings may belong to one of two kinds of meaning, those that refer to mythological events and those that refer to topographical features, though the dichotomy is not always clear-cut because places may also be manifestations of ancestral events. "Many Yolngu paintings can be interpreted from two quite distinct perspectives: first as a record of mythological events, and second as a map of a particular area of land."[48] More recently Morphy suggests that "topographical representations" may be a better term than maps in such cases, "though I am not against words like map becoming part of an anthropological metalanguage where you actually engage in a process of shifting the central meaning of the term away from its conventional European sense, but as you say that is a gamble since it can work the other way."[49]

MAPS OF MAPS, OR TRANSFORMATIONS?

The very word "maps" carries its own cultural baggage. There is no direct translation for such a word into Aboriginal languages. The conditions under which Aboriginal topographic representations become cartographic are those in which they become of interest to a global audience of geographers and historians of cartography.

In no sense am I suggesting that Aboriginal images are primitive maps or precursors to the allegedly more advanced maps of modern civilizations. This kind of unilinear evolutionist view has long since been discarded by scholars. Aboriginal images of country are not, however, just different maps from those of, say, the Portuguese or the Japanese. A preeminent concentration on topographic symbolism in Aboriginal images perhaps justifies including this chapter in a history of cartography rather than in a history of writing or a history of art, although all three could be justified–and attacked–if one interprets all three histories as modes of intellectual appropriation by a powerful, and now globally distributed, industrial society.

Aboriginal iconographers make no pretense of representing topography itself as a precultural geography. They are typically, of course, highly accurate in their knowledge of the physical features of their homeland areas, the relative distances between sites, and the direction in which each site lies relative to another. Topographic elements present in their works, however, are frequently rearranged on the image surface with what may appear to be great freedom. The "correctness" with which someone has executed a topographic representation, within Aboriginal practice, is a matter of conformity to certain principles of design rather than iconic fidelity to physiography, relative distance, and direction.[50]

One reason for this interpretation is that in Aboriginal tradition representations of country are conceived of not as pictures of nature (another term untranslatable into

ies in many ways–may be shown in section view even in the desert or semidesert. As one approaches the north Australian coast from the desert, one finds occasional examples where the general graphic standpoint is horizontal rather than perpendicular. In a somewhat rare development, but one that is well entrenched, rock outcrops in western Arnhem Land paintings are often, but not always, shown in section view; see, for example, the bark painting in Peter Sutton, "Responding to Aboriginal Art," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 33–58, esp. 45 (fig. 71).

44. In addition, many collectors of Aboriginal images have assigned the term "map" to an image, but this cannot be taken to reflect a choice of terms by the person who made the object. Kupka, for example, describes a painting by Midjau-Midjawu collected at Croker Island in western Arnhem Land in 1963 as "Carte de la région d'Oenpelli" (Map of the Oenpelli region), which depicted certain creeks, lagoons, rock art sites, and the location of the painter's birthplace; see Kupka, *Peintres aborigènes d'Australie,* XLV (note 20).

45. Nicolas Peterson, "Totemism Yesterday: Sentiment and Local Organisation among the Australian Aborigines," *Man,* n.s. 7 (1972): 12–32, esp. 21.

46. Fay Gale, "Art as a Cartographic Form," *Globe: Journal of the Australian Map Circle* 26 (1986): 32–41.

47. Helen Watson, "Aboriginal-Australian Maps," in *Maps Are Territories, Science Is an Atlas: A Portfolio of Exhibits,* by David Turnbull (Geelong, Victoria: Deakin University, 1989; reprinted Chicago: University of Chicago Press, 1993), 28–36, esp. 33 and 36. In another work, Watson and Chambers refer to them more broadly as text; see Helen Watson and David Wade Chambers, *Singing the Land, Signing the Land: A Portfolio of Exhibits* (Geelong, Victoria: Deakin University, 1989), 49. Bark paintings are known by many different terms depending on the local Aboriginal language (of which there are some 250). Watson uses the term *dhulaŋ,* which means bark painting only among the Yolngu, in the languages of northeast Arnhem Land.

48. Morphy, *Ancestral Connections,* 221–25 and quotation on 218–19 (note 3).

49. Howard Morphy, personal communication, 15 June 1995.

50. Iconic accuracy may, however, be used as an Aboriginal criterion for excellence in the figurative depiction of, for example, animal species; see Morphy, *Ancestral Connections,* 153 (note 3).

Aboriginal languages) but as designs that themselves show only designs. One could describe these images as "icons of icons" rather than as maps of land, since the designs people have in their heads are what they show in paintings and sculptures, rather than the visual images they hold of the actual details of landscape, vegetation, distances, and directions. Aboriginal icons with topographic content depict something that is itself not so much a representation as a transformation. Topographies, or their presence as designs in Aboriginal paintings and sculptures, do not "represent" the Dreamings or ancestral events but are transformations of them.

Nancy Munn has been the pioneering scholar in the field of Aboriginal iconography, particularly for Central Australia.[51] Her paper "The Transformation of Subjects into Objects in Walbiri [Warlpiri] and Pitjantjatjara Myth" (1970) has played a seminal role in the wider understanding of Aboriginal relationships with place. She posits three types of transformation in Aboriginal myth for the region: metamorphosis (the body of the ancestor is changed into some material object); imprinting (the ancestor leaves the impression of his or her body or of some tool); and externalization (some object emerges from or is taken out of the ancestor's body).[52] Thus a topographical feature is often both a hill or creek and at the same time a transformation of such a kind, and it remains understood as an ancestor's body or body part or as an excrescence or imprinting (such as a track) left by an ancestor. The same feature can also be a transformation of a sacred object that "is" the ancestor's body. A particular hill may thus be a digging stick, a bull-roarer the stick turned into, an ancestral being's body, and a hill. In Central Australia a sacred stone object (*tjurunga, churinga*) incised with designs representing places in a myth is typically itself also regarded as the transformed body or body part of an ancestor and is identified with the living incarnation of that ancestor, who is a particular known individual. Such transformations are not so much becomings as equivalences.

Munn discovered that Warlpiri men represented the sites joined by ancestral travels using combinations of circles and lines. There was an iconic relation between these arrangements and what they depicted, but it was not strictly maplike in the sense of being narrowly iconic. For example, a line of three campsites would be shown as three circles joined by straight lines–but the sites might not be in a straight line in actual known space. Similarly, a meandering line might join circles representing sites on the pathway of an ancestral being who indeed meanders, such as a snake or a stream of water. Again, where the paths of two ancestors crossed, lines in the design might intersect. But, Munn comments, "as these examples demonstrate, the variant arrangements are treated by Walbiri as ways of depicting different spatial distributions of locales, and are not simply a decorative play with the circle-line motif. It is for this reason that central Australian designs have sometimes been referred to as 'maps.'"[53]

PERFORMANCE VERSUS INFORMATION

A key reason to be cautious about identifying painted and sculpted Aboriginal icons of country as kinds of maps is that they arise principally as display or performance rather than as explanation or record.[54] No doubt Aboriginal ceremonial performances, particularly where novices are inducted into new knowledge, involved and still involve the transmission of information, but even under a tutor the decoding of classical Aboriginal iconographies by a novice typically depends on some foreknowledge both of the landscape depicted and of the conventions used in showing it, especially since "explanation" in an Aboriginal ritual context is often highly cryptic and places the onus on the subject to generate his or her own understanding based on somewhat fragmentary verbal guidance. Information transmission generally, in Aboriginal culture, is more like natural language acquisition than formal instruction in the industrial academy, although at times it may resemble both. That is, novices learn not so much by absorbing preexisting facts under programmed instruction as by generating a model of aspects of the world out of a mixture of explicit statements and a scatter of explanatory shreds and patches, under a general prohibition on asking questions.[55]

51. Nancy D. Munn, "Totemic Designs and Group Continuity in Walbiri Cosmology," in *Aborigines Now: New Perspective in the Study of Aboriginal Communities*, ed. Marie Reay (Sydney: Angus and Robertson, 1964), 83–100; idem, "The Transformation of Subjects into Objects in Walbiri and Pitjantjatjara Myth," in *Australian Aboriginal Anthropology: Modern Studies in the Social Anthropology of the Australian Aborigines*, ed. Ronald Murray Berndt (Nedlands: University of Western Australia Press for the Australian Institute of Aboriginal Studies, 1970), 141–63; idem, "Spatial Presentation" (note 29); and idem, *Walbiri Iconography* (note 3).

52. Munn, "Transformation of Subjects," 142.

53. Munn, *Walbiri Iconography*, 136 (note 3). (The standard spelling of this name is now Warlpiri.)

54. In Central Australian "sand stories," sites and their spatial relationships, as well as plans of camps, are drawn in sand by tellers of narratives and wiped out as episodes (scenes) end. They are part of the narrative performance, as illustrations, or represented visualizations of narrated events. They are, however, rather like explanatory "mud maps" (see pp. 405–8) drawn to advise travelers of topographical features ahead, in the sense that they are integrated with verbal discourse.

55. Strehlow, *Aranda Traditions*, 5–6, 110 (note 32); idem, *Songs of Central Australia*, 70, 197–98 (note 37); Ken Hale, "Remarks on Creativity in Aboriginal Verse," in *Problems and Solutions: Occasional Essays in Musicology Presented to Alice M. Moyle*, ed. Jamie C. Kassler and Jill Stubington (Sydney: Hale and Iremonger, 1984), 254–62; and Ian Keen, *Knowledge and Secrecy in an Aboriginal Religion* (Oxford: Clarendon Press, 1994).

Means and Interpretations

Enduring Templates, Ephemeral Materials

Aboriginal icons such as Banapana's bark painting of Djarrakpi (see plate 18 below) are typically constructed using traditional designs, and their makers often say their images are in the style used by their ancestors. Although many Aboriginal design elements have indeed been stable over at least the past century or so, there have also been clear shifts of style.

By designs I do not mean fixed whole images. What is stable in such systems is a stylistically homogeneous set of recurring templates and more or less standard visual devices. These are combined into more or less unique whole images with each act of execution.[56] Until the emergence of the Aboriginal art and artifact markets, most mobile Aboriginal works, at least in the classical tradition, were made for short-term purposes and then left to decay in the elements or were intentionally destroyed as part of the relevant ceremonies. In fact, things made by people were seldom kept and maintained for long periods (by the standards of most other cultures). The transience of the medium was not felt to be inconsistent with the permanency of the symbolism and sacred qualities often attributed to the object itself. Sacred stone slabs and sacred wooden boards, most of them depicting sites of sacred significance, were probably the only topographical representations, apart from designs on rock surfaces, that lasted beyond a few days or months. The wooden *rangga* (sacred posts) of Arnhem Land are often kept in mud in sacred wells, but their designs have to be repainted each time they are used.

In Aboriginal eyes, much less than in those of outsiders, it is almost always the design that matters most, rather than the object it decorates. An image of a sacred water hole, a clan hatching style, a depiction of a certain Dreaming, is usually transposable between media. The same design may be painted, for example, on a boy's body during initiation, on the walls of a wet-season shelter, on a painting made for sale, on a bark or log coffin, on a biscuit box lid, on an aluminum dinghy, or on a pair of sneakers.[57] It is the designs, or rather their elemental templates, that have continuity. In the cultural context of a museum collection, however, the interest of most staff and visitors in the continuities of such objects has at least as much to do with the age and physical preservation of the artifact itself as with the life history of its design components. Sedulous keepers of artifacts in state institutions are sometimes shocked at the apparently cavalier attitude with which Aboriginal people, keepers of the truly felt meanings of such objects, may treat their material expressions in certain contexts.

Non-Aboriginal landholders may need a paper map to demonstrate their tenure within their own legal system. Aboriginal people often point out that their title deeds, within their own customary law, are not pieces of paper but such things as sacred designs. Thus in theory they may, if they wish, "burn the map and hold the country."[58] Another reason "map" may be a misleading title for Aboriginal topographic images is that such works often make little attempt at technical precision. The European colonists of Australia tended to disparage the visual works of the Aborigines on the grounds that they were crude or rude, not only because they were often executed with little finesse but because of their media, such as roughly chopped sheets of eucalyptus bark (plate 15) or the walls of rock shelters.

Bark painting, at least in several parts of northern Australia, goes back before the arrival of the cash market. A number of early observers recorded that people painted the insides of their bark shelters (fig. 9.7).[59] Even very early barks collected without notice (stolen) from Aboriginal camps are at least roughly rectangular, although the older ones do have more ragged edges than more recent examples.

Most barks used for painting are prepared as follows. Two shallow rings are cut some distance apart around a eucalyptus tree's girth, using an ax. This is usually done around wet season, since the running sap makes it easier to pry off the bark at that time. (Removing the bark kills the tree, although this is not an objective.) The bark sheet is singed to remove loose bits and help flatten it. It may be weighted down with stones or sand for some days, also to make it flat. It is scraped clean, and a ground is laid on the inner surface. The outlines of main designs are then drawn, including borders within which details will be added, followed by more details, and repetitive and decorative elements such as cross-hatching and dotting are added last. Pigments are natural solids ground or crushed and mixed with water and a fixative. By the 1980s the major fixative had become the wood glue Aquadhere (orchid juice was more usual in the past). Red and yellow ochers, kaolin, and charcoal are the main pigments. Brushes are made from sticks, pandanus fibers, hair, and other materials; occasionally a commercial brush is used,

56. On templates in Aboriginal iconography, see Morphy, *Ancestral Connections,* 235–41 (note 3).

57. See Sutton, "Responding to Aboriginal Art," figs. 50, 51, and 85 (note 43).

58. With apologies to Fred R. Myers, see his "Burning the Truck and Holding the Country: Property, Time, and the Negotiation of Identity among Pintupi Aborigines," in *Hunters and Gatherers,* 2 vols., ed. Tim Ingold, David Riches, and James Woodburn (New York: Berg, 1987–88), vol. 1, *Property, Power and Ideology,* 52–74.

59. Norman B. Tindale, "Natives of Groote Eylandt and of the West Coast of the Gulf of Carpentaria, Part II," *Records of the South Australian Museum* 3 (1925–28): 103–34, esp. 115 and 117, and Baldwin Spencer, *Wanderings in Wild Australia,* 2 vols. (London: Macmillan, 1928), 2:792–94.

FIG. 9.7. WET-SEASON BARK HUT (SINGLE MEN'S HOUSE), MID-1970s. This bark hut at Manggalod on the Mann River in central Arnhem Land has secular bark paintings on the walls.
By permission of Howard Morphy.

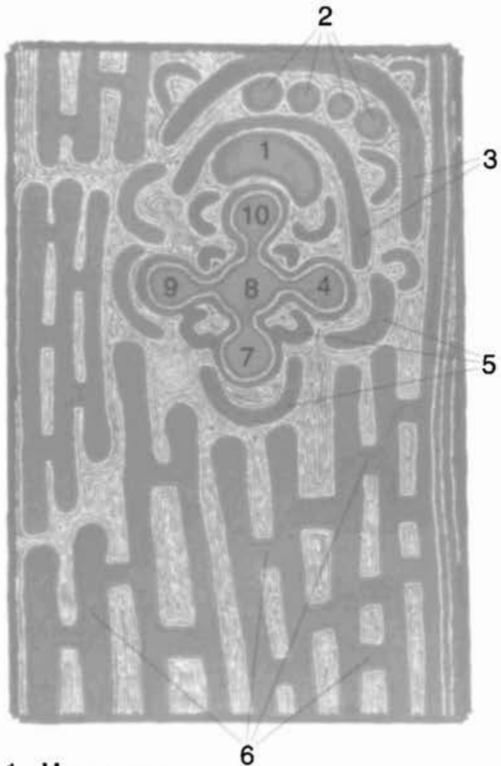


FIG. 9.8. SCHEMA OF WATER HOLES AT JILA JAPINGKA AND PAJPARA (PLATE 16).
After Christopher Anderson and Françoise Dussart, "Dreamings in Acrylic: Western Desert Art," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 89– 142, esp. fig. 141a.

especially for laying the ground. Many bark painters, particularly since the 1950s, have attached supporting rods to the top and bottom of the bark.

CONVENTIONS

When combined into whole images, the classical visual templates are arranged into what are usually plan views whose major elements are schematic images of natural features such as hills, creeks, water holes, and islands or created features such as wells ("soakages"). Their canons of proportion, however, are not highly naturalistic but offer the image maker choices that often reflect different emphases on various myth topics, social relationships between landholders, usually severely reductive graphic principles of symmetry and geometry, and the constraints of the media used (in the 1990s most involved a base surface of a rectangle, either of canvas or of bark, unless they were sculptures or ground designs).

Even where a painting such as Peter Skipper's *Jila Japingka* (plate 16) shows not only specific Dreaming sites but also a widely distributed physiographic zone of parallel sand hills, the zone itself is shown schematically, as a type rather than as a copy of actual and specific landforms (fig. 9.8). Vegetation associations, running water, clouds, smoke, and similar amorphous, widely or patchily distributed geophysical features are also often shown as formal background patterns in Western Desert and Arnhem Land paintings. In such works the environmental feature that typifies a certain district is thus itself typified rather than figuratively copied.

With few exceptions, a plan view is maintained whether the image is focused on relational patterns between places or on a single site. This approach, I suggest,

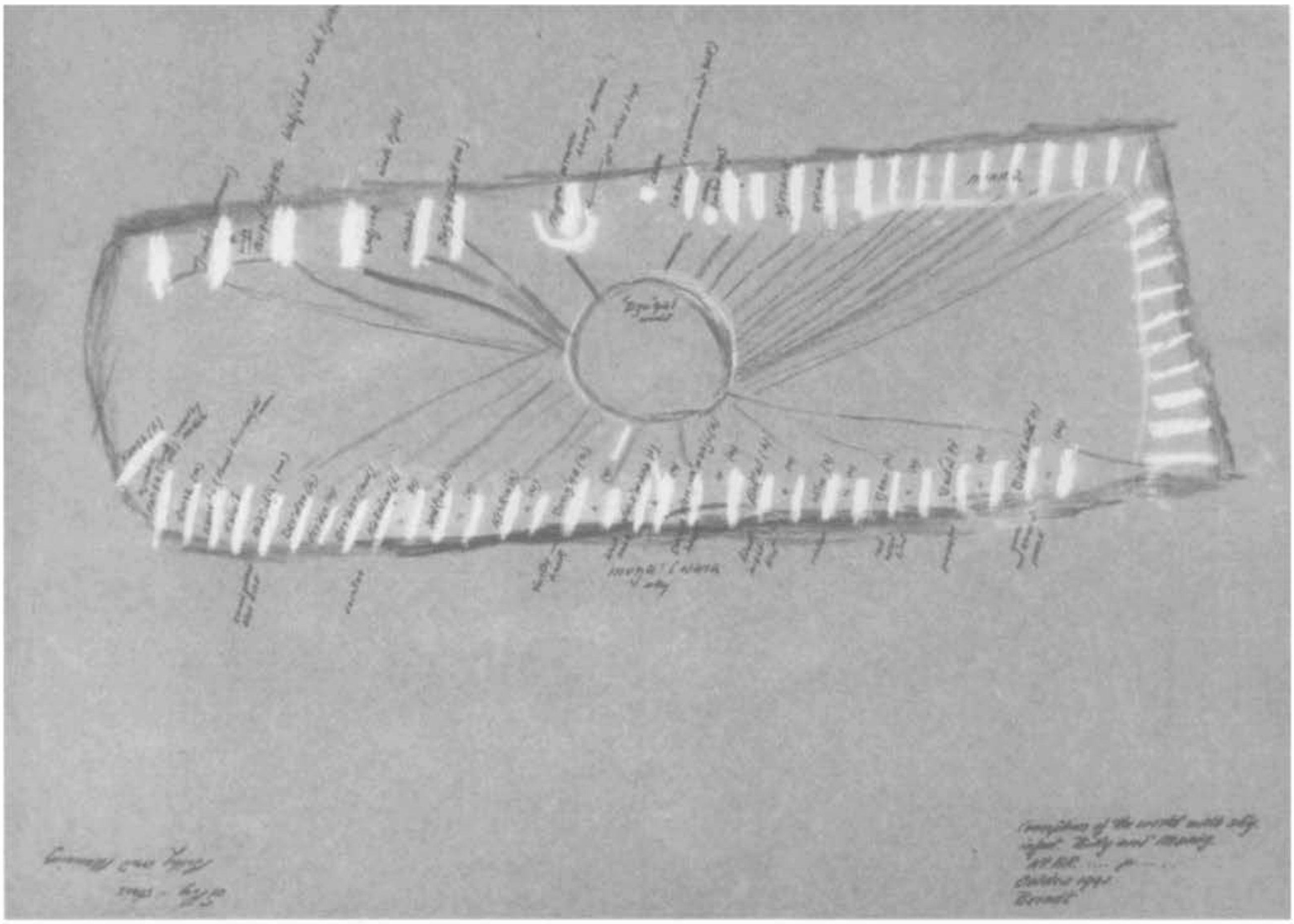


FIG. 9.9. *CONCEPTION OF THE WORLD WITH SKY,* 1941. Crayon on paper by Billy and Maning, Ooldea, South Australia. Photograph courtesy of the Berndt Museum of Anthropology, University of Western Australia, Nedlands (P22144).

reflects an emphasis on syntagmatic rather than paradigmatic relations between places, and between different groups of people associated with them, that is deep-seated in Aboriginal culture.

There is enormous variation in the degree of visual complexity of Aboriginal topographic representations. The highly compartmentalized, infilled designs of northeast Arnhem Land may be contrasted with the spareness of a single daubed circle from the desert. But the formal simplicity of much Aboriginal imagery belies its embodiment of complex social, ceremonial, and mythic meanings. This simplicity often rests on a preference for cryptography and obliqueness demanded by a restricted economy of religious knowledge, the basis of so much power in traditional Aboriginal society.[60] Although practitioners of many visual traditions try to achieve something like a copy of a visual impression, the Aboriginal iconographer generally seeks to create reductive signs for the things represented. Some signs are more reductive than others. The most sacred and ritually dangerous images are often the most schematized, the most geometric, and thus, by superficial measures, the simplest. From an Aboriginal point of view these are often the deepest works, with the most layered meanings.

The cosmos itself is also layered, in the sense that the subterranean, geophysical, and heavenly zones receive rather different treatment in Aboriginal visual representation. Although Dreamings often move underground, there tends to be little sign of this in the conventions of the images representing the sites thus joined together in myth and song. It is rare, also, for images of stars and planets to be integrated with earthly topographies in these traditions.

COSMOLOGICAL AND ASTRONOMICAL DEPICTIONS

Billy and Maning's crayon drawing *Conception of the World with Sky* of 1941 (fig. 9.9), and Njien's *Star Plan*

60. See Morphy, *Ancestral Connections* (note 3); Keen, *Knowledge and Secrecy* (note 55); and Eric Michaels, "Constraints on Knowledge in an Economy of Oral Information," *Current Anthropology* 26 (1985): 505–10. This topic is taken up in more detail below.

FIG. 9.10. *STAR PLAN,* 1941. Crayon on paper by Njien, Ooldea, South Australia. Photograph courtesy of the Berndt Museum of Anthropology, University of Western Australia, Nedlands (P22143).

of 1941 (fig. 9.10), both commissioned and collected by Ronald Berndt at Ooldea in the western part of South Australia, together with the Lake Eyre toa of about 1905 depicting the earth, atmosphere, sky, and stars, collected by J. G. Reuther (fig. 9.11), are among a relatively small number of Aboriginal images of the grander scheme of earth and heavens. Aboriginal depictions of the heavens as a whole are not at all common. This is not to say that the moon and sun do not occur in Aboriginal images as mythic characters. But there is seldom an inclination to use an astronomical entity such as a specific constellation as a base for an image, in spite of the misleading circumstance that one of the most widely circulated images of Aboriginal painting, repeatedly published and exhibited since the early 1950s, is Minimini Mamarika's *Orion and the Pleiades* of 1948 (fig. 9.12).[61] This is interesting because Aboriginal traditional knowledge of the stars, at least in Central Australia, is generally richer and more precise than that of a lay urban dweller, extending beyond merely a mythological symbolism for many constellations to a knowledge of the two types of apparent motion of the stars and the distinct colors and brightnesses of different stars.[62]

I suggest that a major reason for this absence is that geographic symbolism in classical Aboriginal culture is particularly concerned with the religious politics of land interests held by different groups, whereas the sky is typically neutral territory. The sky and the distant seas far offshore in coastal parts of Australia are places to which the personal soul is frequently held to be transported when the individual dies.[63] These two are excellent candidates

61. This exotic European title was bestowed by Mountford. The painter of the work would almost certainly have never heard of Orion and the Pleiades as names for the constellations. See also Sutton, *Dreamings: The Art of Aboriginal Australia,* 221, no. 35 (note 3).

62. B. G. Maegraith, "The Astronomy of the Aranda and Luritja Tribes" (Adelaide University Field Anthropology, Central Australia, no. 10), *Transactions and Proceedings of the Royal Society of South Australia* 56 (1932): 19–26.

63. For a crayon drawing on this subject, see Mawalan Marika's *The Voyage of Yawalngura to the Dua Moiety Land of the Dead,* Yirrkala 1947, reproduced in Ronald Murray Berndt and Catherine Helen Berndt, *The Speaking Land: Myth and Story in Aboriginal Australia,* 1st

FIG. 9.11. TOA (WAYMARKER) INDICATING THE SITE PALKARAKARA, CA. 1904. Palkarakara ("to climb up onto something in the twilight"), near Lake Eyre, South Australia, is where the ancestral heroes Milkimadlentji and Mitjimanamana saw in their mind's eye the souls of the dead climbing upward. The lower white section indicates the earth, and the recessed waist, with its yellow bands, is the atmosphere between earth and the heavens. The upper white section is the sky, and the vertical lines are the souls of the dead climbing to the heavens. Above are the stars, which are the souls of the dead shown as white patches. The toa, made from gypsum, ochers, and wood, is from the defunct Killalpaninna Lutheran Mission, South Australia.
Height of the original: 26.9 cm. Photograph courtesy of the South Australian Museum, Adelaide (A6168).

FIG. 9.12. *ORION AND THE PLEIADES,* 1948. Ocher and manganese on bark painting made at Groote Eylandt by Minimini Mamarika (1904–72) for ethnographic collector. At the top are the wives of the fisherman Burumburumbunya seated in their circular grass hut. This is the constellation known to Europeans as the Pleiades. The T-shaped form at the bottom is the constellation known to Europeans as Orion. Across the top of the T are three fishermen (Orion's belt), and below them are the fishermen's fire, two parrot fish, and a skate.
Size of the original: 76 × 32 cm. Photograph courtesy of the Art Gallery of South Australia, Adelaide (701PA46). © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

to be such destinations because they are politically "free." (The spirit image, or the fleshly ghost, by contrast, is often a second aspect of the person in the afterlife, which is typically sung or otherwise ritually sent to a territorially very symbolic location in or close to the individual's own homeland.) Another factor, however, may be that in the classical traditions it is generally true that people can represent designs only for country in which they have some licit right, either by birthright or by license from its traditional owners. Since nobody owns pieces of the heavens, perhaps nobody has a normal customary right–or much incentive–to represent them.

THE DEPICTION OF TIME IN SPACE

Aboriginal images, as well as sacred song verses, often not only connote a topography and its specific sites but also add the dimension of time, such as seasons of the year or phases of the day. Relative mythic time–that is, a sequencing of events or creative phases within the mythic domain–is rarely of any moment, however. Morphy refers to this as the "subordination of time to space" in the case of Yolngu thought.[64] It is the places where ancestral events occurred, and their relative locations, that are the primary structuring forces in the Dreaming narrative world, not periods or strict episodic sequences.

On the other hand, time in the sense of seasons of the year or phases of the day and night carries much symbolic power in Aboriginal classical thought. Liwukang Bukurlatjpi's bark painting known to curators as *Squid and Turtle Dreamings* (fig. 9.13), which is concerned with the landscape history of the Wessell Islands, illustrates this. The squid on the left is female and created all the families and places along the Wessell Islands chain. The squid on the right is the male who allocated the places made by the female to estates owned by different Aboriginal clans, the same clans that survive today. Going south along the Wessell Islands chain, he handed over named sacred places to about eleven clans. South Australian Museum documentation contains the details of eleven site names and the clans to which they are said to have been allocated. All the site names are said to mean squid in the various languages of the clans.

The image not only connotes the sacred political geography of the Wessell Islands but also maps time onto that space. The bands of cross-hatching next to the male squid, and on the turtle's carapace, are in the color sequence black, red, yellow, white. Here these represent night, sunset, sunrise, and still water at midday. The image further suggests the arrival of a certain season. The squid, as Liwukang explained during our conversation at Yirrkala in 1987, transformed itself into turtle. This turtle is associated with the relation between weather and the relative safety of sea travel in the area.[65]

The female squid on the left remains in the Wessell Islands in the form of a rock formation at the island of Djidinja, where the black mark of the squid's ink can be seen on the landscape, flowing from land to sea. The black paint on the squid here represents this ink also. The island of Djidinja may thus be connoted by the paint color itself and therefore be represented without any depiction of the island's outward form. Indeed, a whole set of places and times is symbolized in this image dominated simply by three sea creatures, but only local knowledge enables one to see this.

The topographic dimension of *Squid and Turtle Dreamings* is thus hidden until one is told about it. This is not accidental: Aboriginal explications of religious imagery are typically parsimonious, piecemeal, and ambiguous. The notion that one should or even may reveal comprehensive information of this type at a single sitting is alien.

KINDS OF OBLIQUENESS

The cryptic, the oblique, the polysemous, the veiled, the secret–all these features and more are characteristic of Aboriginal iconographic traditions in general and have been written about by scholars in considerable detail for the regions of Arnhem Land, Central Australia, and the Western Desert. Howard Morphy's major work *Ancestral Connections: Art and an Aboriginal System of Knowledge* (1991) has as its focus the role of northeast Arnhem Land iconography in a complex and variably restricted system of knowledge. Another major ethnography from the same region, but based farther west, is Ian Keen's *Knowledge and Secrecy in an Aboriginal Religion* (1994), in which about a third of the description and analysis is concerned with secrecy and its cultural matrix.[66]

A major contrast employed by the Yolngu of the region is between inside and outside knowledge–knowledge that is more or less restricted (inside) to initiated men is contrasted with things that may be known also to women and children (outside knowledge). Knowledge of both kinds may be combined within a single topographically focused image, such as Malangi's *Sacred Places at Milmindjarr'* (plate 17), which I was able to document in detail with Malangi at Ramingining in 1987. The story concerns the travels of the founding ancestral figures known

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United States ed. (Rochester, Vt.: Inner Traditions International, 1994), pl. 28.

64. Morphy, "Ancestral Past," 187–89 (note 38).

65. Once a year the turtle travels north along the chain of islands. When she comes up to breathe she exhales air that turns into clouds. These clouds are a seasonal sign that the sea is smooth, the weather is calm, and the fishing is plentiful.

66. Morphy, *Ancestral Connections* (note 3), and Keen, *Knowledge and Secrecy* (note 55).

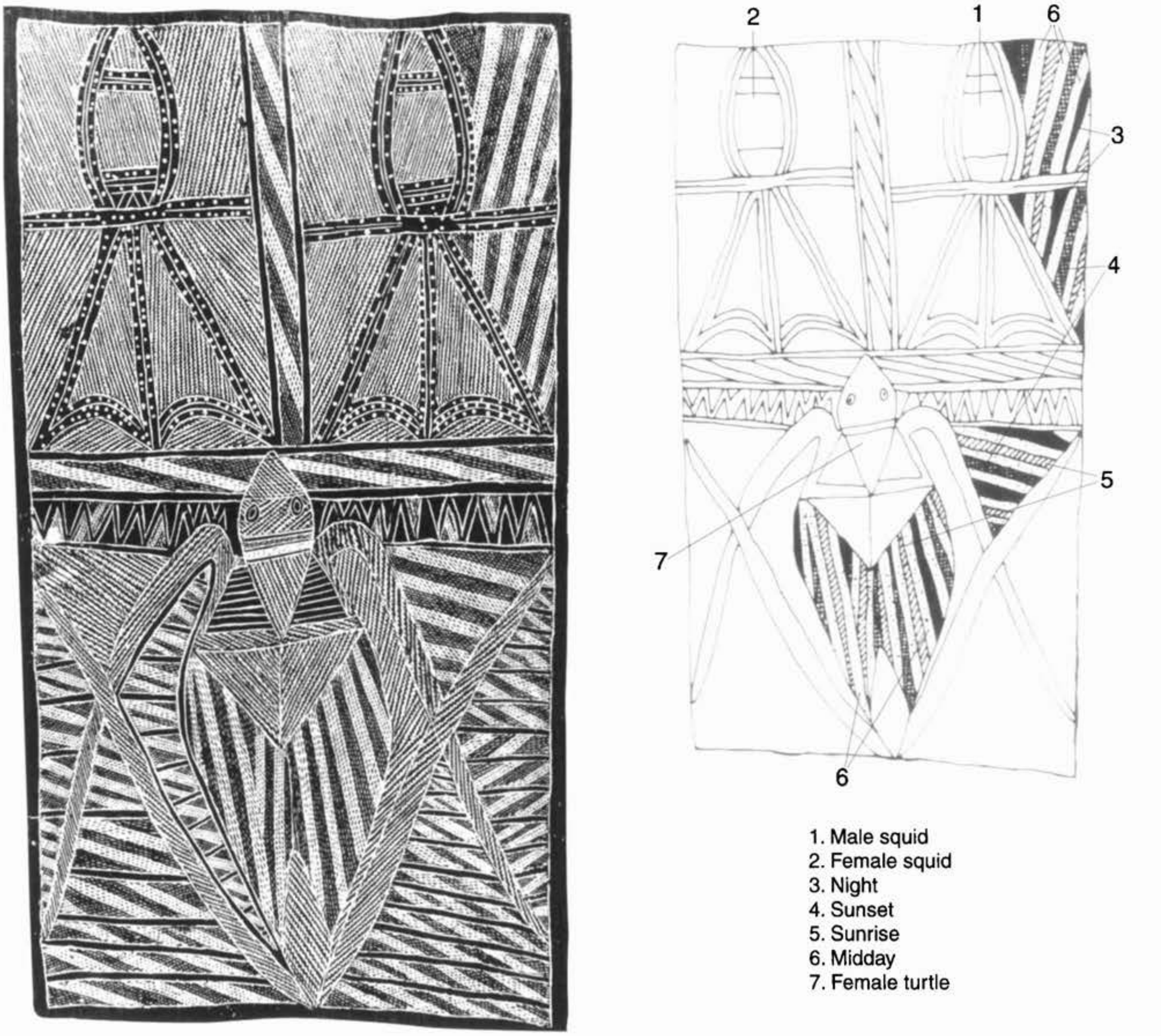


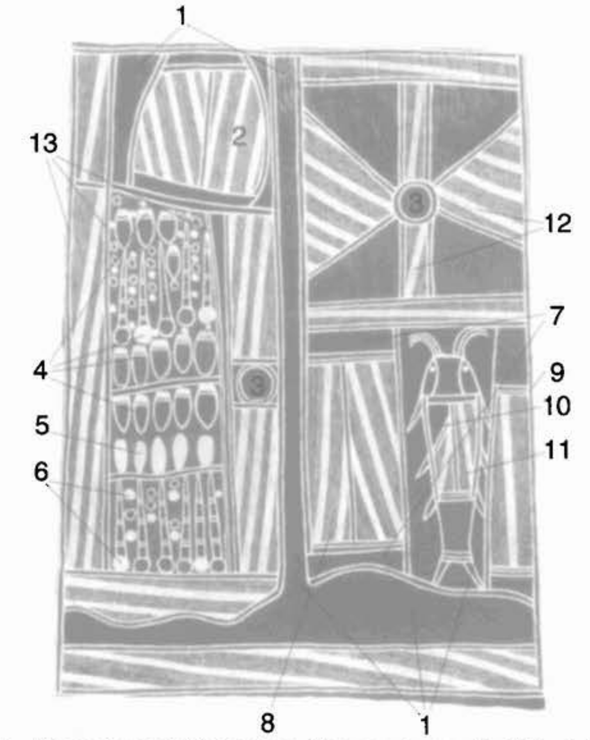
FIG. 9.13. *SQUID AND TURTLE DREAMINGS,* 1972. On the left is the painting, ochers on bark, made for sale by Liwukang Bukurlatjpi at Galiwinku, northeast Arnhem Land. Size of the original: 92 × 52 cm. Photograph courtesy of the South Australian Museum, Adelaide (A67540). © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney. Schema after Peter Sutton, "Responding to Aboriginal Art," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 33–58, esp. fig. 81a.

over much of Arnhem Land as the Djan'kawu Sisters.

This painting is a partial representation of the mythic geography of Malangi's own clan country in the area of Ramingining. His clan is Manharrngu, Dhuwa moiety,[67] of the Djinang language. The story that is central here is a segment of that of the Djan'kawu Sisters, two women whose legendary travels over vast distances in Arnhem Land are locally famous. As they traveled from place to place, paddling their canoe and walking overland, they created the clans (landowning groups) and their languages, named natural phenomena, and created spring waters by plunging their digging sticks into the ground. Elements from only a few episodes of this story are shown in the painting (see fig. 9.14).[68] As Malangi got to mo-

67. Dhuwa and Yirritja are the names of the exogamous patrilineal moieties (halves) of Yolngu society.

68. Further details of the story, from various vantage points in Arnhem Land, are contained in, e.g., Warner, *Black Civilization,* esp. 335–70 (note 26); Ronald Murray Berndt, *Djanggawul: An Aboriginal Religious Cult of North-eastern Arnhem Land* (Melbourne: Cheshire, 1952); and Ian Keen, "One Ceremony, One Song: An Economy of Religious Knowledge among the Yolŋu of North-east Arnhem Land" (Ph.D. diss., Australian National University, 1978). The latter espe-



1. Seawater and tidal stream. The coast opposite Milingimbi is at the bottom, and the tides rise up the river in the center of the painting. The river is all Dhaamala.
2. Garangala Island, David Malangi's country, south of Murrunggwa
3. Milmindjarr', the well
4. The "waterlily" called *ragi* (spikerush, *Eleocharis dulcis*)
5. Spikerush corms, with skin removed
6. Black and white leaves of the spikerush
7. David Malangi's Dreaming
8. White, yellow, and red ocher in regular alternation
9. Catfish Dreaming (Djikkarla)
10. Liver of Catfish
11. "Paint to make him pretty" (Malangi)
12. (Meanings secret)
13. "Little rivers"

FIG. 9.14. SCHEMA OF *SACRED PLACES AT MILMINDJARR'* (PLATE 17).
After Peter Sutton, "Responding to Aboriginal Art," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 33–58, esp. fig. 80a.

tif 7 (his Dreaming) during our 1987 discussion of this painting, his reply to my usual question about its significance was: "I know. You don't know." And I was not about to be told, either. The line of secrecy is constantly being drawn in such contexts.

INDETERMINACY OF INTERPRETATIONS

Apart from varying degrees of restrictedness, Aboriginal classical images of country share another common and culturally distinctive feature: indeterminacy of interpretations. Although the relation between topography and its representation in Aboriginal images is typically iconic, this does not mean it is typically figurative; indeed, as we have seen, the precise details of physiographic features, relative distances between places, and directional relations between sites are commonly subordinated to the demands of the maker's design. The maker's design itself is typically confined within the conventions of the local iconographic tradition, even though each whole image thus produced may be unique.

Such a schematized and conventionalized approach means that each finished image cannot easily be tied to a single interpretation. It may be subject to varying explications, even by the same person. This indeterminacy may consist of simple polysemy, in which elements of an image may stand for different things that are symbolically linked or of different levels of secretness. For example, a circle may represent a named water hole, and also the breast of a female Dreaming figure who is said to have created the water hole with her digging stick; at a deeper or more secret level the circle might also represent her vagina. But there are also different interpretations that do not necessarily form layers of contemporaneous meanings in this way. I refer to these as alternatives.

Howard Morphy provides us with a useful example of the latter type of indeterminacy. Morphy's informant Narritjin, of the Manggalili clan, had explicated an image executed by his son Banapana (plate 18) in several different ways on separate occasions (fig. 9.15).[69] First, he had interpreted it as an account of the mythical journey of two koels (a bird species), two opossums, two emus, and a number of other ancestral beings. Although the mythology behind the painting specifies the particular places and clan countries involved, this particular interpretation collapsed the geography, the travels of the Dreamings, and the passage of time into a single image and provided a generalized account of the journey as a whole. On another occasion, Narritjin interpreted the same painting as a specific account of the mythic fashioning of the topography of Djarrakpi at Cape Shield in Narritjin's Manggalili clan country. On a third occasion, and in a way that was unusual and distinctive, Narritjin also used the painting as a topographical map to show Morphy the final stages of his own recent journey there and the work that had been done in building the Manggalili settlement at Djarrakpi, Cape Shield (see fig. 9.16).

cially makes the visual imagery and the details of the myth utterly coherent, but in a way that cannot be revealed here because of religious restrictions on the explanations.

69. Morphy, *Ancestral Connections,* 218–27 (note 3).

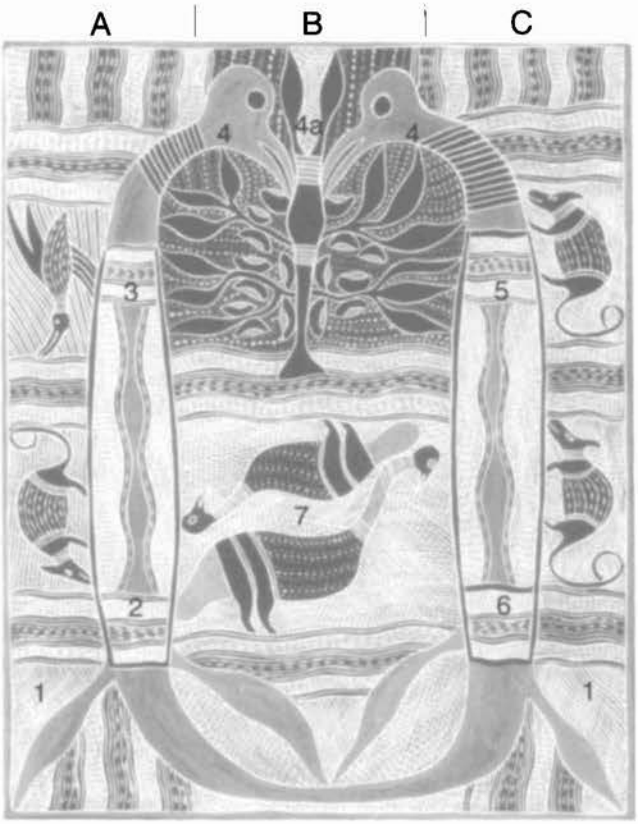


FIG. 9.15. SCHEMA OF DJARRAKPI LANDSCAPE (PLATE 18). Narritjin, Banapana Maymuru's father, offered three interpretations of this painting. In the first interpretation, each night, at a different place, the koels (4) would sit on top of a native cashew tree (4a). The opossums (the three ringtails in the image) would also climb the tree and spin their fur into string. Each length of string was given to the clan in whose country they had stopped on that occasion. The emus (7) traveled with them, drilling water holes with their feet as they went from place to place.

In the second interpretation, when the koels arrived they landed in some cashew trees (6). While they ate, the opossums (see ringtails) spun their string. Then the koels measured the string by stretching it between two places (5, 6) and gave the string pieces to other clans with close religious links to the Manggalili. The strings became gullies to the north of a lake, and each gully is associated with a different clan. The ancestral beings danced with the fur strings to a sacred cashew tree (4a), where they measured out more strings, the longest of which became the sand hill on the western edge of the lake. An ancestral woman, Nyapililngu, lived in the trees on the opposite side of the lake (2, 3). She traveled up and down her side of the lake, making fur string that later became the coastal dunes on the eastern side of the lake. The emus (7) drilled for water in the Djarrakpi lake bed but found only salt water. Frustrated, they threw their spears into the nearby sea, creating the freshwater springs that are exposed at low tide.

Narritjin's third interpretation is of the painting as a topographic map. It showed, for example, where during a recent visit the Land Rover had arrived (at C1) and drove along the sand hills to the clump of trees (6), after camping where they had driven to the next clump of trees (5), and where he prayed at the marrawili (cashew) tree (4a), and finally where they started building the airstrip (to the right of the right bird's head). See also figure 9.16.

After Howard Morphy, *Ancestral Connections: Art and an Aboriginal System of Knowledge* (Chicago: University of Chicago Press, 1991), 219.

Rock Paintings and Engravings

Most Aboriginal representations of country were in ephemeral media until the advent of commercial Aboriginal art production. Rock paintings and engravings and stone arrangements were the major exceptions. Rock paintings, while they often represent individual mythic and totemic figures rather than what appear overtly to be landscapes, nevertheless frequently convey meanings embedded in a ritual and mythological system that is specifically based on known particular landscape features and their songs and Dreaming events.[70]

Among the very oldest Aboriginal rock art must be the pecked engravings of the so-called Panaramitee style (fig. 9.17).[71] Widespread on the Australian continent, across regions whose rock painting, other painting, and wooden artifact styles differ considerably, are these engravings of undoubtedly archaic provenance, dominated stylistically by circles, animal and bird tracks, and lines. Over and over again, Aboriginal people have said they were made not by human beings but by Dreaming beings. They are nonetheless able, in many cases, to "read" the engravings. The readings they offer typically relate the designs on the rock to the Dreaming landscape of the immediate region, but in each case they were couched in strong prohibitions on any dissemination of the specific form and meanings of the images beyond a local, initiated male audience. For that reason such a site will be described in general terms, and no details will be provided.

In the north-central part of the Northern Territory, on a large cattle station called Muckaty, one day in mid-1992 my colleague David Nash and I were taken to a rocky outcrop. We were researching a land claim to permanent inalienable freehold over the property by its traditional owners, on whose behalf the pastoral lease to the land had already been purchased. Senior men of appropriate kinship and ritual status climbed the outcrop first. The rest of us followed. A stone cairn that marked the peak was attributed to the actions of two female Dreaming beings who had paused here on a vast journey across country. This was a journey marked by many events and

70. See, for example, Layton, *Australian Rock Art,* and Chaloupka, *Journey in Time* (both note 15).

71. Charles Pearcy Mountford and Robert Edwards, "Rock Engravings of Panaramitee Station, North-eastern South Australia," *Transactions of the Royal Society of South Australia* 86 (1963): 131–46, and Margaret Nobbs, "Rock Art in Olary Province, South Australia," *Rock Art Research* 1 (1984): 91–118.

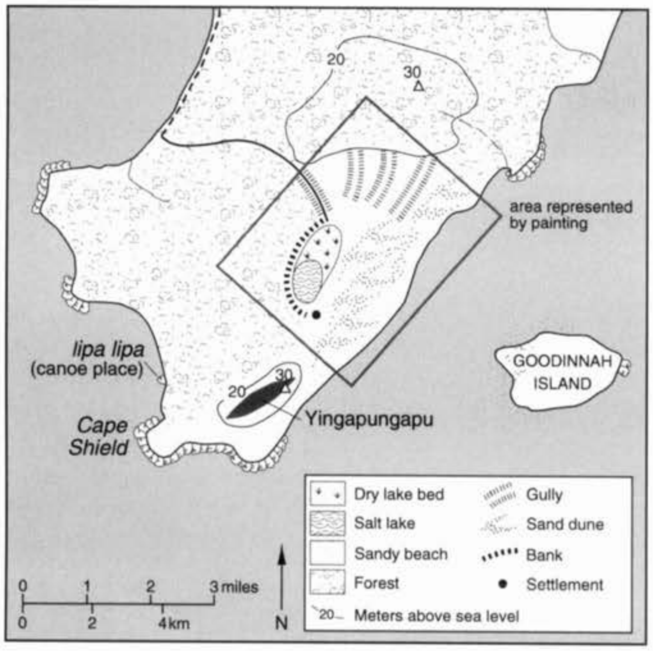


FIG. 9.16. REFERENCE MAP OF DJARRAKPI AREA, NORTHEAST ARNHEM LAND. Compare figure 9.15 and plate 18.
After Howard Morphy, *Ancestral Connections: Art and an Aboriginal System of Knowledge* (Chicago: University of Chicago Press, 1991), 223.

significant sites, a large number of them celebrated in the ceremonial songline for the two figures. On flat sections of the outcrop were old pecked designs of a nonfigurative kind. Each one was identified either as a site on the Dreaming track of the two beings in the story or as a line connecting sites along the path of their heroic journey.

REGIONAL EXAMPLES

There is not space here to cover the geographical iconographies of all regions of Aboriginal Australia, but the following discussion covers salient aspects of the traditions of northeast Arnhem Land, western Cape York Peninsula, the Western Desert, and the Lake Eyre basin.

JEALOUSLY GUARDED DESIGNS: NORTHEAST ARNHEM LAND

In classical Aboriginal traditions, sacred designs are not public, anonymous property. Ancestral beings, Dreamings, gave them to certain groups to hold in sacred trust. Infringements of this kind of copyright are in some places still met with vigorously applied sanctions. Australian law also recognizes Aboriginal copyright, but only for whole images, not particular motifs such as clan-specific patterns.

FIG. 9.17. PANARAMITEE STYLE ENGRAVING, YUNTA, SOUTH AUSTRALIA. By permission of Grahame L. Walsh.

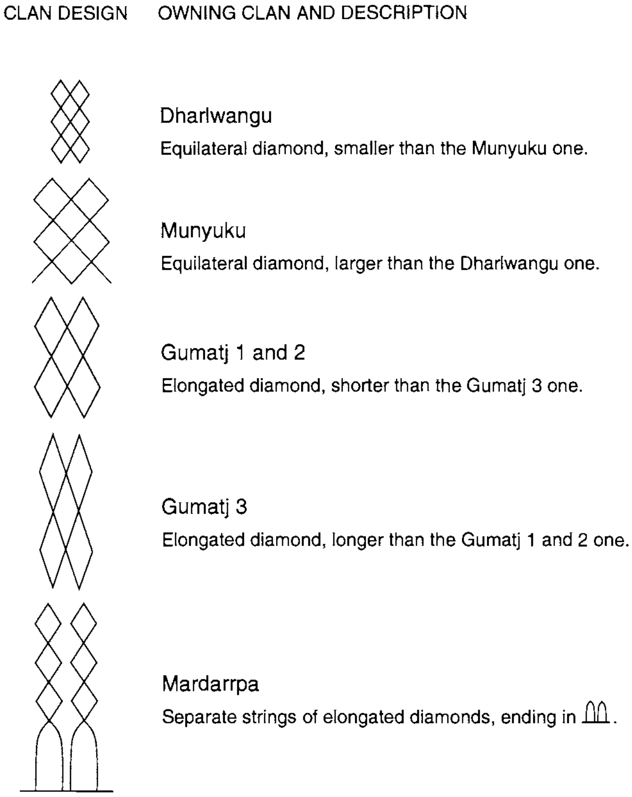


FIG. 9.18. CLAN VARIANTS OF THE YIRRITJA MOIETY DIAMOND DESIGN TYPE, NORTHEAST ARNHEM LAND. These five clans of the Yirritja moiety are connected by the journeys of a set of ancestral beings who include Fire and Wild Honey. The mythic explanations for the origins of these various designs refer to the cells of beehives, the patterns of folded paperbark, and the markings of fire, including the markings burned onto a crocodile's back, forming the cellular pattern of its scales, during mythic events. For example, in the Gumatj clan's Fire pattern, red diamonds represent flames, red and white crosshatched diamonds represent sparks, black diamonds represent charred wood, and white diamonds represent smoke.
After Howard Morphy, *Ancestral Connections: Art and an Aboriginal System of Knowledge* (Chicago: University of Chicago Press, 1991), 172.

The traditional owners of Aboriginal designs may be loose regional groupings, members of cult lodges[72] linked by Dreaming tracks, members of patrifilial clans, and so on, depending on which part of Australia is involved. This particular system appears to be at its most precise and forceful in northeast Arnhem Land, where great harm could arise from the misappropriation of others' designs.[73] Even to "speak for" another group's clan design was to invite serious trouble, especially from the more tradition oriented ("the old people").[74] The icons of classical Aboriginal practice are thus never merely statements of religious geography, but express political and economic geography as well. The principal underlying reason is that Aboriginal interests in land, under customary law, are essentially framed by religious principles rather than by histories of physical occupation and economic use of land. Usufruct and residence rights, however, ultimately have their basis in symbolic linkages between people and land mediated by the sacred domain, and most particularly by linkages sanctioned in myth, totemism, and ceremonial practice.

In northeast Arnhem Land, clans, which are generally small groups of people linked by descent in the male line and are the primary landowning units,[75] have distinctive designs that are used in paintings. These clan designs, as Morphy says, "cover the surface of the painting in areas defined by figurative representations and certain other components. . . . These designs consist of repeated sequences of geometric elements elaborately infilled with cross-hatching. The designs vary according to which Ancestral Beings the design is associated with and which clan it belongs to."[76]

To exemplify this Morphy lists five distinct variations on the diamond pattern associated with five clan groups that belong to the same Yirritja moiety (fig. 9.18). But Morphy's major study of the artistic system of northeast Arnhem Land, on which I draw so heavily here, has shown that there is no simple relation between painters as members of clans, the Dreaming sites of clan estates (owned lands), and clan designs in paintings.[77]

72. Members of a totemic cult patrilodge in north-central Australia are the core custodians, structurally speaking, of a particular Dreaming in its localized manifestation. See Mervyn J. Meggitt, *Desert People: A Study of the Walbiri Aborigines of Central Australia* (Sydney: Angus and Robertson, 1962), 47–74.

73. When we were interviewing Gambali in Yirrkala, northeast Arnhem Land, about paintings to be used in the exhibition "Dreamings" (Sutton, *Dreamings: The Art of Aboriginal Australia* [note 3]), he alerted us to this possibility.

74. "With Old People," Gambali warned, "everything politics." "Old People" usually refers to ancestors and their continuing spirits, or to living senior authorities, in Aboriginal English.

75. Keen, *Knowledge and Secrecy,* 63–64 (note 55), convincingly argues that the term "clan" is problematic in the case of this particular region and avoids its use, preferring "group." "Clan" is so well established in the literature for the region, however, that it is likely to have some staying power. I maintain it here for convenience, to avoid the imprecision of the term "group," but without proposing that these clans are more enduringly well-defined corporations than the best ethnography suggests.

76. Howard Morphy, "What Circles Look Like," *Canberra Anthropology* 3 (1980): 17–36, esp. 26–27.

77. Howard Morphy, "'Too Many Meanings': An Analysis of the Artistic System of the Yolngu of North-east Arnhem Land" (Ph.D. diss., Australian National University, 1977). See also the following works by Howard Morphy: "Yingapungapu–Ground Sculpture as Bark Painting," in *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe,* ed. Peter J. Ucko (Canberra: Australian Institute of Aboriginal Studies, 1977), 205–9; "The Art of Northern Australia," in *Aboriginal Australia,* by Carol Cooper et al. (Sydney: Australian Gallery Directors Council, 1981), 52–65; "'Now You Understand': An Analysis of the Way Yolngu Have Used Sacred Knowledge to Retain Their Autonomy," in *Aborigines, Land and Land*

RELATIVE FREEDOM: RELIGIOUS SYMBOLISM AND LANDOWNERSHIP IN WESTERN CAPE YORK PENINSULA

The political economy of owned designs in this kind of society is paralleled in complexity by the religious politics of land interests, and the two domains overlap considerably. In normal circumstances, for a northeast Arnhem Land person to paint a design that refers to another clan's country, using the other's distinctive decorative patterns, where the person has no link of descent or other codified rights in that clan's *sacra,* is to break Aboriginal law and cause serious conflict. By contrast, in the Wik-speaking region of western Cape York Peninsula people are relatively free to make designs that refer to symbols and places associated with another nearby group.

In the western coastal region of the Peninsula, at least, there is a great freedom–striking by desert and eastern Arnhem Land standards–in how people may employ symbols associated with the countries of other clans in the region.[78] It is thus possible for Wik persons to legitimately represent sites in clan estates other than those in which they themselves have a proprietorial interest.[79]

The relative freedom with which site-specific images may be employed in Wik designs is exemplified by a bark painting made by Angus Namponan in 1976 (fig. 9.19).[80] The image contains three panels, and various motifs within each panel have been identified (fig. 9.20). The sites referred to appear on figure 9.21.

Panel A ("Spearing Milkfish by Night") is an image drawn from an important myth and related ceremonial performance that is part of the Winchenem ceremonial group's spiritual heritage. Three men are spearing milkfish.[81] The specific site referred to in this panel is given by Namponan as Wuben (see fig. 9.21).[82] The artist is not a member of the clan whose estate includes the location of the mythic events shown here, nor is he a member of this ceremonial group. His own estate is just inland from Cape Keerweer, and his ceremonial group is Apelech. The remaining panels, B and C, depict mythic events at sites that belong to Apelech clans, although again neither site is specifically a part of Namponan's own clan country or one to which he has particularly close lineal connections.

The mythic reference in panel B ("Mother Shark at Man-yelk") is to the Shark totemic story complex focused on the area of Man-yelk, the large estuary of the Kirke River just inland from Cape Keerweer. Shark is a major totem of the clans whose lands surround this estuary.[83] The two sides of the Kirke River belong to different clans. The clans have different languages and significant differences in their totems but have long enjoyed an alliance. By invoking this particular story and its geography, Namponan "maps" in a single image the fact that the two groups are distinct but linked or, in local parlance, "same but different."[84] Both the panel's specific mythic content and its decorative patterning (Apelech dotting)[85] refer directly to a known area. The mythic event conjures up specific sites, while the pattern of dots conjures up a broad area and the collectivity of its traditional owners. Namponan's image thus evokes another powerful cultural theme in Wik culture: the relation of the part (here local clan estates) to the whole (the regional group).

In panel C ("Two Thirsty Spirits at Moolench"), two male spirit images are shown dancing in an Apelech ceremony, holding ceremonial poles. The location of the myth

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Rights, ed. Nicolas Peterson and Marcia Langton (Canberra: Australian Institute of Aboriginal Studies, 1983), 110–33; *Journey to the Crocodile's Nest* (Canberra: Australian Institute of Aboriginal Studies, 1984); "On Representing Ancestral Beings," in *Animals into Art,* ed. Howard Morphy (London: Unwin Hyman, 1989), 144–60; "From Dull to Brilliant: The Aesthetics of Spiritual Power among the Yolngu," *Man,* n.s. 24 (1989): 21–40; *Ancestral Connections* (note 3); and "Ancestral Past" (note 38).

78. This remark applies not only to the Wik region, from the Embley River to the Edward River and inland to about Coen, but also in the Mitchell River region to the south (Barry Alpher, personal communication, 4 October 1995).

79. This freedom applies not only to two-dimensional images but also to mythology and music. Sacred narratives, which always describe events at known places and therefore at locations in known clan estates, may be told by members of groups from within the region who do not necessarily have a close relation to the estates in question.

80. For further details about this painting, including translations of text given in Aboriginal languages, see Peter Sutton, "Bark Painting by Angus Namponan of Aurukun," *Memoirs of the Queensland Museum* 30 (1990–91): 589–98.

81. A species also known as bonefish. In ceremonial performances by the Winchenem group, carved representations of these fish have often been used. See the University of Queensland Anthropology Museum example illustrated in J. Bartlett, "Australian Anthropology," in *Cultural Exhibition of Queensland,* by J. Bartlett and M. Whitmore (Saitama, Japan: Saitama Prefectural Museum, 1989), 13–70, esp. 66 and cat. A158, and the National Museum of Australia installation illustrated in Morphy, "Art of Northern Australia," 58, 129 (color pl. 9), and 154–55 (cat. N217) (note 77). See also the film *Dances of Aurukun* of 1962 (held by the Australian Institute of Aboriginal and Torres Strait Islander Studies, Canberra) for an example of the use of these milkfish (bonefish) carvings in Winchenem performance.

82. Detailed field mapping by David Martin with members of the relevant clan has established that the precise location is called Walkaln-aw, literally "Milkfish Totemic Center." Further details of this site and the others related to the painting are contained in Peter Sutton et al., *Aak: Aboriginal Estates and Clans between the Embley and Edward Rivers, Cape York Peninsula* (Adelaide: South Australian Museum, 1990). This is currently a restricted document.

83. The dominant narrative for the shark complex is that of the two young women. A published version of that story is to be found in my commentary on the sculptures of the Two Young Women of Cape Keerweer, by Angus Namponan, assisted by Peter Peemuggina and Nelson Wolmby, in Sutton, "Dreamings," 26–29 (note 18).

84. This shark complex is vital to the Apelech mythic and ceremonial cycle that extends geographically from just south of Archer River to between the Knox and Kendall Rivers in coastal western Cape York Peninsula. For published material on this cycle see Sutton, "Mystery and Change," 84 (note 33).

85. For more on the dot pattern and its relation to the Apelech group, see Sutton, "Dreamings," 28–29 (note 18).

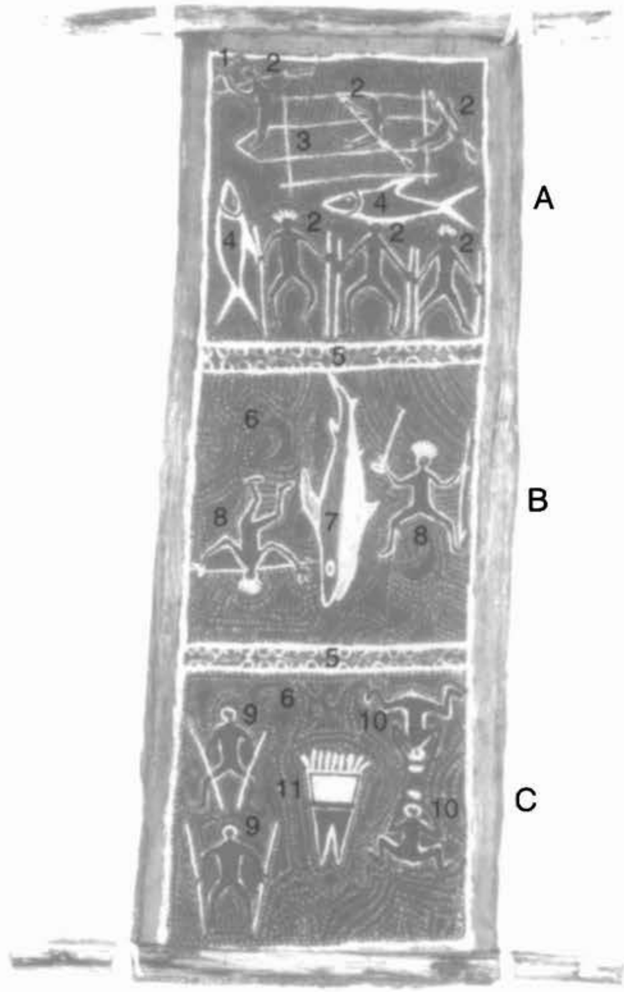


FIG. 9.19. THREE DISTINCT MYTHIC EPISODES IN A SINGLE IMAGE. The painting, ochers on bark, wooden restrainers, and string, was made for sale by Angus Namponan, 1976, Aurukun, western Cape York Peninsula. There are three vertical panels. For an explanation of the mythic episodes, see figure 9.20.
Size of the original: 55 × 20 cm. Photograph courtesy of the Queensland Museum Board of Trustees, Brisbane. By permission of Garry Namponan, Aurukun, Queensland.

FIG. 9.20. SCHEMA FOR FIGURE 9.19. Panel A shows three men (2) spearing milkfish. One has a multipronged spear hooked up to his throwing stick, and the other two hold paddles. The outrigger canoe (3) is shown in plan view, while the figures in it are shown three-quarters frontally in perspective. They are spearing fish at night–one man in the outrigger canoe is holding aloft a torch (1)–and the season is also suggested, since these fish are speared in this way from August to October. The milkfish themselves are indicated by the typically streamlined fish forms with dark side patterning (4). Part of the borders between panels is made up of large half circles (5) referred to as "Winchenem dots" and also as "from on top." This is because most of the clans associated with Winchenem ceremony have estates in the dry sclerophyll uplands east of the coastal floodplains. The inland countries are "on top," and the coastal countries are "bottom side." Panel B shows two men (8) with spears (one also holds a throwing stick) and a large shark (7). The men wear feather cockades and are engaged in a ritual enactment based on what appears to have been a seasonal physical process as well: the removal of juvenile sharks from the pregnant mother shark, followed by releasing the living mother back into the water. This is part of Apelech ceremonial performance, in which carvings of sharks are used. The fine dotting (6) is said to be Apelech dotting. In panel C, two male spirit images (9) have just been ritually sent by their living relatives, as spirit images of the deceased are still sent soon after a death, to a site in the area just south of Cape Keerweer. There they encounter two women (10) who are sitting and squeezing the white fluid out of the flesh of stingrays. The white objects in their hands are lumps of stingray flesh. The location of the myth is a well depicted by the geometric form in the center (11).
After Peter Sutton, "Bark Painting by Angus Namponan of Aurukun," *Memoirs of the Queensland Museum* 30 (1990–91): 589–98, esp. 591.

is a water well, depicted by the very geometric form in the center. This form contains the triangular base designs so distinctive of the painting tradition of this area.[86] The name of the site was given in this case (by Namponan) as Thum-merriy. This is a well-known site name, but further details given by Namponan and Wolmby suggest that the precise location of the story is actually a place within Thum-merriy called Moolench.[87]

Bark painting has never become a common medium of expression in this particular region.[88] Namponan's painting, however, is characterized by several features often said to be typical of bark paintings in the Northern Territory: symmetry, fineness of execution, a contrast between solid primary motifs and a detailed infill, and a "quotative" approach to representing sacred myth in that only one or two episodes are shown, implying the rest of the story.

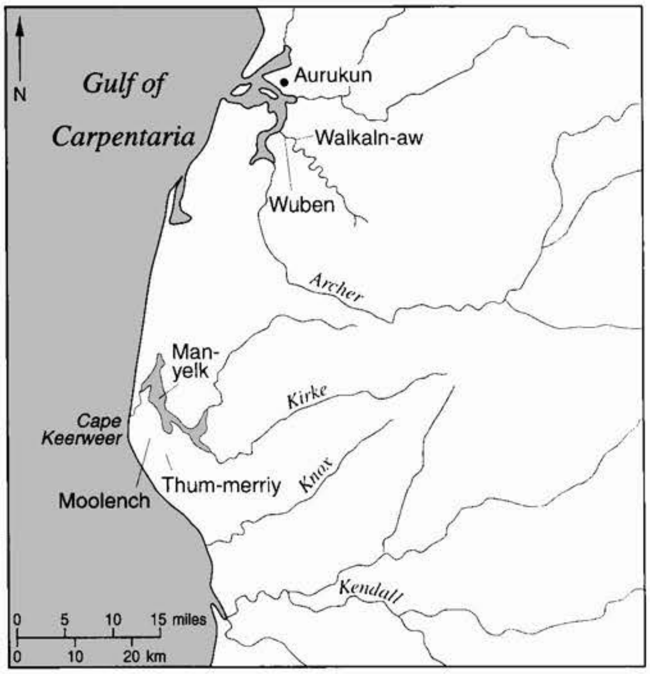


FIG. 9.21. REFERENCE MAP OF SITES REFERRED TO IN FIGURES 9.19 AND 9.20.
After Peter Sutton, "Bark Painting by Angus Namponan of Aurukun," *Memoirs of the Queensland Museum* 30 (1990–91): 589–98, esp. 594.

FORM AND COMPOSITION IN THE DESERT

In Central Australia, painting is performed on large, irregular surfaces such as rock walls and slabs or on ground areas made of pulverized termite mounds. It is also performed on the far more symmetrical and limited bases of the human body and of mainly ovate artifacts such as shields, wooden dishes (plate 19), sacred boards, sacred stones, ceremonial posts, and bull-roarers. Very few of these media are rectangular.

Since the early 1970s, Western Desert acrylic painters have added to these older media the rectangular canvases and artists' boards that arrive ready-made or are prepared in the community craft shop. Right-angled corners and straight edges have suddenly exerted new pressures on ancient design practices.

For those unfamiliar with their literal meanings, the acrylic paintings of desert Australia demand more immediate attention for their composition than for their depiction of things outside themselves. Their style is far less obviously iconic, less figurative, than that of most bark painting. Some bark paintings do look just like acrylics, but they are a minority.[89] With acrylics the focus is much more often their arrangement of motifs on a ground or against dotted background areas.

These compositional arrangements in desert painting since the 1970s rest on an ancient past, albeit one now entering an uncertain future. As iconic mappings of political geography–only one of their many roles–these works are conservative statements about relationships between people and land, relationships sanctioned by the Dreaming. Thus they present, and reinforce, not merely order, but a particular order in each example. It is therefore appropriate that they be schematized, compressing the unruly facts of geography into a semblance of the balance, symmetry, and reciprocity desired of human relationships themselves. Desert designs are at the high end of the scale of geometric and symmetrical tendencies among Aboriginal visual traditions.

The strong tendency of modern Western Desert painting toward rectilinearity and symmetry has classical Aboriginal religious and intellectual foundations. This tendency has also been a major factor in granting it a distinctive level of intelligibility for members of other cultures and has thus underpinned its exposure to a wide audience through the commercial art market and galleries. And yet it has been the individual motifs, not the whole images and their structures, that have gained the most

86. Triangles are rare in traditional Aboriginal designs. Apart from Cape York Peninsula, the main area where they are found is northeast Arnhem Land. In both cases, long-established foreign artistic influence–in Arnhem Land from the Macassans, here from Torres Strait–is probably the origin of the form.

87. I am indebted to the anthropological field mapping of David Martin for this information on Moolench. Moolench is an extremely dangerous place, the home of a monster called Wuthelpal, a huge snakelike being with a mane of long hair and feathers, resembling a "lion."

88. Bark paintings are a medium introduced to Cape York Peninsula since the 1970s through the influence of the arts and crafts industry, and very few have been produced there or have found their way into public collections. Namponan's own preferred medium is wood, and he regularly carves crocodiles for sale (unpainted) and sacred sculptures for house-opening ceremonies (painted).

89. See Sutton, *Dreamings: The Art of Aboriginal Australia,* figs. 40 and 88 (note 3).

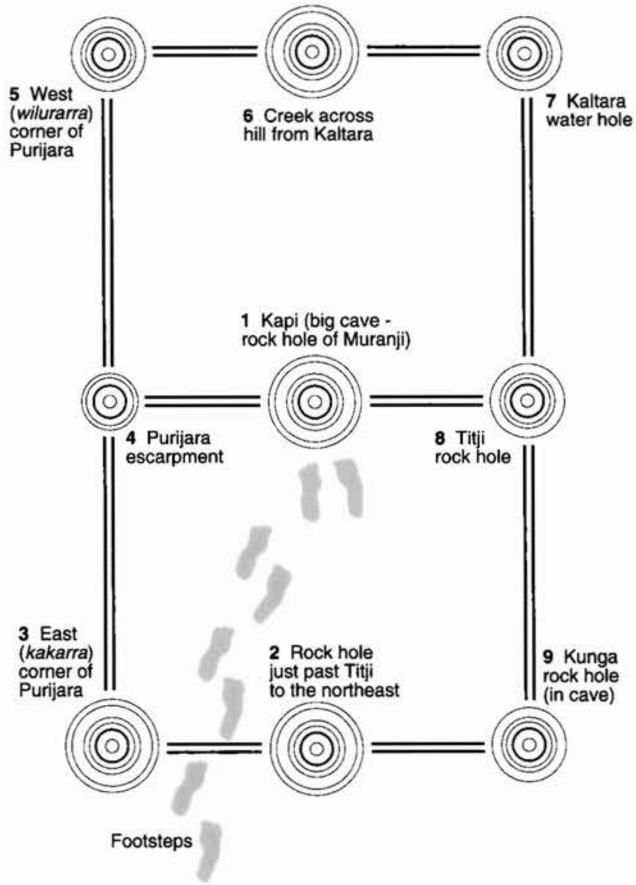


FIG. 9.22. SCHEMATIC REPRESENTATION OF MURANJI ROCK HOLE AREA. Based on the painting by Big Peter Tjuburrula, ca. 1974; whereabouts of the original are unknown. Tjuburrula's rearrangement of the sites into a pattern reflects the sequence of events in the story, which concerns a young boy's escape from a homicidal old woman. Beginning at the cave at the center of the image (1), the story's events proceed clockwise through the other numbered sites, with the southeast and southwest corners of the escarpment (3 and 5) providing the foundation for the most iconic of the resemblances between this painting and the spatial distribution of the sites in real space. Tjuburrula's image, like all such Western Desert paintings, is a plan view, as if seen from above.
After David Lewis, "Observations on Route Finding and Spatial Orientation among the Aboriginal Peoples of the Western Desert Region of Central Australia," *Oceania* 46 (1975–76): 249–82, esp. 268.

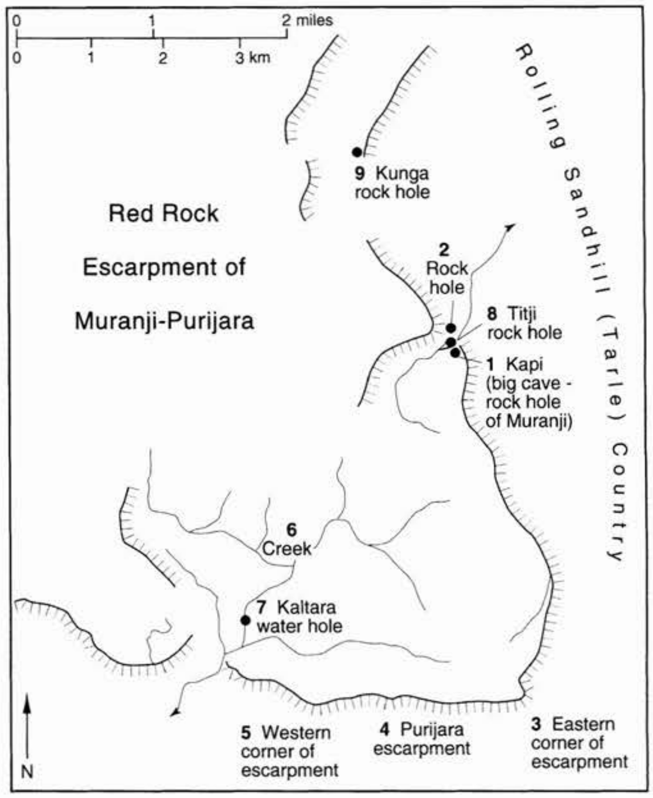


FIG. 9.23. "WESTERN" CONVENTIONAL PORTRAYAL OF THE AREA SHOWN IN FIGURE 9.22. Drawn from a modern topographic map.
After David Lewis, "Observations on Route Finding and Spatial Orientation among the Aboriginal Peoples of the Western Desert Region of Central Australia," *Oceania* 46 (1975–76): 249–82, esp. 269.

emphasis in explanatory readings of works that have been published.

Writers on the Aboriginal art of the Western Desert and associated regions have often been at pains to isolate these recurring motifs and to offer lists of their denotations.[90] Together with an account of the myth or myths shown in a painting and the geographic relations between the sites featured, these motif glosses may, one supposes, cumulatively offer an interpretation of the whole painting, just as the legend of a printed topographical map explains its conventions and helps one read the map's unique content.

But there is much significance in what is excluded from such images, just as there is meaning in what has been selected for inclusion. Only certain myths of a particular geography are normally shown in a single Aboriginal painting, making it more a kind of quotation than an attempt at comprehensive depiction. Similarly, only certain of the sites to which the relevant Dreamings traveled are usually shown. Furthermore, the act of symmetrically rearranging key landscape features in such an image is itself a kind of exclusion–the messiness of showing the proportional distances between places, and their actual orientation with regard to each other, is to a significant degree eliminated.

Schematization of Spatial Relations

David Lewis, who made a study of Aboriginal navigation in the region in the 1970s, has published examples of the

90. For a more detailed discussion see Peter Sutton, "The Morphology of Feeling," in *Dreamings: The Art of Aboriginal Australia*, ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 59–88, esp. 81 and n. 31 (p. 246).

way Western Desert painting schematizes spatial relations between places using the site-path framework.[91] In figures 9.22 and 9.23, Lewis presents us with a direct comparison between Big Peter Tjuburrula's painting of a set of mythically linked sites and a "Western" view of the same landscape drawn from a 1:250,000 map.[92] It is clear from this comparison that the painting shows the same sites as does Lewis's map, but their relative placement is very different both in mutual orientation and in the distances between them. The variability indicated by the map is radically reduced; the topographic background–intimately well known to the artist–has effectively been dropped out; the asymmetry of the distributional pattern of the sites has been thoroughly rectified; and the shapes of the sites' different physical features have been remade into the geometry of circles. Tjuburrula's painting is clearly an icon rather than a map, in the rather simplistic terms I discussed earlier. And yet it is more than just an aesthetically satisfying design. It does have an indicative or way-showing capability as well, but it is one that heads the viewer along a story line rather than across rocks and sand hills.

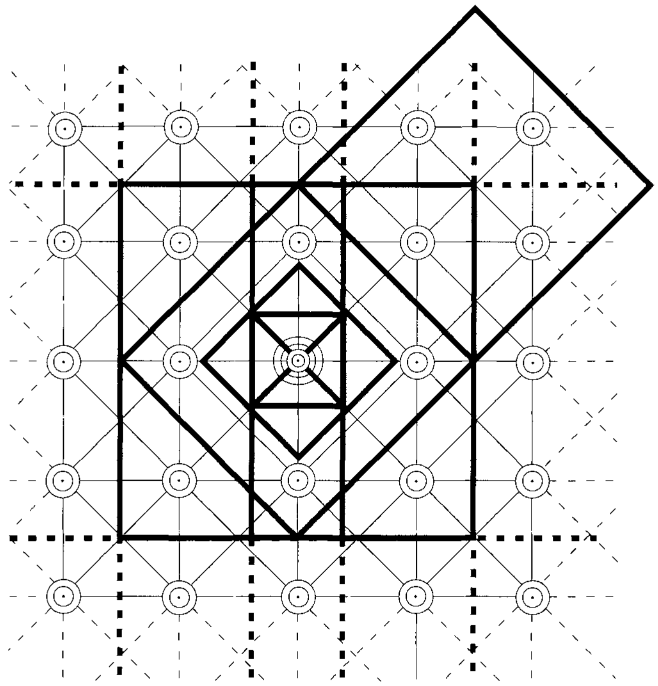


FIG. 9.24. THE SITE-PATH FRAMEWORK. Borders indicate typical extracts made for Western Desert paintings. After Peter Sutton, "The Morphology of Feeling," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 59–88, esp. fig. 132.

The Site-Path Framework

The symmetrical composition of most Western Desert paintings can generally be interpreted as systematic reductions of or balanced extracts from the hypothetical template or grid known as the site-path framework (fig. 9.24).[93] Patterns based on such a template may be found on ancient stone sacred objects that cannot be shown here, on painted shields, in cave paintings, in crayon drawings by desert people who depicted country and Dreamings for ethnographers in the 1930s to 1950s, in bark paintings, and par excellence, in acrylic paintings of the Western Desert (fig. 9.25).

The archaeologist Daniel Sutherland Davidson noted that Aboriginal art produced an infinite number of designs from a limited number of elements.[94] I suggest that much Western Desert art produces a finite design by subtraction–perhaps "quotation"–from a potentially unbounded grid of connected places-Dreamings-people, in which real spatial relations are literally rectified and represented by symmetrically ordered roundels in a site-path framework. This framework is manifested graphically as usually balanced sets of circle-path arrangements or sets of unconnected circles. The circles typically stand for sites, and the lines that join them are the Dreaming paths that connect the sites in myths.

Such a template or grid of essentially unlimited size works against the notion that particular centers in the landscape might be privileged above all others, and it reflects a culture in which there are no fully bounded groups and the underlying pattern is one of continuously overlapping egocentric social networks. It also reflects the fact that Western Desert groups are generally focused on areas deep within the Australian hinterland and that the ultimate boundary–the sea–rarely figures in their topographic representations.

This template is a model of desert political geography, emphasizing multiple centers of local focus, and a manifold connectedness between places and their people. The smallness of the fragments drawn from this template, as seen in Western Desert paintings, reflects the time and space limitations of making selections for specific narrative purposes and the geopolitical limits on a painter's authority to depict country. In a tradition-oriented Aboriginal society, those who control the mysteries have

91. David Lewis, "Observations on Route Finding and Spatial Orientation among the Aboriginal Peoples of the Western Desert Region of Central Australia," *Oceania* 46 (1975–76): 249–82.

92. "Western" is probably an inappropriate term here for two reasons. First, such views and maps are common to members of global industrial society, whether they are in, or from, the "West," the "East," or, say, the Pacific Ocean. Second, the use of "Western" is derived from a situation long past in which people of Western Europe could universalize their own local perspective.

93. Munn, *Walbiri Iconography,* 128–38 (note 3). See also Sutton, "Morphology of Feeling," 80–86 (note 90).

94. Daniel Sutherland Davidson, *A Preliminary Consideration of Aboriginal Australian Decorative Art* (Phildelphia: American Philosophical Society, 1937), esp. 93.

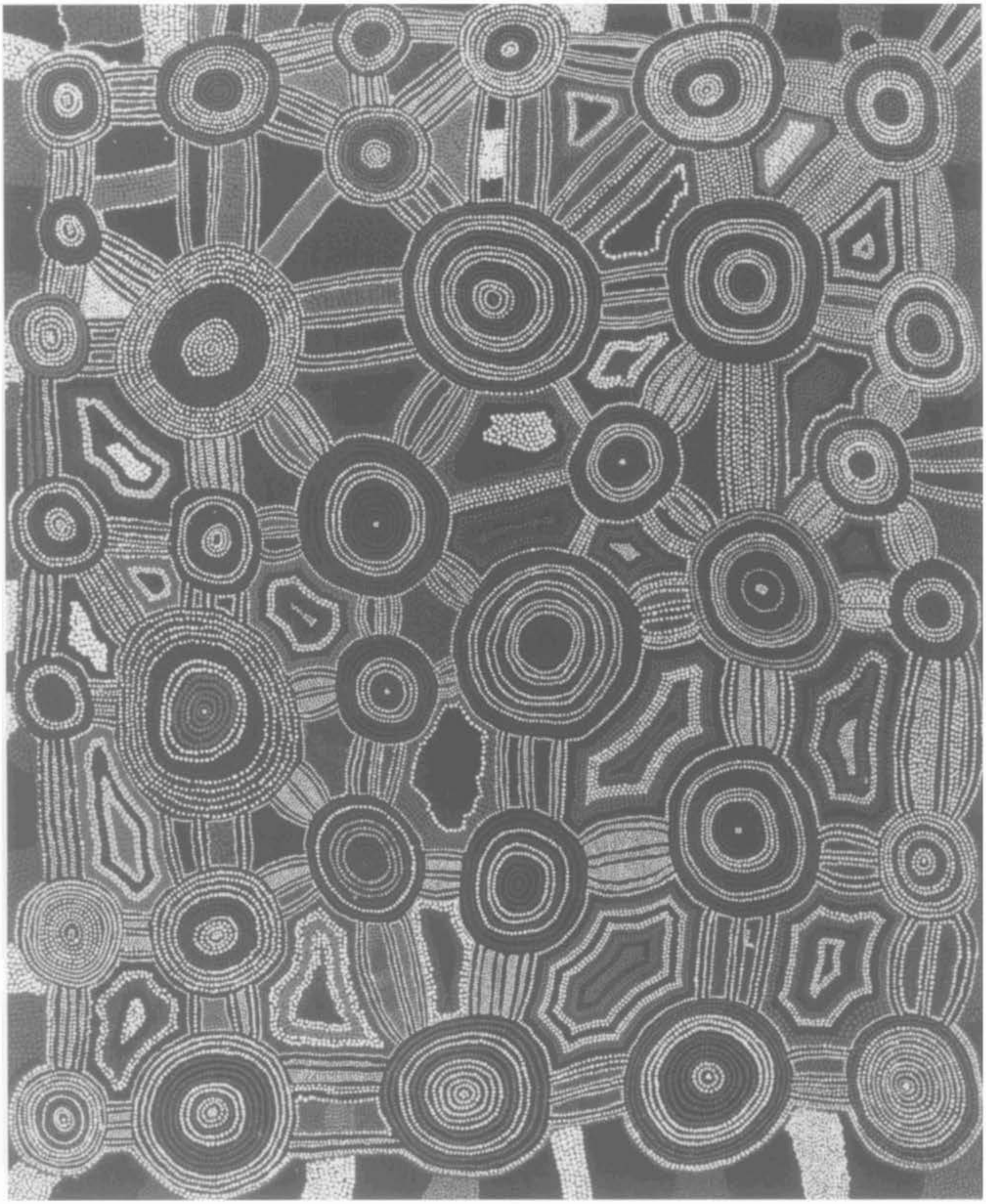


FIG. 9.25. TINGARRI (ANCESTRAL MEN) AT LAKE MCDONALD (MACDONALD), 1979. Acrylic on canvas painting made for sale by Uta Uta Jangala, Western Desert. Size of the original: 187 × 154.5 cm. Photograph courtesy of the South Australian Museum, Adelaide. © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

much of the power. Religious authorities in Aboriginal society are always letting others know that what they are revealing is only part of something bigger.

The commercial art market has created a demand for Western Desert paintings that show more than small fragments of one or two Dreaming histories. Larger canvases, containing more of the different Dreamings in a particular landscape, fetch better prices. They also represent a further departure from the ceremonial origins of the designs themselves: Fred Myers notes that "one emergent form is the 'map' which represents a wide variety of Dreamings in the [Pintupi] painter's country. . . . Traditionally, maps of a sort were drawn on the ground for communication of complex information, but I do not think there was a ceremonial context in which all of these stories were at once relevant and therefore incorporated into a single design."[95]

Desert Sculptures: The Toas of Lake Eyre

I now turn to a class of objects that show typical Aboriginal desert iconographic techniques and styles, but that themselves were said to be designed to stand upright in the ground as indicators of place: the toas of the Lake Eyre region of South Australia. Lutheran missionary and collector J. G. Reuther (1861–1914) sold his collection to the South Australian Museum in 1907. There were 385 items of a single type known in the Diyari language as the toa, and these were the most extraordinary feature of his collection.[96] Toas are small sculptures, mostly fifteen to forty-five centimeters long, and most are based on a length of wood sharpened at the lower end (plate 20). They were restricted solely to the Lake Eyre region, and though Reuther's fellow missionary Oskar Liebler collected some toas at the same location in the same period, objects of exactly this type are not reported for the Lake Eyre region by early observers other than the Lutheran missionaries. Old Aborigines alive in the 1960s when L. A. Hercus made detailed inquiries about toas had never heard of them.[97] They are also, therefore, known only from a single period in history.

According to Reuther:

> To the Aborigine, toas are way-markers [or direction posts] and location-finders. Each toa indicates a particular locality according to its topographical character, and by its shape bears reference to the name of the place in question. From the colours [on the toas] the Aborigine [can] recognise the present whereabouts of his friends' camp as concerning its [general] geographic formation, while head-pieces [or "crests"] on some of the toas help through their symbolism to determine the place-names more accurately. An Aborigine [can] decipher the relevant place-name from the toa. For this reason one can probably say with [some] justification that the toa[s] are a [form of] Aboriginal "sign language."
>
> When Aborigines travel from one campsite to another, but expect friends or acquaintances to visit them within the next few days, a toa is made relevant to the present camp, informing the visitors that the [inhabitants] have moved for one reason or another to this or that place, [and] may be found at [such and such] a place. They are [then] traced to the spot, accordingly. . . .
>
> A toa is stuck by its nether point [into the ground] in one of the unoccupied wurleys [shelters] of the camp, in order to protect it against wind and weather. Signs are engraved in the sand in front of the wurley, so that any visitor [will] know that he [can] obtain information from within.[98]

In virtually every instance the design of a toa symbolizes a named place in the eastern Lake Eyre region. It does this by symbolically referring, in most cases, to a certain group of natural features and to a mythological event believed to have taken place there.

Certain totems in this region were passed down from fathers to children.[99] These patrilineal totems, known in Diyari as one's *pintharra,* were the plants, animals, or other things who, as mythological beings, moved about the landscape leaving traces of themselves and their activities in features such as trees, rocks, sand hills, and water holes. These beings were the Muramuras (Diyari term), the ancestral heroes and emblems of the landholding patrilineal clans. That is, a person's country was inherited primarily based on his or her *pintharra* relationship to its mythological sites.[100]

95. Fred R. Myers, "Truth, Beauty, and Pintupi Painting," *Visual Anthropology* 2 (1989): 163–95, esp. 182.

96. See the abstract from Reuther's manuscript by Edward Stirling and Edgar R. Waite, "Description of Toas, or Australian Aboriginal Direction Signs," *Records of the South Australian Museum* 1 (1919–21): 105–55; Jones and Sutton, *Art and Land* (note 24); and L. A. Hercus, "Just One Toa," *Records of the South Australian Museum* 20 (1987): 59–69.

97. Hercus, "Just One Toa," 61.

98. J. G. Reuther, *The Diari,* 13 vols., trans. Philipp A. Scherer, AIAS microfiche no. 2 (Canberra: Australian Institute of Aboriginal Studies, 1981), 12:1–2. The original is in German (unpublished); the words in brackets are augmentations by the translator. The account by H. J. Hillier, English schoolteacher and artist responsible for illustrating the Reuther collection, matches that of Reuther: H. J. Hillier, Letter to the Director of the Queensland Museum, dated 12 September 1916, and idem, Letter to the Director of the Queensland Museum, dated 27 September 1916, Petersburg, South Australia; both in the Queensland Museum Archives.

99. Reuther, *Diari,* vol. 11; A. P. Elkin, "Cult-Totemism and Mythology in Northern South Australia," *Oceania* 5 (1934–35): 171– 92; H. K. Fry, "Dieri Legends," *Folk-lore* 48 (1937): 187–206, 269– 87; and Ronald Murray Berndt, "A Day in the Life of a Dieri Man before Alien Contact," *Anthropos* 48 (1953): 171–201.

100. People in the region also had matrilineal totems, but these, as

Reuther said he had noted down some three hundred ceremonial songs "that are woven into the legends," and also that "corroborees [ceremonies] are the dramatized and descriptive representation of the life-story of the one-time muramuras."[101] Thus to the extent that toas depict sites on mythological routes, they map in fragments the songlines of the Lake Eyre region.

It is possible that totemic and mythological designs typically used in ceremonial contexts in this region at some stage also became part of a practical sign system for wayfinding as Reuther suggested for the toas. The obscurity surrounding this particular question, and the allegation by one of Reuther's contemporaries that the toas were a hoax, have added to their mystique as artifacts.[102]

For all their unique characteristics, toas do seem typical of much of classical Aboriginal culture, and the myths and place-names they referred to are certainly attested to independently by a number of sources. There are many reports in this same region of boomerangs or other wooden implements stuck in the ground, both in myths and in statements about magical or ceremonial acts.[103] Toas do bear visual resemblances to certain religious objects from the Lake Eyre region and from Arnhem Land, ceremonial poles from Central Australia, painted message sticks from Central Australia, and directional markers and carved message sticks from western Queensland.[104] Their supposed functions are effectively the same as those of directional markers once used in northeast Queensland and Victoria.[105] The use of color symbolism for specific types of stone or soil at the referent site makes toas rather similar to bark paintings (fig. 9.26). Their iconographic complexity, however, sets the toas apart from the simpler directional markers found elsewhere. Howard Morphy analyzed a large sample of toas in detail. He found that they were of three main types (fig. 9.27) and that the painted symbols on them fell into eight main groups.[106]

Toas may have been innovative extensions of a preexisting tradition. But they also seem to have flourished and disappeared in something like a single generation. Toas are not equivalent to the *tjurunga* or sacred stones and boards of Central Australia. Accounts of sacred boards and stones exist for the Lake Eyre region, but they make no mention of toas.[107] T. G. H. Strehlow, renowned for the depth of his knowledge of Central Australian religion, saw no reason to doubt Reuther's assertion that the toas were public objects.[108] In the 1980s and 1990s, however, a few Aboriginal people claimed they were secret-sacred objects and should be kept from public view.

Conclusion

Observers have long been struck by a contrast between the richness of the social and religious lives of Australian Aborigines and the often stark simplicity of their traditional foraging economy and technology. Classical Aboriginal culture concentrates on human relationships, or on how things lie in relation to each other, rather than on things themselves. Relationships between people (kinship, social organization, amity, conflict), and between people and place (homelands, sacred sites, mythology, songlines, topographic icons), form central concerns in such a tradition.

Aboriginal culture's emphasis on an economy of knowledge and valued states of connection between people, rather than on accumulating excess production and freeing the individual from material dependency on others, does not make it ethereal. Hard and reliable topographic and natural resource knowledge, at least in the past, was the major factor standing between living Aboriginal people and the not very distant possibility of death from thirst, hunger, or exposure. Generally speaking, people gathered only enough food for the day's requirements. Yet their emphasis on meaningful forms, and their general avoidance of fetishizing things that for others might become commodities in a money economy, ensures that it is

elsewhere in Australia (e.g., the Lake Woods region, Northern Territory) were not localized.

101. Reuther, *Diari,* 11:13–14 (note 98).

102. Jones and Sutton, *Art and Land,* 54–61 (note 24).

103. Reuther, *Diari* (note 98); George Horne and G. Aiston, *Savage Life in Central Australia* (London: Macmillan, 1924), 25–26; Elkin, "Cult-Totemism and Mythology," 184–85 (note 99); and Ben Murray, interview by Philip Jones, Port Augusta, South Australia, cassette recording (South Australian Museum, Adelaide), 1985.

104. C. W. Nobbs, "The Legend of the Muramura Darana," typescript (photocopy) (Adelaide, South Australian Museum [ca. 1985]); Warner, *Black Civilization,* pl. IIIb (note 26); Strehlow, *Aranda Traditions* (note 32); Thomas Worsnop, comp., *The Prehistoric Arts, Manufactures, Works, Weapons, etc., of the Aborigines of Australia* (Adelaide: Government Printer, 1897), 47–49; and Walter Edmund Roth, *Ethnological Studies among the North-West-Central Queensland Aborigines* (Brisbane: E. Gregory, Government Printer, 1897), 132–33, 136–38, and pl. XVIII.

105. Walter Edmund Roth, "North Queensland Ethnography, Bulletin No. 11," *Records of the Australian Museum* 7 (1908–10): 74–107, esp. 82–84, and Howitt, *Native Tribes,* 722–23 (note 10).

106. Howard Morphy, "A Reanalysis of the Toas of the Lake Eyre Tribes of Central Australia: An Examination of Their Form and Function" (M. Phil. thesis, London University, 1972), and idem, "Schematisation, Meaning and Communication in *Toas,*" in *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe,* ed. Peter J. Ucko (Canberra: Australian Institute of Aboriginal Studies, 1977), 77–89.

107. See, for example, T. Vogelsang, "Ceremonial Objects of the Dieri Tribe, Cooper Creek, South Australia (Ochre Balls, Woven String Wrappers, and Pointing Sticks) Called the 'Hearts of the Two Sons of the Muramura Darana,'" *Records of the South Australian Museum* 7 (1941–43): 149–50, and Horne and Aiston, *Savage Life,* 90, 112, 164 (note 103).

108. T. G. H. Strehlow, "The Art of Circle, Line, and Square," in *Australian Aboriginal Art,* ed. Ronald Murray Berndt (Sydney: Ure Smith, 1964), 44–59, esp. 55.

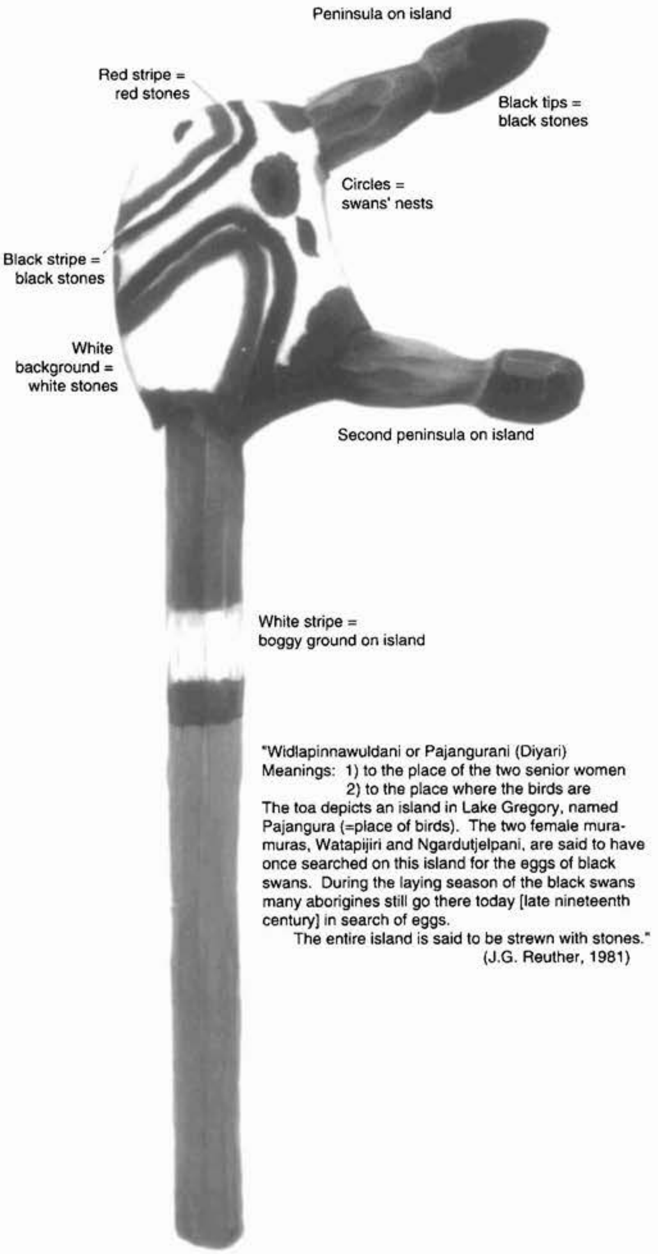


FIG. 9.26. LAKE GREGORY TOA, CA. 1904. This illustration of the Lake Gregory toa has Reuther's description of its mythic symbolism and topographic references. Ochers on wood, string, gypsum; from Killalpaninna Lutheran Mission, South Australia.
Height of the original: 40 cm. Photograph courtesy of the South Australian Museum, Adelaide (A6169). Annotations after Philip Jones and Peter Sutton, *Art and Land: Aboriginal Sculptures of the Lake Eyre Region* (Adelaide: South Australian Museum, 1986), 62.

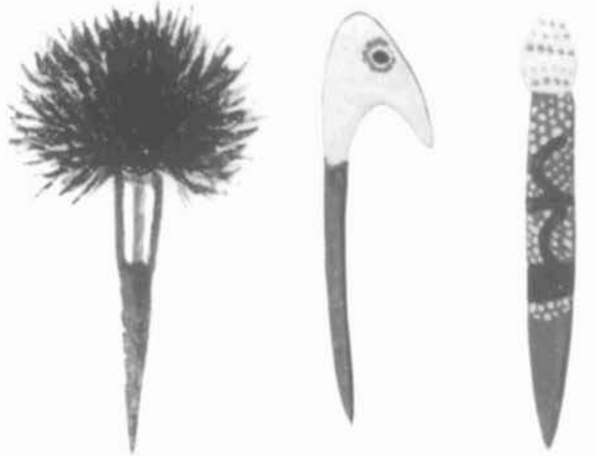


FIG. 9.27. TOA TYPES. The three examples, painted by H. J. Hillier, are based on Howard Morphy's three types. Type I (left) has a natural object or artifact (e.g., vegetation, bird feathers, human hair, teeth, bark, or wood splinters) attached to the head and may also have painted designs on the stem and the head. Type II (center) bears a molded or carved representation of some artifact or natural object (e.g., figures representing boomerangs, bodily ornaments, geographical features, parts of human or animal bodies such as hands, feet, legs, bird heads), which is either attached to the stem or constitutes the body of the sculpture itself. Type III (right) has the wooden stem and gypsum head painted with formal designs using the same range of symbols as the paintings on toas of types I and II, but there are no attached, molded, or carved representational objects.
From Philip Jones and Peter Sutton, *Art and Land: Aboriginal Sculptures of the Lake Eyre Region* (Adelaide: South Australian Museum, 1986), 63.

the enduring patterns of designs and their often sacred and multilayered meanings, not the objects on which these designs are placed, that mostly attract notions of high value in classical Aboriginal practice.

I have, however, viewed a good deal of the material above through the lens of certain kinds of objects, and through individual objects. Many of them are held by institutions in which fetishizing objects is integral to the accumulation-oriented culture in which they have evolved. Most of these objects endure only because professionals, usually non-Aborigines, work to make sure they do not rot or get used for firewood on a cold night. It is true, of course, that few readers of this text will ever see the objects themselves, apart from the pictures I have chosen to include here. For many, this will be enough.

And here we find perhaps some unexpectedly deep commonality between the industrial mind and classical Aboriginal thought. Our sense of control of the subject matter–whether it is topography or images of it–depends in large part on our capacity to reduce its chaotic reality to schemata, to reductive images at some remove from the ultimate object of attention. In that sense readers may interpret this chapter as itself a map. Especially in a case like this, the efficacy of words may depend on their capacity to evoke visualizing rather than ratiocination. Thus it remains true at a certain level that (as Aboriginal people themselves frequently suggest) for non-Aborigines who struggle to comprehend Aboriginal images of place, to see is to understand.[109]

109. Morphy, "'Now You Understand'" (note 77), and W. E. H. Stanner, *White Man Got No Dreaming: Essays, 1938–1973* (Canberra: Australian National University Press, 1979), 278–79.

10 • Aboriginal Maps and Plans

PETER SUTTON

In chapter 9 I explored classical modes of topographic representation in Aboriginal Australia. There I drew a heuristic distinction between "icons of country" and "maps." Icons belong to Aboriginal classical traditions and are images that arise principally from a context of ritual display. These are by and large distinct from what I refer to here as "Aboriginal maps and plans." Maps and plans are depictions of political, residential, and religious geographies created largely in response to a need to communicate practical knowledge to others.[1]

My focus will be works drawn on paper, since many have been collected and documented by anthropologists, but I also discuss "mud maps" and sand drawings, which are images scored into the ground to accompany narratives or the giving of directions, as well as certain stone arrangements that depict in plan view the layout of boats and dwellings.

MAJOR COLLECTIONS OF ABORIGINAL MAPS

THE SOUTH AUSTRALIAN MUSEUM

From 1930 to 1954 Norman B. Tindale, curator of ethnology at the South Australian Museum in Adelaide, together with various other colleagues who accompanied him on regular field expeditions in outback Australia, systematically collected Aboriginal crayon drawings in Central Australia and Western Australia. This collection was not part of the principal research of these expeditions, which largely focused on biological anthropology, collecting indigenous artifacts, and some sociological work on social and local organization, but along with eliciting vocabularies and myths, issuing paper and crayons to local informants and subjects became one of the expeditions' less arduous routines (fig. 10.1). Over time the importance of these documents, most depicting specific landscapes and their classical Aboriginal mythologies, has begun to rise dramatically.

These crayon drawings were bound in ten volumes and are held at the South Australian Museum (appendix 10.1). I shall refer to them in this text by the codes SAM 1 through SAM 10. The terms "collected," "gathered," and "obtained" that Tindale used in titling these bound volumes are potentially misleading. All these works were clearly commissioned by the ethnologists, and all the materials used, basically brown paper and a modest color range in crayons, had been provided by members of the research expeditions. With the exception of SAM 10 it appears that the ethnologists refrained from directing the artists to any particular content or approach. Charles Pearcy Mountford, writing about the 1935 collection from the Warburton Range (SAM 5–SAM 7), said: "Special care was taken to avoid influencing the choice of either subject or colour. Until the aborigines became conversant with the author's wishes, the only direction given them was to make *walka* (marks) on the paper. In a few days, however, such a request was not necessary; the natives became so eager to 'make marks' that the author was unable to gather all the relevant information. The supply of paper and crayons had then to be curtailed accordingly."[2]

An instruction in such circumstances to "make marks" is not, in Aboriginal tradition, likely to be interpreted as an invitation to carry out meaningless doodling. The term *walka* in this Western Desert language means "1. design, drawing, any meaningful marks 2. pattern e.g. on bird or animal,"[3] and its semantic range specifically includes ancestral totemic designs.[4] The equivalent term in Aborigi-

For their helpful assistance with sources I thank John Stanton, Kate Alport, Carol Cooper, David Trigger, David Nash, and Philip Jones.

1. Here I do not broach the more complex subject of the semantics and grammar of Aboriginal spatial geography, the system that underlies the manifestations observed here and in chapter 9 above. For a detailed account of such a system, see David Nash "Notes towards a Draft Ethnocartographic Primer (for Central Australia)" (in preparation).

2. Charles Pearcy Mountford, "Aboriginal Crayon Drawings III: The Legend of Wati Jula and the Kunkarunkara Women," *Transactions of the Royal Society of South Australia* 62 (1938): 241–54 and pls. XIII, XIV, esp. 241.

3. Cliff Goddard, *A Basic Pitjantjatjara/Yankunytjatjara to English Dictionary* (Alice Springs: Institute for Aboriginal Development, 1987), 168.

4. Nancy D. Munn, "The Transformation of Subjects into Objects in Walbiri and Pitjantjatjara Myth," in *Australian Aboriginal Anthropology: Modern Studies in the Social Anthropology of the Australian Aborigines,* ed. Ronald Murray Berndt (Nedlands: University of Western Australia Press for the Australian Institute of Aboriginal Studies, 1970), 141–63, esp. 142.

FIG. 10.1. ABORIGINES MAKING CRAYON DRAWINGS. This photograph was taken during the Board for Anthropological Research expedition to Mount Liebig, Central Australia, ca. 1932.
Photograph courtesy of the South Australian Museum Archives, Adelaide.

FIG. 10.2. JALIARNA AREA, CENTRAL AUSTRALIA. Crayon on paper, Warburton Range, 1935, by Katbulka. Collector's note reads: "No song for here and not a ceremonial spot."
Size of the original: 35.9 × 54.2 cm. Photograph courtesy of the South Australian Museum Archives, Adelaide (SAM 5, A49482).

nal languages generally refers both to any patterns or marks and to sacred designs and thus typically carries overtones of religious significance.[5] Furthermore, the major visual art traditions of traditionally oriented Aboriginal people are religious rather than secular, especially in the desert hinterland.[6] Apart, perhaps, from the children's drawings, most of the designs of the South Australian Museum crayon drawings are oriented toward sacred meanings as well as toward a schematic imaging of geography.

A significant, perhaps very large, proportion of the men's drawings in this collection are in fact secret-sacred.[7] For this reason I cannot reproduce those that may fall into that class. Among the Tindale-Mountford collections of drawings, however, are some with notes attached making it clear that the images are not restricted to initiated men. It is from these and other secular drawings that I have selected examples to illustrate this chapter.

Volumes SAM 5–SAM 7 of 1935 contain 277 drawings in the style that remains typical of the Western Desert region (fig. 10.2), a style that has become internationally recognizable through the exhibition and sale of acrylic paintings made by Western Desert people since the early 1970s.[8] The different volumes show some evidence of either specific requests for subject matter made by the ethnologists or perhaps different waves of subject preferences among the artists. SAM 8, for example, consists largely of depictions of ceremonial paraphernalia, sacred boards, and sacred designs in the abstract, as well as some images of secular artifacts and animals. Although these designs undoubtedly refer to Dreamings[9] and their specific spatial associations, overt references to sites or topography are rare in SAM 8. Nevertheless, some designs are described as "drawings of country" (e.g., sheet 118), and a drawing on sheet 116 by Jerry, of the Walmadjari language group, is described as "waters in his country," even though the image consists entirely of linked circles.

SAM 4, to give another example, contains about thirty drawings from the southern fringe of the Western Desert region, collected at Ooldea in 1934, which include many images of ritual celebrants wearing sacred body decorations and headdresses. Again, while these designs refer to localized mythic beings and events, the places concerned are not usually documented by the collector. In the notes written on one drawing in SAM 4, however, we can sense Tindale's early grapplings with the often severely abstracted conventions of representation employed in the Western Desert tradition. Sheet 27 by the man Jalanu

5. See, for example, Howard Morphy, *Ancestral Connections: Art and an Aboriginal System of Knowledge* (Chicago: University of Chicago Press, 1991), 102; R. David Zorc, *Yolngu-Matha Dictionary* (Darwin: School of Australian Linguistics, 1986), 189; and Peter Sutton, "Dreamings," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 13–32, esp. 19.

6. See chapter 9 above.

7. See Eric Michaels, "Constraints on Knowledge in an Economy of Oral Information," *Current Anthropology* 26 (1985): 505–10; Morphy, *Ancestral Connections,* 75–99 (note 5); Ian Keen, *Knowledge and Secrecy in an Aboriginal Religion* (Oxford: Clarendon Press, 1994), 169–254; and Christopher Anderson, ed., *Politics of the Secret* (Sydney: University of Sydney, 1995), for some of the most helpful literature on the important role of secrecy in Aboriginal society.

8. For examples of acrylic paintings see fig. 9.25 and pl. 16.

9. Ancestral beings; see pp. 360–61 above.

(about forty-five years old) contains many circles joined by tracks. Tindale annotated it thus:

> keinika walka
> tracks of native cat
> each concentric circle
> represents a water + the
> lines of the track between
> them, conventionalized.
> the whole does not form
> apparently a geographical plan;
> rather a generalized one.

The generalized plan Tindale was contemplating has been described more recently as a transformation of geographical knowledge into a design using the techniques of reduction, rectification (making geometric), and the imposition of symmetry.[10] Although these means are used widely across Aboriginal Australia, they appear to have reached their most extreme form in the Western Desert region.

Most of the SAM drawings are by men, but in SAM 7 there are a number of drawings by women and children. Unlike those of the men, these consist almost entirely of concentric circles, unconnected visibly with each other or anything else. There are almost no annotations on them revealing their significance, but the few exceptions to this indicate that the circles represent specific hills, caves, and water holes. On one, possibly that of a child (A49763), the ethnologist wrote: "These are idle drawings no meaning attached."

The earliest volume of these drawings (SAM 1) contains items with minimal documentation, regardless of the sex or age of the artists. From 1935 onward, however, Tindale and his colleagues, especially Mountford, increasingly wrote directly on the relevant designs of each drawing the names of places and mythological beings and the physical category of many of the geographical features depicted there. Each sheet may contain many words, usually in the local language but also sometimes in English, scattered over the marks made by the artist. Thus one frequently finds concentric circles next to which is the word *jabu* (i.e., *yapu,* "hill"), *kabi,* or *kapi* ("water"). At the edge of the sheets the ethnologists also recorded information about the person who made the drawing (the "artist"), such as name, sex, estimated age, and tribal affiliation. They also noted the date of collection and the name of the collector. The collectors did not print their names or use just their surnames but placed their formal signatures on each work, creating a kind of authorial voucher for a work that was clearly seen as a joint production. And yet it remained something whose dominant content–a representation of places–was squarely that of the Aboriginal artist-cartographer and, in most cases, used only the artist's visual conventions.

Each artist was assigned a code number preceded by a letter representing the expedition's place in the annual sequence of surveys mounted by Adelaide's Board for Anthropological Research (e.g., the young man Ka:kelbi in SAM 5 became "K33," since the 1935 Warburton Range survey was expedition K). The same individuals were usually measured in detail and photographed, their genealogies elicited, and their blood and hair sampled. On occasion plaster casts were taken of parts of their bodies or even, in a few cases, their whole bodies.

These expeditions typically lasted two or three months, were carried out by several men working as a multidisciplinary team, and involved rapid surveys of large numbers of individuals rather than in-depth learning of a particular culture.[11] This is perhaps the chief shortfall of the work, apart from the political and ethical criticisms that can easily be made of it with hindsight, but it was done systematically and with care, and the results continue to be useful, particularly to Aboriginal people seeking to find out more about their family histories, their ancestry, and their land-based affiliations.

SAM 10 is distinctive. It contains maps obtained in the northwest of Western Australia, most of them by Tindale and some by his collaborator Joseph B. Birdsell. It is notable that only the title of this last volume refers to "Native Maps," whereas all the others refer to "Aboriginal (Crayon) Drawings." The distinction is perhaps appropriate in the sense that this is the volume with the greatest range of approaches to depicting geography and, in contrast with the other volumes, contains explicit attempts to approximate a European style of mapmaking. There is evidence that the "artists" in this case generally had more exposure to European culture, including schooling, than most of the others. The earlier volumes consist mainly of images drawn by desert people who had little or no experience of Western culture. Few are recorded as having yet acquired English names. SAM 10, by contrast, contains work by many more people who had English names and who had been settled for some time either on cattle stations or on missions.

SAM 10 also contains works by people from both the desert hinterland and the coast. In terms of graphic conventions, the desert styles for representing geography in this case either are very similar to the highly conceptual styles of the earlier volumes, emphasizing mythological landscapes rather than physiography or territorial zones as such, or make an attempt to indicate major physio-

10. See p. 381 above.

11. The expeditions began in 1925 and continued to occur in most years until 1954, with a gap from 1941 to 1950. In 1938–39 Tindale was engaged in the major Harvard–Adelaide Universities expedition with Joseph B. Birdsell, and he worked with Birdsell again for the first two years of the UCLA expedition of 1952–54. Information courtesy of Philip Jones, South Australian Museum.

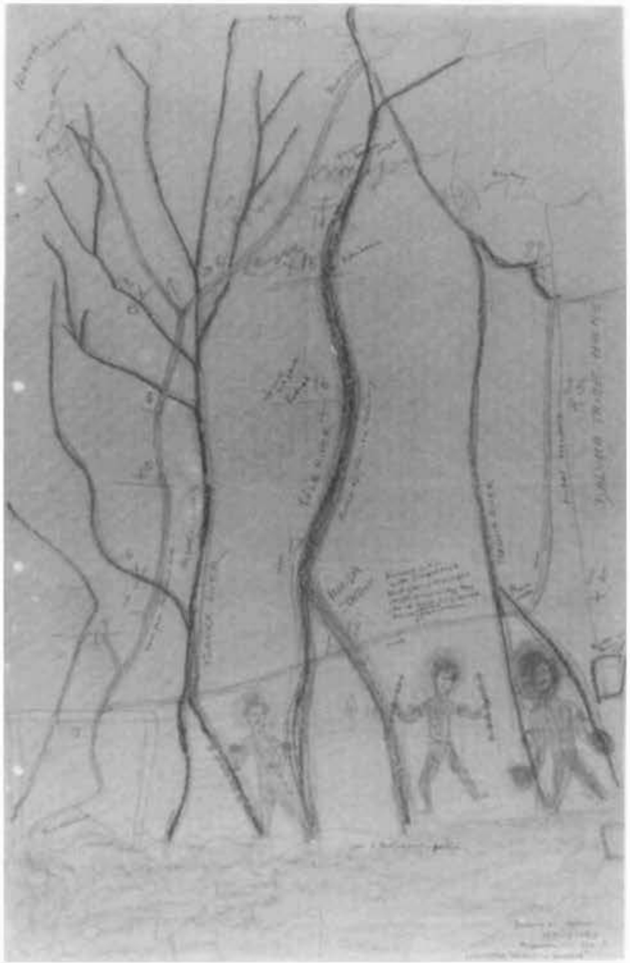


FIG. 10.3. RIVERS OF KARIARA COUNTRY. Crayon on paper, by Captain. Collector's note reads: "Any woman can see it." The mapmaker has shown his own region near Port Hedland (the area associated with owners of the Kariara [Kariyarra] language) as central and neighboring languages (Njamal [Nyamal] and Ngaluma [Ngarluma]) on the periphery. The sea is shown, but it is not the primary focus.
Size of the original: 54.1 × 35 cm. Photograph courtesy of the South Australian Museum Archives, Adelaide (SAM 9, sheet 203).

graphic features such as ranges of hills and creeks and to superimpose on them (in the handwriting of the ethnologists) the names of language groups or the limits of land tenure interests.

Works in SAM 10 that were drawn by coastal people are far closer to a Western figurative style. Figure 10.5 shows rivers, including the Fitzroy, as well as hinterland country, in northern Western Australia. Here it is notable that the rivers are represented effectively as a series of parallel straight lines. This convention closely resembles that used in some of the western Arnhem Land drawings collected by Ronald Murray Berndt and in Bob Holroyd's maps of western Cape York Peninsula.[12] All of these relate to coastal and pericoastal areas.

Examples like the 1953 map of rivers entering the sea near Port Hedland, Western Australia, by a man called Captain are perhaps the nearest these works come to being "tribal maps" pure and simple (fig. 10.3). Here and elsewhere there is a strong tendency for the cartographer to show his own country or language area at the center of the image, with its neighbors rather incompletely represented around the periphery.

The maps in SAM 10 point to this general difference between images by inland desert peoples, which are not very figurative and tend toward geometric reductions, and images by coastal peoples, which are more figurative and less reductive (and thus more like those of the European tradition). The latter resemble maps collected by Ronald Berndt for the coastal areas of Arnhem Land.

Many of the drawings in SAM 8, also from the northwest of Western Australia, are of single humanlike figures known as Wandjina, and these come from the coastal region of the Kimberleys.[13] Although mythological details are noted on many of these figures, none of the myths are located geographically. What the Wandjina figures have in common with the coastal maps from the same region, and also with the coastal maps from Arnhem Land, is a sureness of line, a boldness in the use of color, and the use of more than just the basic Australian colors (red, white, black, yellow), features generally absent in the works from the desert hinterland, apart from a number of the images depicting designs on sacred objects. The desert icons and maps, those that were collected in the form of crayon drawings, are often executed with a spidery, indefinite use of line and with only light pressure applied to the paper. Infilling is often irregularly executed, and there is little use of internal borders. Compare this with the definiteness of the map by a Kitja man from south of Kununurra in Western Australia in figure 10.4 and the complete use of infill in the highly abstracted map of the Fitzroy River region in figure 10.5.

This spidery quality in the desert maps may arise from the fact that classical desert graphic techniques are dominated by dots rather than by linear forms, and dotting in acrylics has become their international artistic hallmark; but the use of lines was by no means absent from the Western Desert visual arts even before the advent of in-

12. Examples collected by Berndt include those illustrated in Ronald Murray Berndt, *The Sacred Site: The Western Arnhem Land Example* (Canberra: Australian Institute of Aboriginal Studies, 1970), 40 and 41, and see below, p. 397. The maps drawn by Bob Holroyd in 1992, during a time of local political upheaval over land in his homeland area in western Cape York Peninsula, are discussed in detail in my forthcoming article in *Oxford Companion to Aboriginal Art and Culture.*

13. See Peter Sutton, "Responding to Aboriginal Art," in *Dreamings: The Art of Aboriginal Australia*, ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 33–58, esp. 48, fig. 76, for an example of a Wandjina figure.

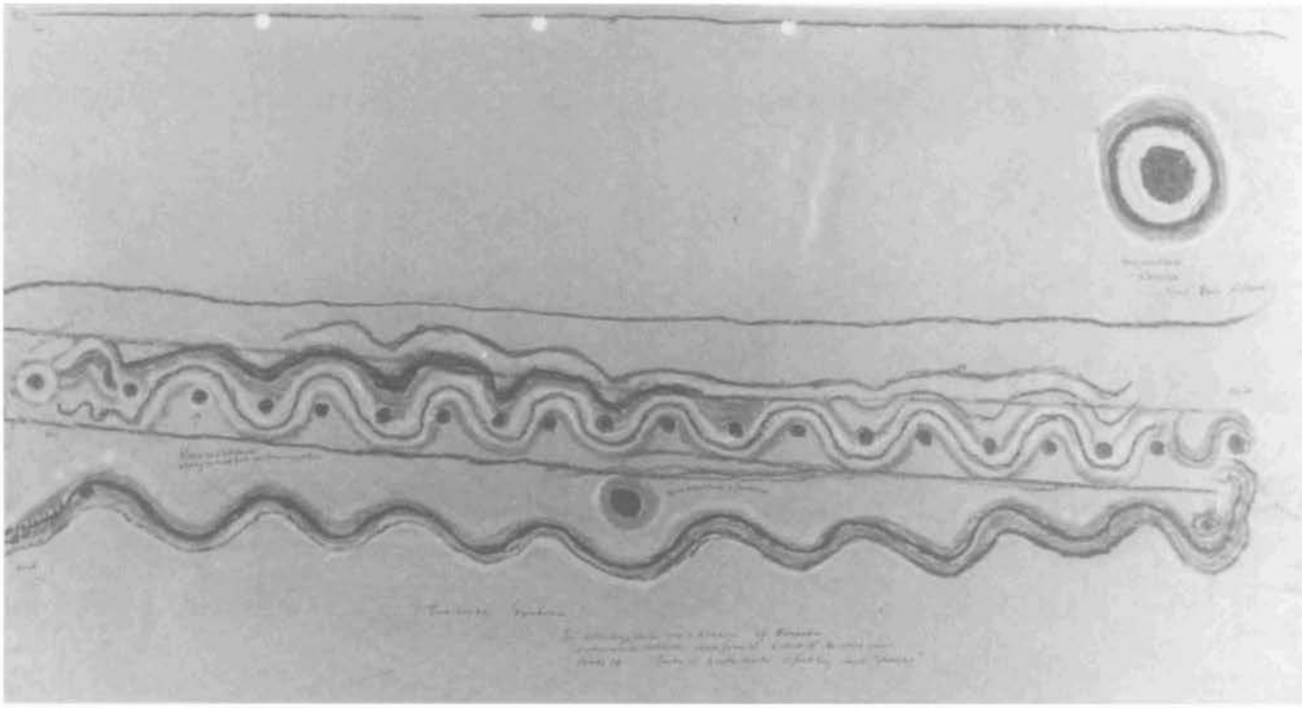


FIG. 10.4. MY ROCKHOLE WOROLEA = NIMDJI BORE N. OF HERE. Crayon on paper, 1953, by a Kitja man. Size of the original: 35.5 × 54 cm. Photograph courtesy of the South Australian Museum Archives, Adelaide (SAM 9, sheet 163).

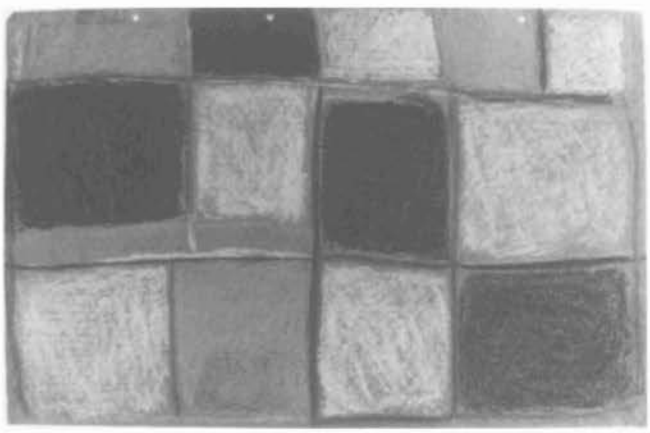


FIG. 10.5. THE FITZROY RIVER, IN NORTHERN WESTERN AUSTRALIA. Crayon on paper, 1953. Size of the original: 35.2 × 54.6 cm. Photograph courtesy of the South Australian Museum Archives, Adelaide (SAM 8, part 2, sheet 166).

dustrial paints. Ground paintings carried out on crushed termite mounds, body painting, and even casual illustrations made in the sand during conversation or narrative involve lines, not simply series of dots or tracklike forms, for example. Whereas physiographic landscape features in these images are shown in plan view, animals, human beings, and trees are usually shown in section view even in the desert or semidesert, as with the trees in figure 10.6.

Mountford also deposited Aboriginal crayon drawings and finger paintings in the State Library of South Australia as part of what is called the Mountford-Sheard Collection. These include over three hundred collected in Central Australia in 1940. Most of these, as well as the South Australian Museum series of drawings, remain unpublished. Mountford was the most prolific publisher of their designs, most of them redrawn as silhouettes and line drawings for the sake of clarity.[14] His major work, *Nomads of the Australian Desert,* contains several of these reproductions and has a section called "Art of the Crayon Drawings."[15] Several of the images in that book, particularly sacred objects photographed by Mountford, were meant for the eyes of initiated men only. The book's release led to legal action by Aboriginal people from Cen-

14. See Charles Pearcy Mountford, "Aboriginal Crayon Drawings from the Warburton Ranges in Western Australia relating to the Wanderings of Two Ancestral Beings the Wati Kutjara," *Records of the South Australian Museum* 6 (1937–41): 5–28; idem, "Aboriginal Crayon Drawings [I]: Relating to Totemic Places Belonging to the Northern Aranda Tribe of Central Australia," *Transactions and Proceedings of the Royal Society of South Australia* 61 (1937): 84–95; idem, "Aboriginal Crayon Drawings II: Relating to Totemic Places in South-western Central Australia," *Transactions and Proceedings of the Royal Society of South Australia* 61 (1937): 226–40; idem, "Aboriginal Crayon Drawings III" (note 2); idem, "Contrast in Drawings Made by an Australian Aborigine before and after Initiation," *Records of the South Australian Museum* 6 (1937–41): 111–14; and idem, *Nomads of the Australian Desert* (Adelaide: Rigby, 1976), 94–97.

15. Mountford, *Nomads,* 94–114.

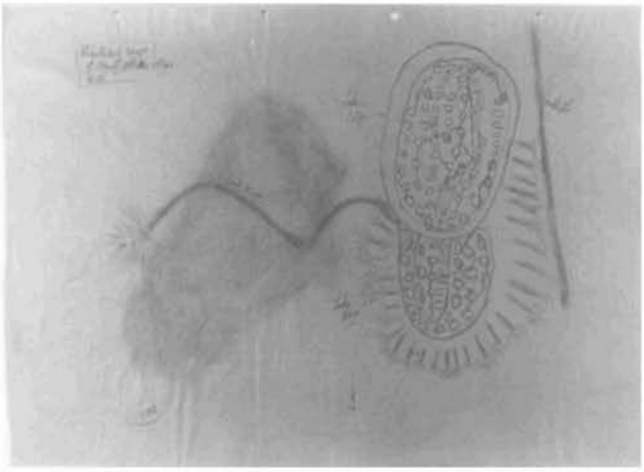


FIG. 10.6. LAKE POLGU AND MILGARI CREEK. Crayon on paper, by Poko Poko (?). The swampy areas, lake, and creek are shown in plan view, with the trees shown in section view.
Size of the original: 36 × 49.9 cm. Photograph courtesy of the South Australian Museum Archives, Adelaide (SAM 10, sheet 22).

tral Australia, and it was withdrawn from sale soon after publication. In a penetrating comparison between the designs on sacred objects relating to some of the same places depicted in crayon drawings published in the book by Mountford, Luke Taylor was able to show that, although the drawings were more figurative in their approach, they shared the same core visual structures as the sacred object designs that were far more geometrical and simple in overt form.[16] For reasons of Aboriginal law, these comparisons cannot be illustrated here.

We are on safe ground, however, in reproducing a woman's drawing on a secular theme published by Mountford (fig. 10.7).[17] It was made at Ernabella (Pukatja) in Central Australia in 1940. Mountford had been working with the men there, whose drawings, with a handful of exceptions, were concerned with sacred mythology. To prevent any suspicion that he might transmit their secrets to local women, Mountford did not work with women himself but had his young companion L. E. Sheard and an Aboriginal woman who was the wife of the cameleer on their expedition obtain a series of women's drawings like the one illustrated here.[18]

THE BERNDT COLLECTION

Ronald Murray Berndt, one of the more eminent anthropologists in the history of Aboriginal studies, carried out fieldwork at many locations in Australia from 1939 to the early 1980s. At virtually every field location he encouraged knowledgeable informants to draw maps of the country in Aboriginal terms and to depict religious themes, including ceremonial dress designs, ritual performance patterns, and images of Dreaming figures. His wife Catherine Helen Berndt, who joined him in fieldwork from the mid-1940s onward, collected similar drawings among the Aboriginal women at most locations. Her sheets of paper tend to be smaller than the ones her husband handed out, and her documentation of the drawings made by women, including the provenance of each sheet by date and place, is less consistently detailed. The drawings they collected are now housed in the Berndt Museum of Anthropology, University of Western Australia.[19]

These drawings, mostly in crayon on paper, number approximately two thousand. If we exclude the children's drawings in the South Australian collections discussed above, the Berndt Collection is by far the most substantial of its kind. The depth of its documentation is also, by and large, far greater than that of the South Australian collections. This is in part because of the greater training of the Berndts, who were professional anthropologists with Ph.D.'s from the University of London, but also because they usually remained for many months at each field location, gaining an understanding of local culture on a broad front by studying at least one local language, collecting texts in it, eliciting genealogies, studying local and social organization and kinship, local history, mythology, and religious and ceremonial life. Their annotations of Aboriginal drawings are voluminous compared with most of those by Tindale and Mountford.

Over some thirty-five years the Berndts published, singly or together, a large number of books, many of which are fine-grained ethnographies of particular groups or of selected aspects of a group's culture. Tindale, on the other hand, was largely self-taught in ethnology, although he practiced as a professional museum curator, and Mountford was a postal worker and enthusiastic amateur. Neither ever published a major ethnography of a single Aboriginal group. The Berndts' collecting of drawings, however, was built on the earlier practice systematically and regularly engaged in by Tindale and Mountford and others who were members of expeditions organized by Adelaide's Board for Anthropological Research. Ronald Berndt was also from Adelaide, and as a young man he took part in one of the board's expeditions (Ooldea, western South Australia, 1939). In their rather massive "preliminary report" on their fieldwork at Ooldea, the Berndts wrote:

> Drawings, an excellent medium for recording details of physiographic import, were obtained. [Berndts'

16. Luke Taylor, "Ancestors into Art: An Analysis of Pitjantjatjara Kulpidji Designs and Crayon Drawings" (B.A. honors thesis, Department of Prehistory and Anthropology, Australian National University, 1979).

17. Mountford, *Nomads*, 112, pl. 51 (note 14).

18. Mountford, *Nomads*, 109.

19. Two works from this collection are also discussed below, pp. 412–13.

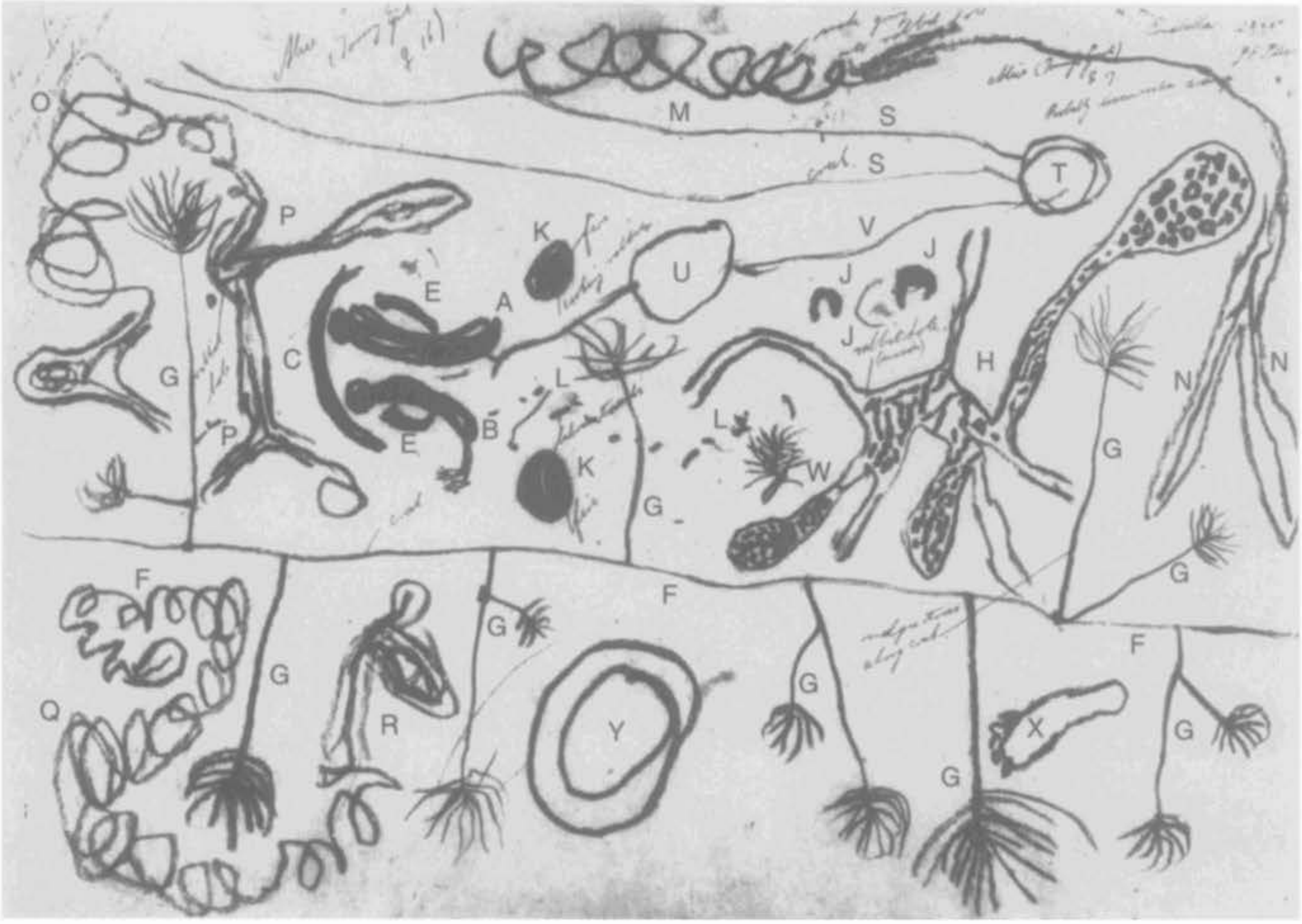


FIG. 10.7. A DAY'S HUNT. Crayon drawing by Alice ("Tommy's girl"), Ernabella, Central Australia, 1940: A and B, two women asleep in their camp (left center); C, their windbreak; E, their two campfires; F, a watercourse; G, mulga trees growing on the banks of the watercourse; H, ground plan of a rabbit warren dug out by the women–the black dots are the rabbits inside; J, the two women, who dug the warren with wooden dishes; K, the two fires where the rabbits were cooked; L, tracks of the women returning to their camp at C; M and O, meandering tracks of snakes; N and P, sections of the rabbit warren entered by the snakes; Q, another snake track; R, rabbit burrow where this snake shelters; S, two creeks flowing into a single water hole; T, the water hole; U, another water catchment; V, creek joining water hole T to U; X, human footprint; Y, unidentified.
Size of the original: 37 × 52.5 cm. Photograph courtesy of the Mountford-Sheard Collection, Special Collections, State Library of South Australia, Adelaide. By permission of Sammy Dodd. Key after Charles Pearcy Mountford, *Nomads of the Australian Desert* (Adelaide: Rigby, 1976), 111–12 and pl. 51.

> footnote: The pioneer in this field is Mr C. P. Mountford, who has made a large collection of aboriginal drawings. His use of strong brown paper approximately 2½ × 1½ feet and lumber crayons of several colours was also adopted.] These mostly consist of plans of water-holes and country associated with the wanderings of ancestral beings drawn by adults, children's drawings, and odd ones of special interest.[20]

Mountford, however, began the practice of collecting crayon drawings some years after Tindale had already made it a regular part of his field practice. But it was certainly Mountford who most encouraged the young Ronald Berndt to follow suit, as he did also with Robert Tonkinson, who began work in the Western Desert in the 1960s.[21]

Berndt once described his method as follows: "My

20. Ronald Murray Berndt and Catherine Helen Berndt, "A Preliminary Report of Field Work in the Ooldea Region, Western South Australia," *Oceania* 12 (1941–42): 305–30; 13 (1942–43): 51–70, 143–69, 243–80, 362–75; 14 (1943–44): 30–66, 124–58, 220–49, 338–58; 15 (1944–45): 49–80, 154–65, 239–75, esp. 12:313. Three of the 1941 Ooldea drawings were published in Ronald Murray Berndt and Catherine Helen Berndt with John E. Stanton, *Aboriginal Australian Art: A Visual Perspective* (Sydney: Methuen, 1982), 73 (pls. 60–62).

21. Robert Tonkinson, personal communication, November 1994. See Tonkinson's *The Mardu Aborigines: Living the Dream in Australia's Desert,* 2d ed. (Fort Worth, Tex.: Holt, Rinehart and Winston, 1991),

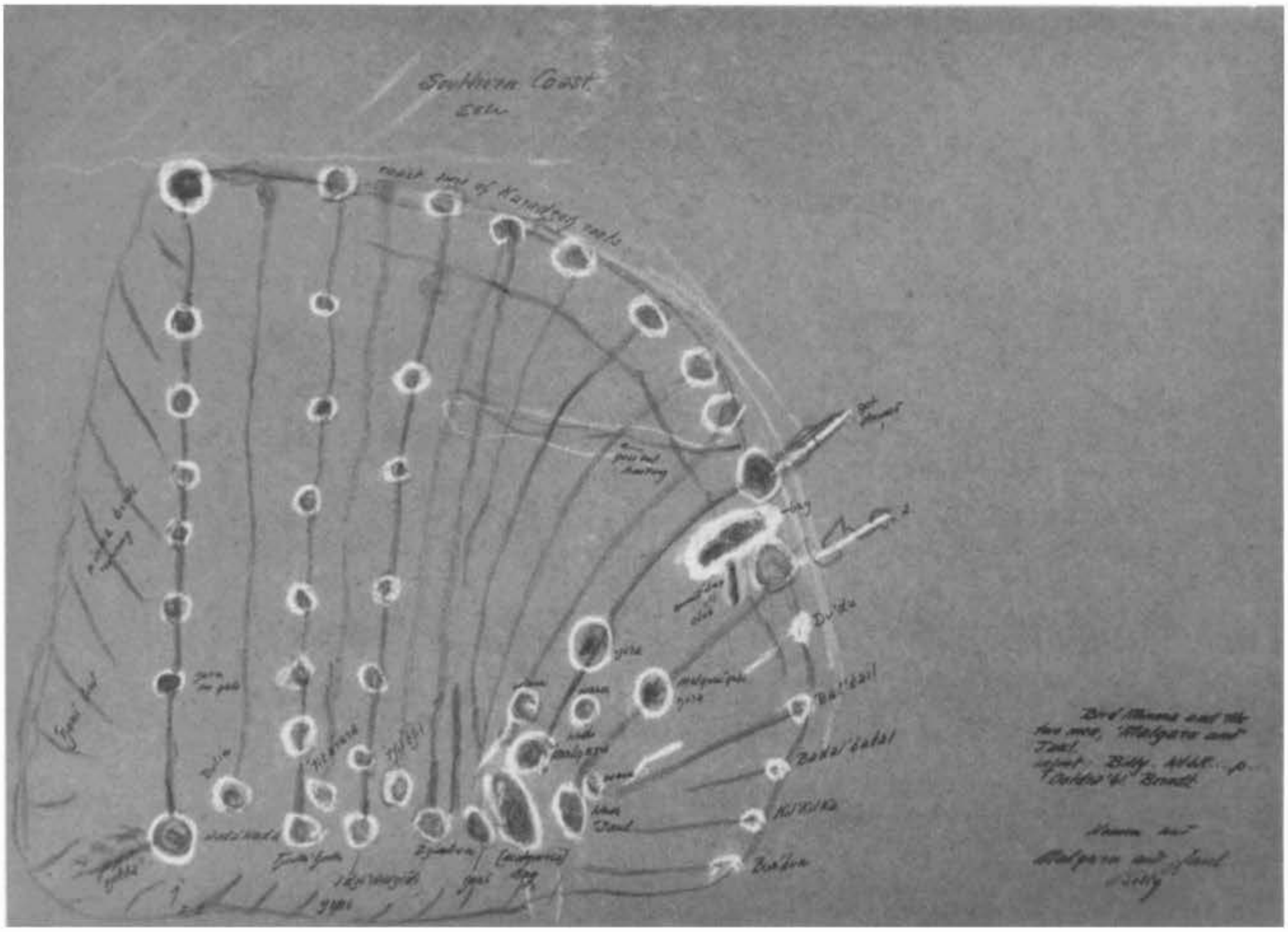


FIG. 10.8. BIRD MINMA [WOMAN] AND THE TWO MEN MALGARU AND JAUL, BY BILLY. Ooldea, South Australia, 1941. Crayon on paper. Represented are their Dreaming tracks from out of the desert to the coast, with two tracks extending into the sea.
Photograph by J. E. Stanton, courtesy of the Berndt Museum of Anthropology, Perth (P22142).

procedure has been to get local informants to draw their country in outline without reference to European maps. Any correlation with the latter is attempted only afterward. There are certain inherent difficulties in such an approach, although in my opinion the benefits outweigh these. . . . Additionally, the Aboriginal maps are not to scale and are not in any sense topographically accurate."[22]

Some fifty-nine of the Ooldea drawings are specifically topographic depictions rather than mythic figures or children's drawings. Two drawings of cosmological topics appear elsewhere in this book (figs. 9.9 and 9.10), and a plan of the Ooldea camp is reproduced below, figure 10.28. A somewhat typical drawing is Billy's illustration of the Dreaming tracks of the Bird Woman and Two Men descending out of the desert interior to the coast and thence, in two cases, into the sea itself (fig. 10.8).

One of the most spectacular objects in the Berndt Collection is a series of map sections consisting of six sheets (in seven parts) (fig. 10.9) and another large sheet made up of four sheets joined together (fig. 10.10), covering a single region from Mount Margaret in the west, north to the Warburton Range, east to Ernabella and Oodnadatta, and south to the east-west railway line that runs through the Nullarbor Plain (fig. 10.11). There are literally hundreds of place-names on this map, placed there by Ronald Berndt in the course of collection but on instructions from the men who were teaching him aspects of their knowledge of this vast area. By contrast with so many crayon drawing maps, this one is a collective product by several men. It illustrates how the fine details of a truly vast area of land may be part of "group knowledge" at a

112 and 114–15, for reproductions of two of the drawings he collected there. Unfortunately, most of Tonkinson's collection of Western Desert drawings has been lost.

22. Berndt, *Sacred Site*, 14 (note 12). Here he was perhaps referring specifically to his western Arnhem Land work, but I think the statement probably applies to all his map elicitation work.

FIG. 10.9. ONE SHEET OF LARGE MULTISECTION MAP, DRAWN BY VARIOUS MEN. One sheet of six that cover south-central Australia from Oodnadatta to Ernabella, Warburton Range, Mount Margaret, and along the east-west railway line. Collected at Ooldea, 1941, by Ronald Berndt. Crayon on paper.
Photograph by J. E. Stanton, courtesy of the Berndt Museum of Anthropology, Perth (P22145–P22150; P22146 shown here).

single place and time without necessarily being held by any of the group's members individually.[23]

In 1958, at Balgo in the northern desert region of Western Australia, Ronald Berndt asked adult men of "mixed dialectal origin" to draw maps showing both mythological tracks and "tracks along which they moved from one point to the next," and Berndt combined some of this information into a sketch map.[24] This map covers most of the same area as a similar map of mythic tracks Berndt published in 1972.[25] A third map covering the same area was drawn for Tindale, presumably in 1953, and published in 1974 (figs. 10.12 and 10.13). Central on all three images is the area associated with the language group Kukatja.[26] In all three maps we see the areas of adjacent groupings mostly shown only in part and on the edges of the image. Typical of desert depictions of country, all three maps focus on sites linked in strings representing either mythic or human travels, with minimal or no attention to topographic features as such.[27] This is in high contrast with Aboriginal maps from northern Australia.[28]

A number of north Australian Aboriginal maps showing topographic features have been published. Ronald and Catherine Berndt collected a major series of Aboriginal maps in western Arnhem Land during fieldwork there carried out on several occasions during the 1940s, 1950s, and 1960s. Three of the maps were published in 1970 as part of a major ethnography.[29] Two are reproduced here with interpretations based on Berndt (figs. 10.14–10.17).

The emphasis in figure 10.14, a map of a clan estate, is on two main structural features of the landscape: watercourses and hills. The estate is typical of those found in watershed areas in that it consists of the heads of several streams. Aboriginal estates farther down drainage systems tend to consist of single drainage subbasins. Here again we strike an example of the common tendency for Aboriginal cartographers to depict their own land at the center of the image, with some neighboring countries shown around its periphery.

Figure 10.16, by contrast, shows six clan estates on the Liverpool River in the region of Maningrida, but the centrality of the cartographer's land is maintained. Most of the map, as in the previous example, consists of only two

23. See the section titled "Crayon and Other Drawings" in Ronald Murray Berndt and Catherine Helen Berndt, *The World of the First Australians*, 4th rev. ed. (Canberra: Aboriginal Studies Press, 1988), 425–26. Ronald Berndt considered the most striking of his crayon drawing collections to be the one created for him at Birrindudu, in the Northern Territory, in 1945. Few of these drawings, however, would come under the rubric of maps that I am using in this case. Examples of the Birrindudu drawings have been published in Ronald Murray Berndt and Catherine Helen Berndt, "Aboriginal Art in Central-Western Northern Territory," *Meanjin* 9 (1950): 183–88 and figs. 1–10, and Berndt, Berndt, and Stanton, *Aboriginal Australian Art*, 74–76, pls. 63–68 (note 20).

24. See Ronald Murray Berndt, "Territoriality and the Problem of Demarcating Sociocultural Space," in *Tribes and Boundaries in Australia*, ed. Nicolas Peterson (Canberra: Australian Institute of Aboriginal Studies, 1976), 133–61, esp. 136–39.

25. See Ronald Murray Berndt, "The Walmadjeri and Gugadja," in *Hunters and Gatherers Today: A Socioeconomic Study of Eleven Such Cultures in the Twentieth Century*, ed. M. G. Bicchieri (New York: Holt, Rinehart and Winston, 1972), 177–216, esp. 184–86.

26. Kukatja is spelled Gugadja by Berndt and Kokatja by Tindale.

27. See further above, pp. 379–83.

28. One exception to this may be the map of a Plains Kangaroo mythic track of the middle Roper River published as part of a land claim book in 1981; see Howard Morphy and Frances Morphy, *Yutpundji-Djindiwirritj Land Claim* (Darwin: Northern Land Council, 1981), 62. The authors do not state that the image was drawn for them by claimants, only that they had "produced" it.

29. Ronald Murray Berndt and Catherine Helen Berndt, *Man, Land and Myth in North Australia: The Gunwinggu People* (Sydney: Ure Smith, 1970), figs. 2–4.

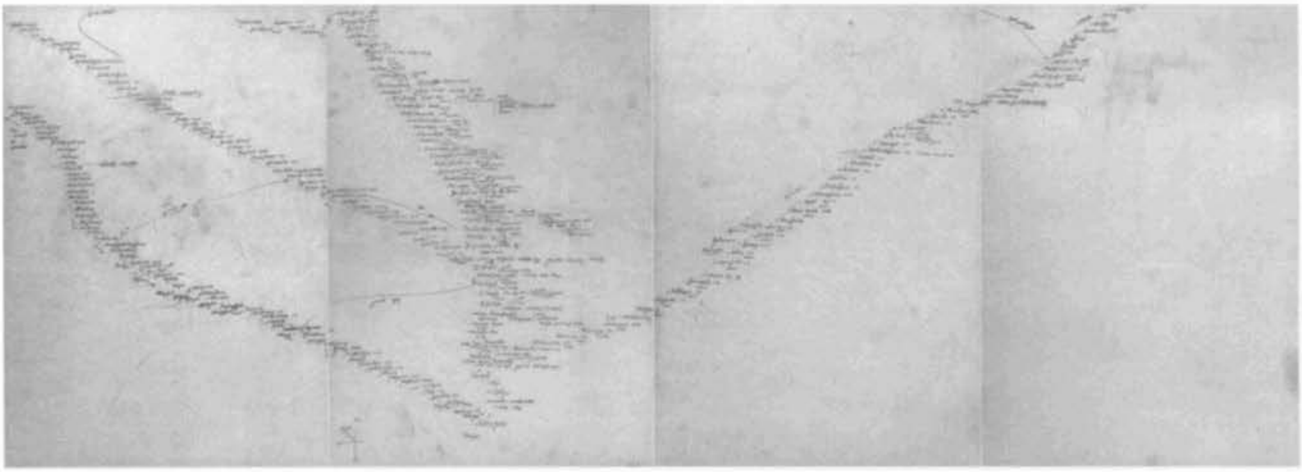


FIG. 10.10. COMPOSITE MAP OF A REGION IN SOUTH-CENTRAL AUSTRALIA. This map of four connecting sheets was drawn by various men, Ooldea, South Australia, 1941. Collected by Ronald Murray Berndt. Crayon on paper. Ooldea is near the bottom of the second sheet.

Photographs by J. E. Stanton, courtesy of the Berndt Museum of Anthropology, Perth (P22152–22155).

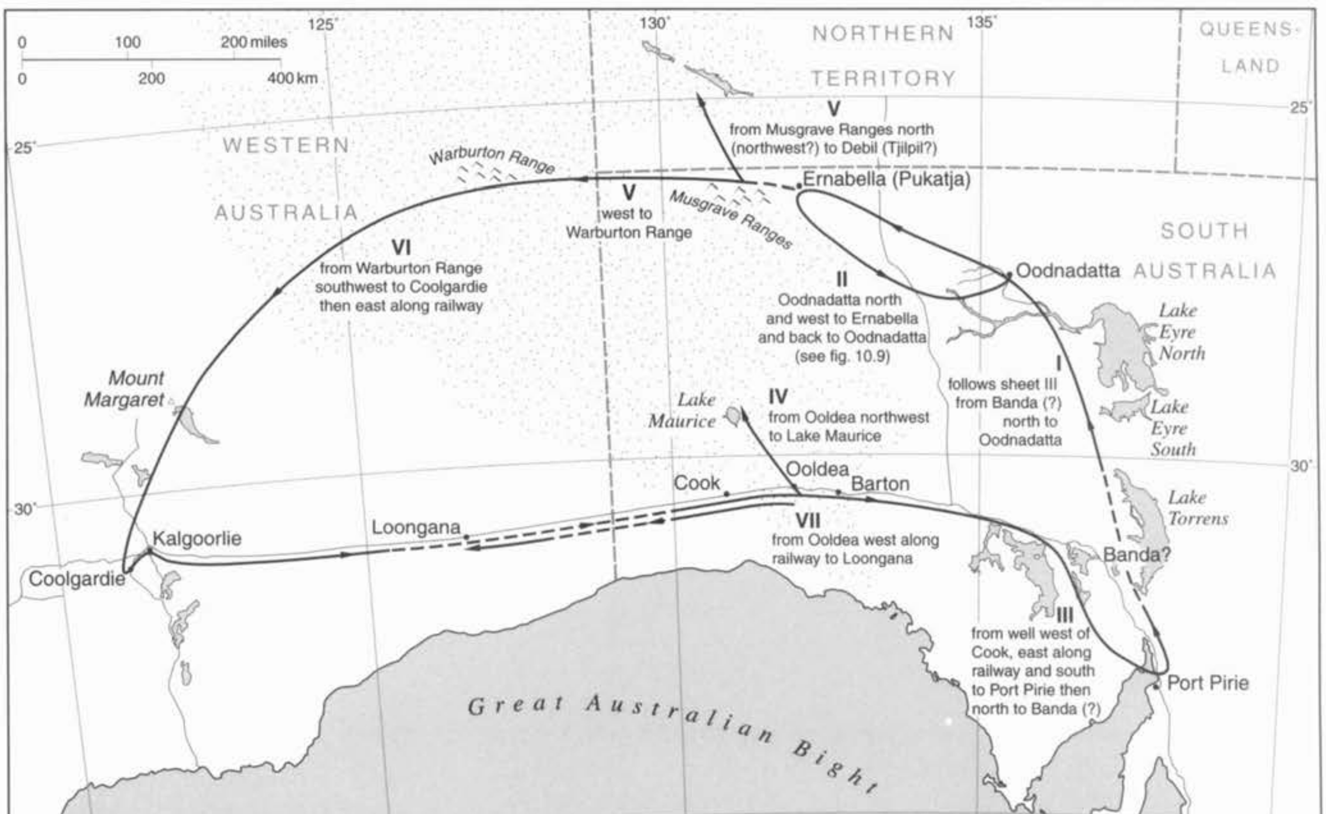


FIG. 10.11. REFERENCE MAP FOR FIGURES 10.9 AND 10.10. This is the region covered by the map sheets prepared by various men and collected at Ooldea in 1941 by Berndt. I–VII show the seven parts of the six-sheet map (II is illustrated in fig. 10.9). Figure 10.10 covers the same region with Juldiŋ'gabi (marked with a small x at the bottom of the composite map) being Ooldea.

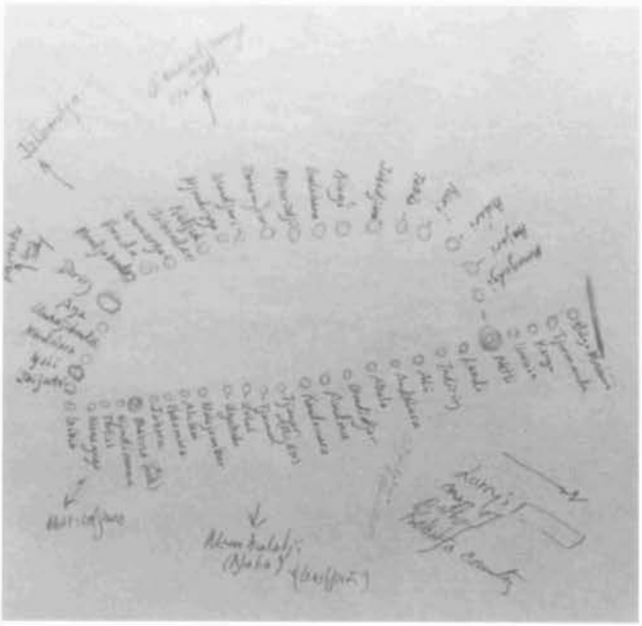


FIG. 10.12. KOKATJA MAN'S DRAWING OF THE COUNTRY SOUTH OF BALGO IN WESTERN AUSTRALIA, CA. 1953. The place-names, the Kokatja man's names for distant tribespeople, and a compass direction marker were added by the observer. See figure 10.13.
Photograph courtesy of the South Australian Museum Archives, Adelaide (SAM 10, sheet 34).

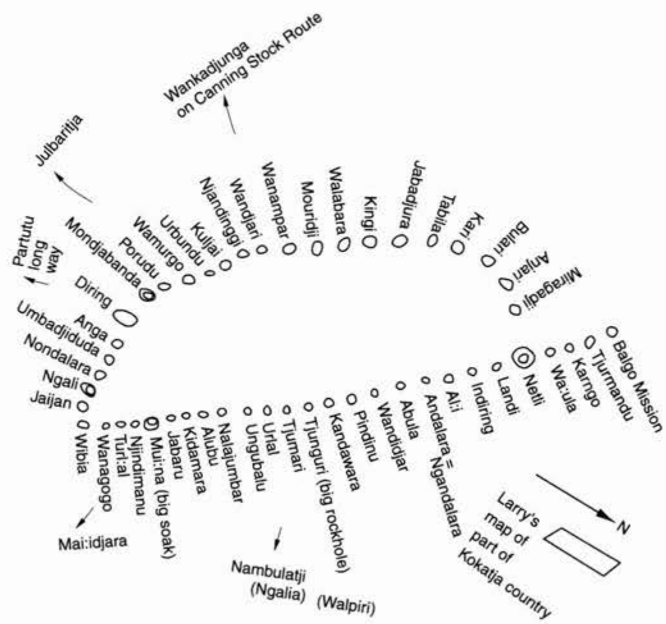


FIG. 10.13. TINDALE'S INTERPRETATION OF KOKATJA MAN'S DRAWING (FIG. 10.12).
After Norman B. Tindale, *Aboriginal Tribes of Australia: Their Terrain, Environmental Controls, Distribution, Limits, and Proper Names* (Berkeley: University of California Press, 1974), 39.

kinds of features, but here they are watercourses and water holes.

In 1968 Berndt obtained a detailed map of Elcho Island, northeast Arnhem Land, in five large brown paper sections, and a redrawing of it was published in 1976. The composite map shows 164 sites numbered by Berndt.[30] These sites fall into fourteen clan estates, almost all of them discontinuous. Marine sites such as smaller islands, reefs, and rocks are included, as well as features as precise as a single named tree. The shoreline itself is the dominant topographic feature, and most sites cluster along it. Inland swamps, as in western Arnhem Land, are shown as circles. A shaded and unshaded contrast, added by Berndt, indicates which of the two patrimoieties the estates belong to.

In a work on sacred sites, published in 1970, Ronald Berndt illustrated his subject with a series of redrawn Aboriginal maps forming a mosaic covering part of western Arnhem Land from Croker Island south to near Oenpelli.[31] Although a number of these map sections deal with the coast and islands, which they represent in a highly figurative way (from a perpendicular perspective), a few show inland areas. Two of these focus on the Murganella (Marganala) floodplain and its various watercourses, and they indicate only small sections of coastline along their margins.[32] The watercourses are shown as straight lines on the Aboriginal maps, but they are by no means straight on the ground. Furthermore, on the Aboriginal maps the lower reaches of river that lack significant tributaries appear to have been stretched out to form most of the river's length. This may reflect a cultural emphasis on the relatively resource-rich lower riverine areas as opposed to the ecologically thinner country upstream. The graphic straightening of the rivers, however, occurs in a number of Aboriginal works. Indicating a floodplain by an enclosing line, on the other hand, is most unusual.

In 1964 Ronald Berndt traveled to Yirrkala in northeast Arnhem Land, another field area in which he had carried out major ethnographic work with Catherine Berndt since the late 1940s. On previous visits there he had obtained many crayon drawings, mostly showing mythological and ceremonial themes and employing classical visual conventions to indicate topographic features. On this occasion, however, the wider political context was different: a major dispute had erupted over the establishment of bauxite mining on the Gove Peninsula.[33] Berndt needed to obtain information on the distribution of sacred sites in the affected area. Detailed on-the-

30. Berndt, "Territoriality," 148–54 (note 24). Berndt had also elicited similar, but much more detailed, maps in his 1946–47 fieldwork in the same region (154–55).

31. Berndt, *Sacred Site* (note 12).

32. Berndt, *Sacred Site,* 40 and 41.

33. Ronald Murray Berndt, "The Gove Dispute: The Question of

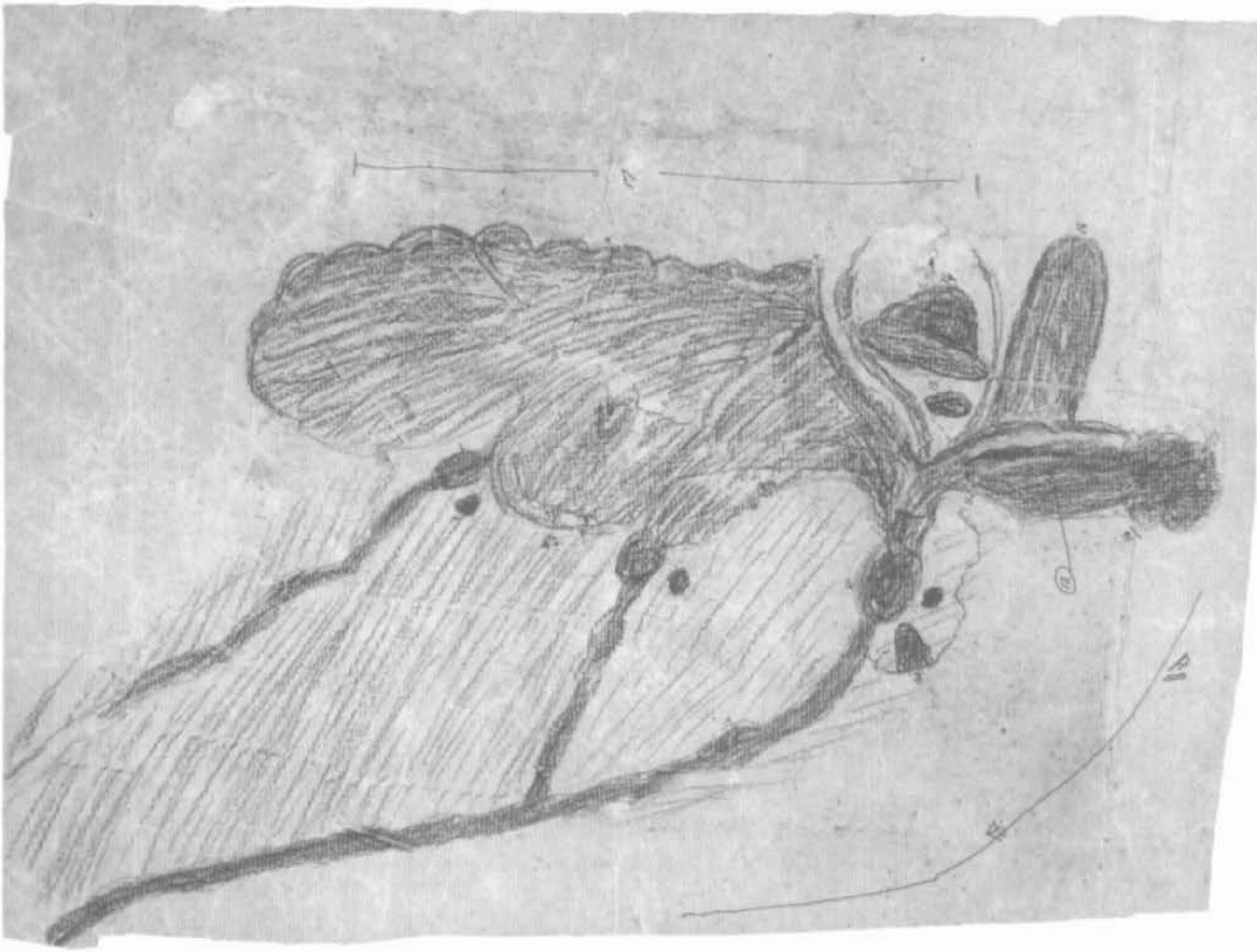


FIG. 10.14. ABORIGINAL MAP OF GUMADIR (GOOMADEER) RIVER AREA BY MANGGUDJA. Crayon on paper, western Arnhem Land, ca. 1950. The map shows the Maiirgulidj clan estate near the Goomadeer River east of Oenpelli. Compare figure 10.15.

Photograph by J. E. Stanton, courtesy of the Berndt Museum of Anthropology, Perth (P22157). © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

ground field mapping had not yet taken place in the region to any significant degree. Berndt organized the drawing of a map of the Gove Peninsula, issuing brown paper sheets and red lumber crayons to Wandjuk Marika, who executed the work. At least eight senior local Aboriginal men took part in the creation of this map, however.[34] It was so detailed it had to be done in six sections, and yet these charts were "not as detailed as they could be." They pinpointed, according to Berndt,

> those sacred and traditional sites and areas which should not, except in extreme circumstances (such as a national emergency), be ceded to any authority other than one controlled by the local people or to the Administration which, ideally speaking, is established to safeguard their interests. In making these claims the men concerned, as spokesmen . . . showed thoughtfulness and responsibility in assessing the position. They have indicated a fair expanse which is available for economic exploitation, covering a large bush area with egress to the sea at various points.[35]

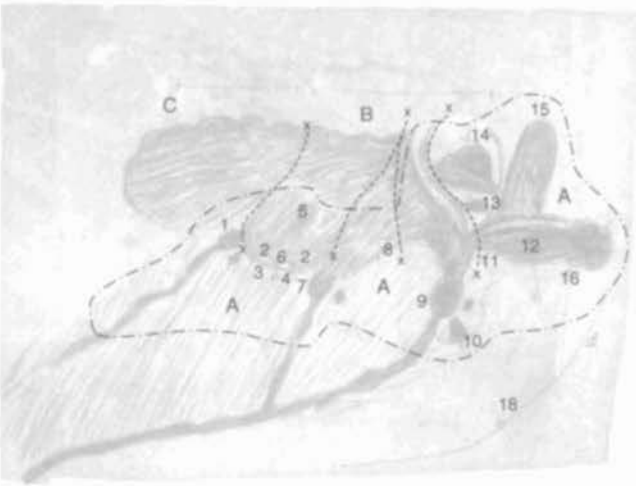
The Gove map is therefore not merely a map of Aboriginal places, but also a map of such places drawn up in response to the threat of a destructive form of development.

This illustrates a basic principle of such artifacts: that their content is always generated within a particular context, one that is reflected in the work itself. There is no "Aboriginal map of country" for all purposes. No such

Australian Aboriginal Land and the Preservation of Sacred Sites," *Anthropological Forum* 1 (1964): 258–95, esp. 258–64.

34. They included Wandjuk's father Mawalan, Mathaman, Milirrpum, Munggurrawuy, Bununggu, Narritjin, Nanyin, and "Gongujuma or Gunggoilma" (Berndt, "Gove Dispute," 269–70); I have transcribed these names in current orthography except for the last one, a name not familiar to me.

35. Berndt, "Gove Dispute," 288 and 291.



x-------x Aboriginal tracks

A, B, C, Clan estates

– – – Estate boundaries

1. Gubudji waterhole. An old Fish-poison *djang* man lived here.
2. Edge or fringe of hill.
3. Marelyi.
4. Djalargaiuwa – Centipede place.
5. Guguraidja caves.
6. Also Centipede *djang.*
7. Manyalg-gabodju?mi – Bee and Honey name.
8. Nabulg-gabandaid.
9. Djurlga.
10. Nabalagaid, a *jarijaning* (yariyaning) *djang* man, now rock. (In a different version he was an orphan, a younger brother, and Djelama *gunmugugur*; his elder brother's name was Nagundjagu.)
11. Mibanar, river and short track.
12. Gundinug hole – water running down.
13. Gwingura hill.
14. Big hill with metamorphosed *ubar* at top (Wurubig).
15. Long hill, Demid. A group of mythical people drowned here; hill 14 sank down and they went to 15, but were drowned.
16. Galardjang. According to Manggudja, who drew this, his paternal grandparents and patrilineal ancestors lived here; during the wet season they made bark houses.
17. Deleted from map.
18. Gumadir River.

FIG. 10.15. INTERPRETATION OF ABORIGINAL MAP OF GUMADIR RIVER AREA (FIG. 10.14). Maiirgulidj clan estate is surrounded by a dot-and-dash line and is identified as A. Neighboring clan estates are shown as B (Barbin estate) and C (Ngalngbali estate). People of the three estates were identified as "one family," that is, as closely related. The Maiirgulidj estate contains a number of sites, sixteen of which are shown by numbers superimposed on the map. It is crossed by several Aboriginal walking tracks, shown as x------x. Watercourses are indicated by roughly parallel heavy lines and infilled. Water holes are elliptical bulbs as at 1 and 12. (The circle at 16 is probably a swamp or water hole also.) The line marked 2 is the edge of a line of hills, and the forms numbered 13, 14, and 15 are particular hills. The smaller form at 10 is a particular rock.
After Ronald Murray Berndt and Catherine Helen Berndt, *Man, Land and Myth in North Australia: The Gunwinggu People* (Sydney: Ure Smith, 1970), fig. 3.

map, I venture to say, would ever be exactly replicated even by the same cartographer on the same day. They are unique performances, like most ceremonial enactments in classical Aboriginal practice. While elements of both maps and ceremonies may remain constants, their selection and combination in each case is always likely to be event specific.[36]

Smaller Scholarly Collections

Many small collections of Aboriginal maps are in private hands, usually gathered by an anthropologist or similar scholar in the course of fieldwork. Occasionally some of these maps find their way into print. One of the earliest examples is Papi's map of coral reefs near Mabuiag in the Torres Strait published early this century, showing Mabuiag Island in section and the reefs in plan view.[37]

Similar collections include that of Robert Tonkinson and that of Michael Robinson, another anthropologist from Western Australia.[38] A number of the drawings, however, are isolated, one-time efforts, such as the one by Clifford Possum Tjapaltjarri of 1988 (fig. 10.18). This map is titled, presumably by Vivien Johnson, "Map of Anmatyerre Country" and is a pencil drawing on paper. It was drawn by Tjapaltjarri, a renowned artist in acrylics, "during a late night conversation with Chris Hodges in New York November 1988. . . . The map began in the dense lower middle section with the artist's principal sites around Mt Wedge, Napperby, Mt Allan and Yuendumu, then spread out to the north, south and east as these Dreaming trails were traced back to their points of origin beyond the artist's family estate."[39] This act of commencing with the cartographer's own core country and moving outward nicely parallels the tendency of maps in the South Australian Museum collection, already discussed, which usually show the cartographer's "tribal" or Dreaming country at the center, often with neighboring groups' countries shown only in part and tangentially. Under Aboriginal tradition, this would normally be the proper way to proceed. Creating a "map" is an act of asserting one's associations with land. Since one can speak only for one's own area, such maps must normally be expected to be geographically egocentric and thus highly partial representations of a person's actual knowledge.

36. See Keen, *Knowledge and Secrecy,* 132–68 (note 7), on improvisation and innovation in ceremonial performances in northeast Arnhem Land.

37. Alfred C. Haddon, ed., *Reports of the Cambridge Anthropological Expedition to Torres Straits,* vol. 5 (Cambridge: Cambridge University Press, 1904), 60.

38. See Tonkinson, *Mardu Aborigines,* 112–15 (note 21). Michael V. Robinson, personal communication.

39. Vivien Johnson, *The Art of Clifford Possum Tjapaltjarri* (Basel: Gordon and Breach Arts International, 1994), 12 (pl. 1), quotation on 153.

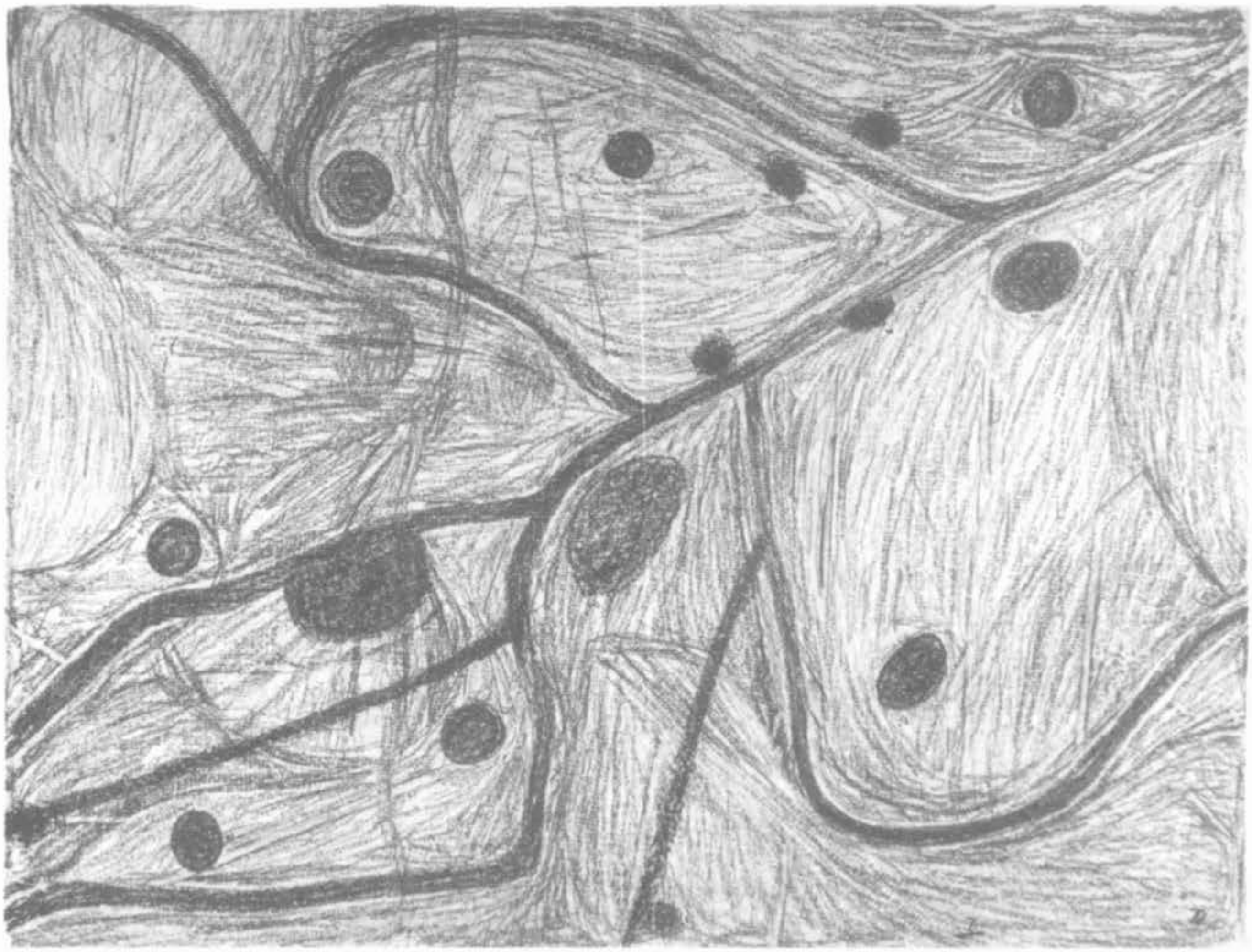


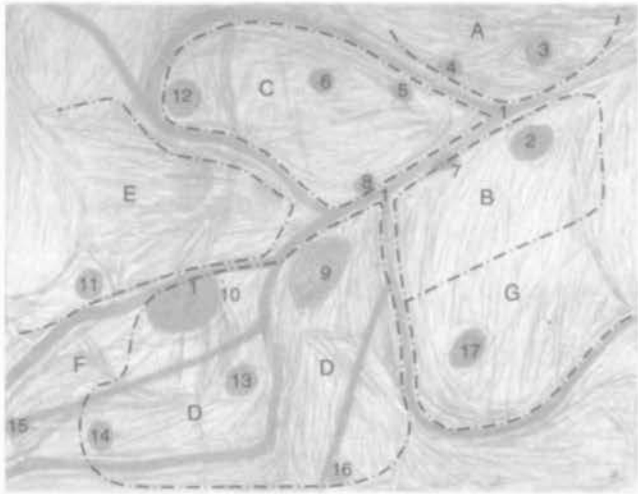
FIG. 10.16. ABORIGINAL MAP OF MARGULIDJBAN AND ENVIRONS: SOME OF THE MAIN SITES, BY DUBUNGU. Crayon on paper. Western Arnhem Land, ca. 1950. Compare figure 10.17.

Photograph by J. E. Stanton, courtesy of the Berndt Museum of Anthropology, Perth (P22156).

The map looks nothing like Tjapaltjarri's paintings but is very like the "mud maps," which have a basic framework of important places and the roads connecting them (this one is bisected by the Stuart Highway).[40] East is at the top if one takes the writing on the map as an indication of orientation, but since Tjapaltjarri did not put the writing there it is likely it was simply aligned with the cardinal directions, in a horizontal position, during his part of its production. The instructional purpose of this drawing, as well as its visual conventions, places it squarely within the category of "map" that I am using here.

Johnson's book on Clifford Possum Tjapaltjarri has a chapter titled "Cartographer of the Dreaming" in which she says that Tjapaltjarri and his late brother Tim Leura Tjapaltjarri shared the innovative idea of combining many Dreamings on a single large canvas and promoted a view of this particular painting process as making "maps of country" rather than just showing particular Dreamings and their sites. Tim Leura used to refer to his paintings as "topographical." Johnson believes an influence here may have been that the father of the two painters had worked as a guide to anthropologists who were making site maps of the country. She also asserts: "Like western topographic maps, these paintings are large-scale maps of land areas, based on ground surveys, with great attention to accuracy in terms of the positional relationships among the items mapped. They can be used

40. For examples of his paintings, see Johnson, *Clifford Possum Tjapaltjarri*; Christopher Anderson and Françoise Dussart, "Dreamings in Acrylic: Western Desert Art," in *Dreamings: The Art of Aboriginal Australia*, ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 89–142 (esp. figs. 149, 152, 163, 172, and 173) and 224–25; and Wally Caruana, *Aboriginal Art* (London: Thames and Hudson, 1993), 119, fig. 101, and 120–21, fig. 102.



A - G Clan estates

- - - Estate boundaries

1. Liverpool River, Margulidjban.
2. Manawugan (and Manidjanggarira, now called Maningrida).
3. Nirgala waterhole.
4. Nabiwo-gadjangdi waterhole – Wild Bee *djang.*
5. Gabulrudmi waterhole.
6. Monggari waterhole.
7. Gulbalyara – Emu *djang.*
8. Guridja waterhole.
9. Bulgul-Namargun, Thunder and Lightning *djang.*
10. Gunraᵓgani waterhole.
11. Mandaidgaidjan waterhole – Long-necked Tortoise *djang;* also Echidna and Carpet Snake.
12. Mumenger waterhole.
13. Gagodbeboldi waterhole – Paperbark Tree name. Aidjilad was killed here by a giant Dog.
14. Mugamuga waterhole.
15. Yirolg – Worm or Maggot *djang.*
16. Magarabulu waterhole.
17. Mamaidba waterhole.

FIG. 10.17. INTERPRETATION OF ABORIGINAL MAP OF MARGULIDJBAN AND ENVIRONS (FIG. 10.16). The cartographer, Dubungu, belonged to estate C (Born clan), which lies in the upper center part of the image. Estates A, E, and F, on the periphery of the map, are shown only in part. Watercourses are shown by infilled parallel lines and water holes by circles. Dashed lines indicate estate boundaries. Most of the estates are shown as bounded by watercourses, but estate D is a "watershed" estate in the sense that it consists of several upper sections of streams.
After Ronald Murray Berndt and Catherine Helen Berndt, *Man, Land and Myth in North Australia: The Gunwinggu People* (Sydney: Ure Smith, 1970), fig. 4.

for site location, and because of their precision have the validity of legal documents–they are Western Desert graphic equivalents of European deeds of title."[41]

I do not accept the statement that such paintings "can be used for site location" in the sense that someone unfamiliar with the country could find their way around with a painting by one of these artists. Although they contain certain parallels with Western topographic maps, their paintings are in general highly formalized, abstracted, and frequently very symmetrical representations that do not rest on a topographic base indicating major natural features in a figurative way. Confirming this contrast between acrylic paintings and sketch maps drawn in something like the European manner is a "Dreaming map" of the Napperby Station area in Central Australia made by Tim Leura Tjapaltjarri with art teacher Geoff Bardon in 1971.[42] It is similar in style to the Clifford Possum sketch map (fig. 10.18).

In a different but adjacent region of Central Australia during the 1950s and 1960s, anthropologist Nancy D. Munn collected a substantial number of Aboriginal crayon drawings in the course of her work.[43] Her discussion of these works reveals a profound grasp of what they might reliably tell us about Aboriginal understandings of the spatial order, cosmology, and iconographic traditions. Some of the drawings she collected show an early form of European influence on landscape perspective.[44]

The scholarly value of collections such as those of Munn, where the collector has attained a relatively deep understanding of the cultural context in which they were produced, is in general far greater than that of the type represented in the Tindale and Mountford collections in the South Australian Museum and State Library. I shall briefly discuss two more such small collections by scholars whose documentation of the maps collected is similar in depth to that of Berndt and Munn: those of Nancy M. Williams and of the late W. E. H. Stanner.

Anthropologist Nancy M. Williams has carried out an in-depth study of land relationships with the Yolngu people in northeast Arnhem Land since 1969.[45] In 1995 she

41. Johnson, *Clifford Possum Tjapaltjarri,* 47. Tim Leura's use of the English word "topographical" is highly unusual, since it is the sort of technical term one would never expect men of his generation, and from this area, to know.

42. Geoffrey Bardon, *Papunya Tula: Art of the Western Desert* (Ringwood, Victoria: McPhee Gribble, 1991), 4–5.

43. Munn published three Warlpiri examples in Nancy D. Munn, "Totemic Designs and Group Continuity in Walbiri Cosmology," in *Aborigines Now: New Perspective in the Study of Aboriginal Communities,* ed. Marie Reay (Sydney: Angus and Robertson, 1964), 83–100, figs. 1–3; a further three in "The Spatial Presentation of Cosmic Order in Walbiri Iconography," in *Primitive Art and Society,* ed. Anthony Forge (London: Oxford University Press, 1973), 193–220, pls. 2–4; and two in *Walbiri Iconography: Graphic Representation and Cultural Symbolism in a Central Australian Society* (Ithaca: Cornell University Press, 1973; reprinted with new afterword, Chicago: University of Chicago Press, 1986), pls. 7 and 9. See p. 365 above for a more detailed discussion of Munn's work.

44. For example, Munn, "Totemic Designs," fig. 1.

45. See, for example, Nancy M. Williams, *The Yolngu and Their Land: A System of Land Tenure and the Fight for Its Recognition* (Canberra: Australian Institute of Aboriginal Studies, 1986). The following

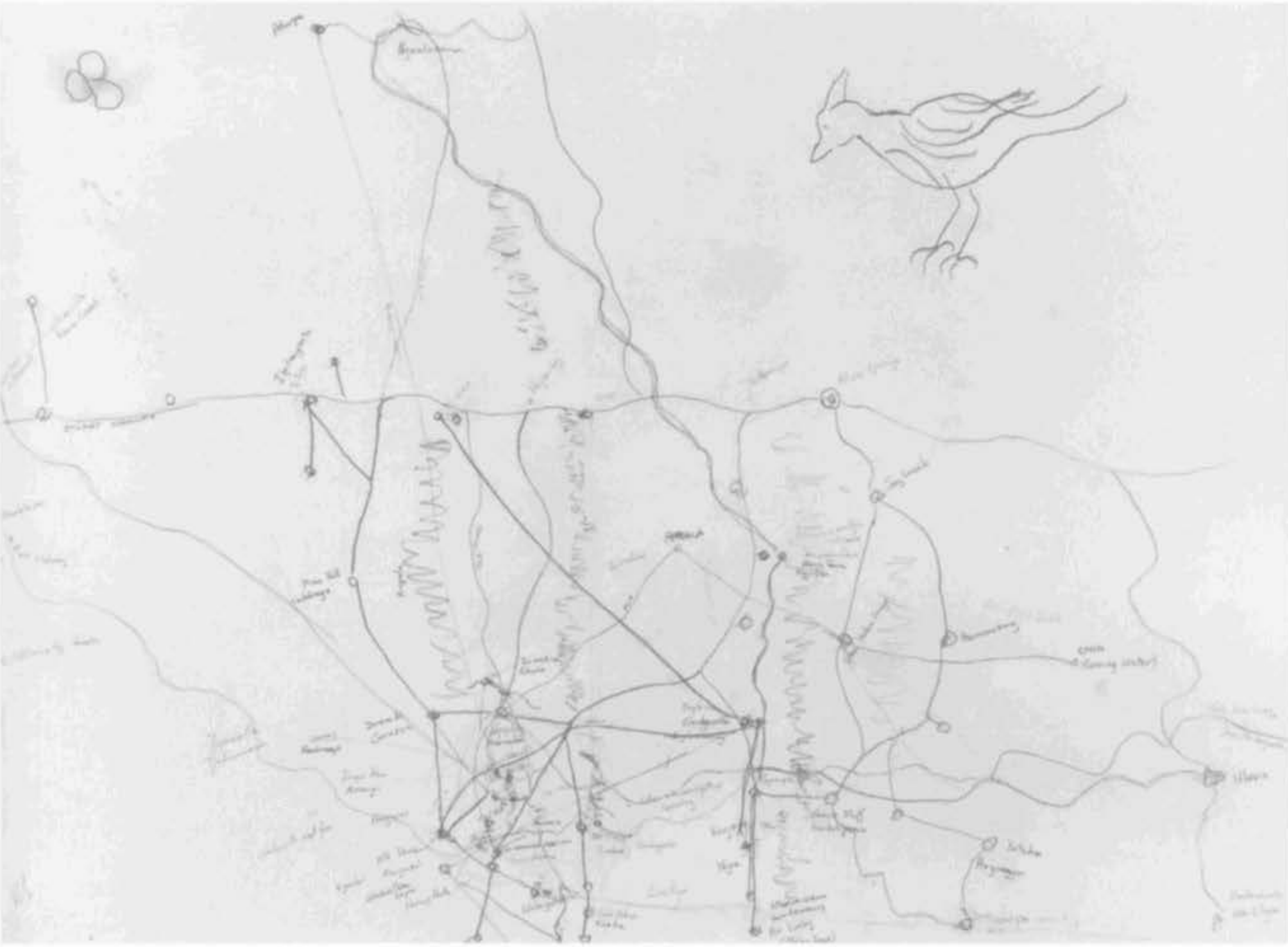


FIG. 10.18. MAP OF ANMATYERRE COUNTRY, 1988. Pencil on paper by Clifford Possum Tjapaltjarri. The map was made during a conversation with a non-Aboriginal man and was intended to explain the broad layout of the country and its Dreamings. Size of the original: 56 × 76 cm. Photograph courtesy of Vivien Johnson. © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

held approximately thirty maps mostly drawn between the end of 1969 and the end of 1970 by Aboriginal people at Yirrkala, northeast Arnhem Land. The maps are of various sizes and contain a variable number of detailed features, including physiographic and "totemic" representations. They were drawn on several kinds of paper, generally with colored pencils and occasionally with colored felt-tip pens. Many also bear notes made in pencil by Williams while the maps were being drawn and their features explained to her. These notes refer to such things as the features shown, mythic and historical themes, and living people associated with them; they were answers to questions Williams put to the mapmakers. She also wrote on the maps the Yolngu names of sites, places, areas, and features, sometimes with English translations.

The maps were drawn to represent lands and seas known to and traditionally held by landowning groups (which Williams has called clans) in northeast Arnhem Land. They were mostly drawn by the heads and other senior members, almost exclusively men, of these landowning groups.

The people who drew them were representing areas to which they had inherited interests through patrifiliation, areas to which they had succeeded (or were claiming succession) through matrifiliation, or areas for which they had custodial-managerial responsibilities through uterine links. In all cases the base map of geographic features was drawn by the people who–usually at the same time–drew the physiographic and cultural features as they explained them.

The map shown in plate 21, collected by Williams, was drawn principally by Djimbun and Ma<u>tt</u>ju<u>d</u>i. Djimbun was a senior man of the Gurrumuru Dhalwangu, the Gur-

account is drawn from Nancy M. Williams, "Yolngu Geography: A Preliminary Review of Yolngu Map-Making" (work in progress).

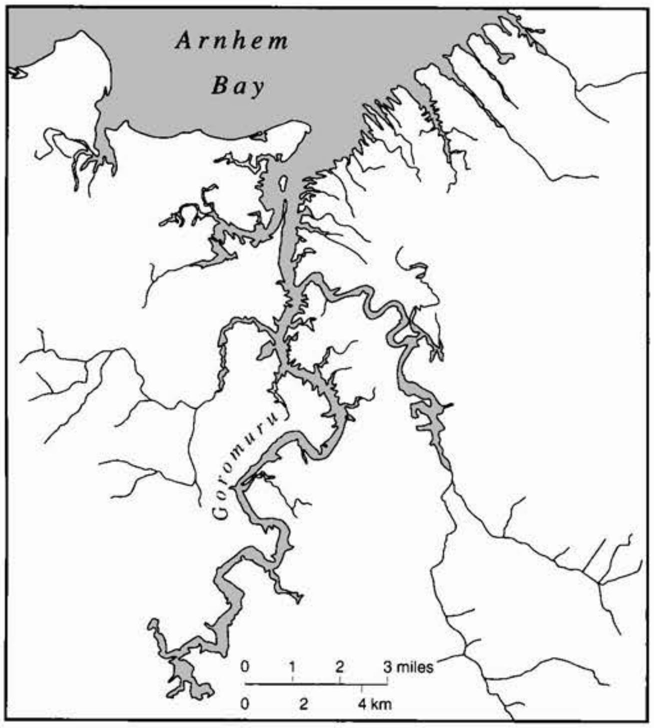


FIG. 10.19. REFERENCE MAP OF THE GOROMURU RIVER AREA. North is at the top. Compare plate 21.

rumuru subclan of Dhalwangu clan, whose principal estate has its focus on the Gurrumuru (Goromuru) River flowing into Arnhem Bay. It is clear that, although stylized and simplified, the image drawn by Djimbun and Maṯtjuḏi has a recognizably iconic relationship with the drainage system of the Goromuru River (compare fig. 10.19). Maṯtjuḏi was then head of the Marrakulu clan, which had long-standing alliance relations with Gurrumuru Dhalwangu.

Larrtjannga Ganambarr's production of the map shown here as figure 10.20 (and compare fig. 10.21) came about in the following way: Williams asked Larrtjannga, senior Ngaymil man, if he would accept a commission to produce a map on a sheet of bark–a bark painting–that would show some part of his clan estate so it would be acknowledged or recognizable as a "map" by both Yolngu and European people. Williams said she would like to use such a map on the cover of the book she was writing about Yolngu land tenure, and Larrtjannga accepted the commission.[46]

In terms of visual technique, this work is very unlike most bark paintings produced in the region, which are typically rather formal constructions, often with internal straight-line borders, showing a high degree of symmetry, and characterized by crosshatched infill. They usually depict places, but not in a very figurative way. This one is different in that it is fundamentally asymmetrical and figurative and has no cross-hatching–with one small exception. Inside this painting there is what looks very much like a small bark painting of the more usual kind.

Wandjuk Marika's map of beach camps at Yirrkala, perhaps better described as a plan, was also drawn at Williams's request (fig. 10.22). She had asked Wandjuk to show each of the residential houses and relevant features and explain to her the relationship of the people who lived there. Wandjuk also drew a second map that portrayed the relationships of the same residential groups to each other in terms of historical and then current alliance and totemic affiliations, affiliations symbolized by the flow of freshwater and saltwater currents (fig. 10.23). Although called an "overlay," the second map is not isomorphic with the map showing residential features, and it is illustrated separately here.

The late W. E. H. Stanner was one of the most eminent scholars working with Aboriginal culture. While doing fieldwork at Port Keats (Northern Territory) in 1959, he provided sheets of Masonite to Nym Pandak (Bunduk) of the Diminin clan (Murrinh-patha language group), who proceeded to paint on them a remarkable series of images of his own traditional homeland area (fig. 10.24). In his notes, Stanner sketched the paintings and placed numbers on elements identified by Pandak, mostly sacred places and topographic features.

Part of Stanner's notes were typed up as a document called "Key to Pandak's painting of a totemic landscape at Port Keats." It begins by identifying forty-four such numbered places, most of them named. Then follow some "general notes" that read:

> This "map" was painted at the Port Keats Mission by Pandak (known to the Mission as Nym Bunduck) in February–March 1959. I had been working with a group, of whom he was one, on genealogical inquiries and mapping of clan territories, based on a large-scale map drawn for me by the Dept of Geography at the ANU [Australian National University] from aerial photographs. All the Aborigines were fascinated by the filling in of the map, which they all quickly appreciated because of (i) the large scale (ii) the clear delineation of creeks and rivers and especially by the fact that they could recognise that (iii) I had had it drawn so as to express what I already knew to be Aboriginal topographic etc. categories. . . . Pandak, entirely unsolicited, asked me one day if I "liked maps." I said that I did; that they helped me to see and understand "country." He then asked me if he could make a map for me. I asked: "What sort of map?" I seem to remember him saying "ngakumal map" (i.e. a map of totems or "dreamings." I said: "Yes, I would like that.") He painted every day for about 4–5 weeks on

46. Williams, *Yolngu and Their Land,* cover illustration and fig. 15 (note 45). For a description of bark paintings and their manufacture, see pp. 366–67 above.

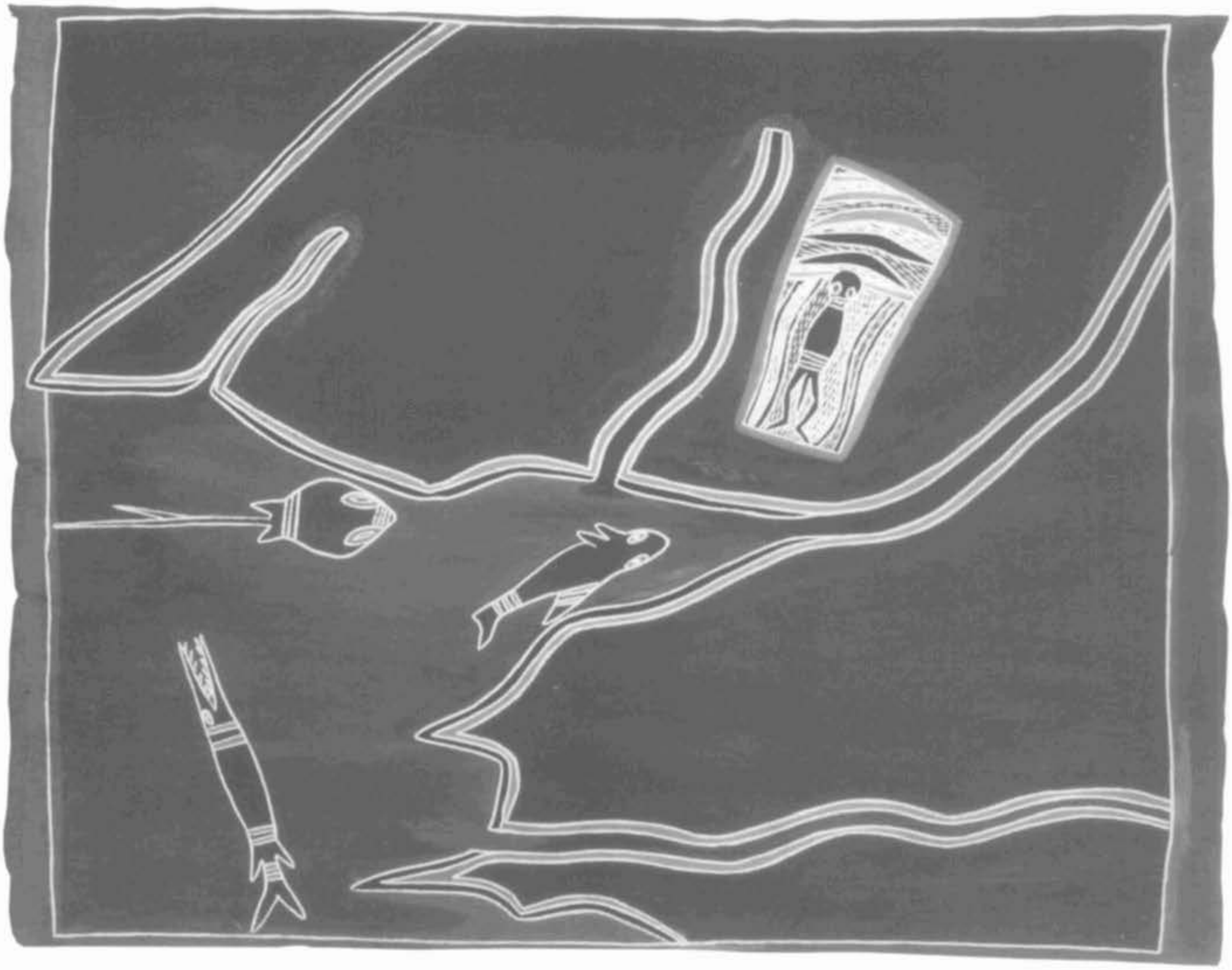


FIG. 10.20. MAP OF ARNHEM BAY. Northeast Arnhem Land, by Larrtjannga Ganambarr. Ochers, manganese oxide, and pipe clay on inner surface of bark of eucalyptus tree. What appears to be a small, more typical bark painting is in the upper right. It represents the site where Bul'ngu ("Thunderman") wrought his transforming marvels on Ngaymil clan land, Bul'ngu being shown in the small "quotation" of a bark painting. The spirit beings Shark, Stingray, and Barracuda are shown in the offshore waters.
Size of the original: 74 × 85 cm. Private collection. © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

a piece of masonite that I obtained at the mission. I copied his painting on 20 March 1959 . . . and noted at the time that he had made two changes during the course of the work. He finished one third of the painting in the first week; then he began to feel that it was becoming too crowded, and rubbed part of it out. In the third week he again rubbed out part for the same reason. Then he completed it without further change.

The "map" should be regarded, I suggest, as an artist's attempt to bring a landscape into purview through visual symbols which point beyond themselves to religious entities.

The planning, design and execution of the painting were Pandak's in their entirety. The "crowding" referred to meant that he had to select with severity what places and totems to represent. It appears from the key that I obtained from him at the time (by questions after the painting had been completed) that he had to omit a large number of places, some of them *ngakumal* [Dreaming sites], some not. So he did not purport to be giving a complete representation of the *whole* of the Murinbata countryside.

The colors he used were entirely made by him of natural earth pigments, except for a very few small patches where he used some flake-white colour that I had with me.[47]

47. W. E. H. Stanner (1958–59), hitherto unpublished (original in the library of the Australian Institute of Aboriginal and Torres Strait Islanders Studies, Canberra). This image has also been reproduced, with

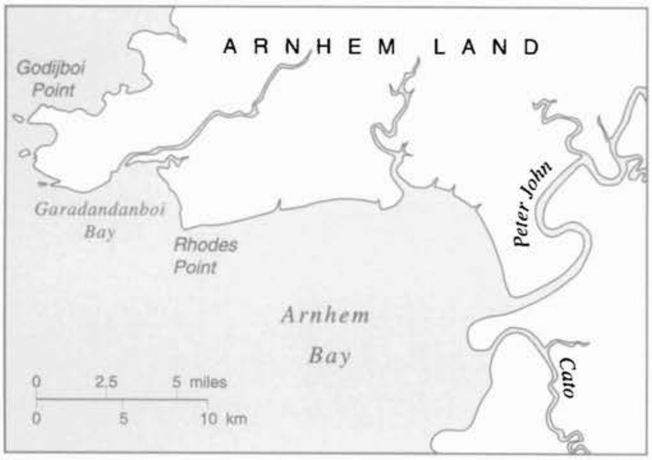


FIG. 10.21. REFERENCE MAP OF NORTHEAST ARNHEM BAY, BASED ON AUSTRALIAN TOPOGRAPHIC SURVEY MAPS. North is at the top. Compare figure 10.20.

This small collection of well-documented "maps" by Pandak stands in contrast to the other works being painted for sale and for collectors at Port Keats at the same period.[48] Pandak's work is less geometric, shows greater variety of visual forms, and sets out topographic features in far greater detail. Had Pandak's paintings, created as "maps" to instruct Stanner, been painted instead for the bark painting market of the day, they would have rivaled, as art market productions, the great acrylic paintings of the 1980s and 1990s. Yet it may have been precisely their explanatory purpose in detailing country, land affiliations, and the locations of sacred sites that set them apart visually from the other works of the same time and place.

The pedagogical role, as I argued earlier in this chapter, suggests a useful distinction between "maps"–topographically based images that are meant to guide or teach, or both–and "icons," which are images of Dreamings and mythic events at specific places that find their central roles in display and performance.[49]

Aboriginal Maps in the Land Claims Era: Nicholson River Land Claim

Although the need to teach and explain about country has for decades been a primary motivation for Aboriginal people to engage in mapmaking, since the 1970s a new context for such works has arisen: that of legal claims to unalienated land. During 1980–82, when an Aboriginal land claim was being researched and processed in the region of the Nicholson River, Northern Territory, the principal anthropologist on the case, David S. Trigger, was given at least three sketches of the country of the father of one of the claimants.[50] This claimant had drawn the sketches to show the location of several important sites. One of these maps had attached to the back a written version of the key myth associated with the totemic significance of the man's country (fig. 10.25). Since he could not write, this story had been dictated to a younger member of his family. The map and narrative dealt with part of the track of Red Kangaroo Dreaming. Two similar sketch maps given to Trigger by the same man showed the same area, depicting physical features of the landscape and a few names of sites.

These maps were produced while the mapmaker was attempting to have his claims over his father's country recognized and accepted, initially by Trigger as the researcher preparing documents for the land claim, and ultimately by the Aboriginal Land Commissioner in a tribunal hearing. This was not a straightforward case because the mapmaker's assertions about the area and about his rights to it according to Aboriginal customary law were not accepted by the claimants as a whole. By his own admission, the mapmaker had visited the area only as a young man, with his father, some thirty to forty years earlier, and some other Aboriginal people said his knowledge of the land was far from comprehensive. Trigger notes that "his strategy may have been prompted by witnessing me carrying and working with maps and (no doubt accurately) taking the view that these were important documents in the context of the research leading up to the land claim."[51]

Mud Maps and Sand Drawings

At the other end of the scale of political temperature, perhaps, are Aboriginal mud maps and sand drawings. When giving someone directions, or laying out landscape features and places for any reason, it is common in Aus-

some commentary, in Caruana, *Aboriginal Art,* 96, fig. 82 (note 40). Another of this set of paintings, Pandak's "Sites in Murinbata Country," is reproduced in Peter Sutton, "The Morphology of Feeling," in *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton (New York: George Braziller in association with the Asia Society Galleries, 1988), 59–88, esp. 60, fig. 87.

48. Compare the Port Keats works illustrated in Caruana, *Aboriginal Art,* 93–95 and figs. 79–81; Michael A. O'Ferrall, *Keepers of the Secrets: Aboriginal Art from Arnhemland in the Collection of the Art Gallery of Western Australia* (Perth: Art Gallery of Western Australia, 1990), 18–25 and figs. 1–10; and Sutton, "Morphology of Feeling," 61, fig. 88.

49. This is not to say that acrylics and bark paintings produced for the market have no educational intent behind them–certainly they do. There is even a genre of bark paintings produced in Arnhem Land known in English as "teaching barks."

50. On the Nicholson River Land Claim, see David S. Trigger, *Nicholson River (Waanyi/Garawa) Land Claim* (Darwin: Northern Land Council, 1982), and Aboriginal Land Commissioner, *Nicholson River (Waanyi/Garawa) Land Claim* (Canberra: Australian Government Publishing Service, 1984).

51. David S. Trigger, personal communication, 24 March 1995.

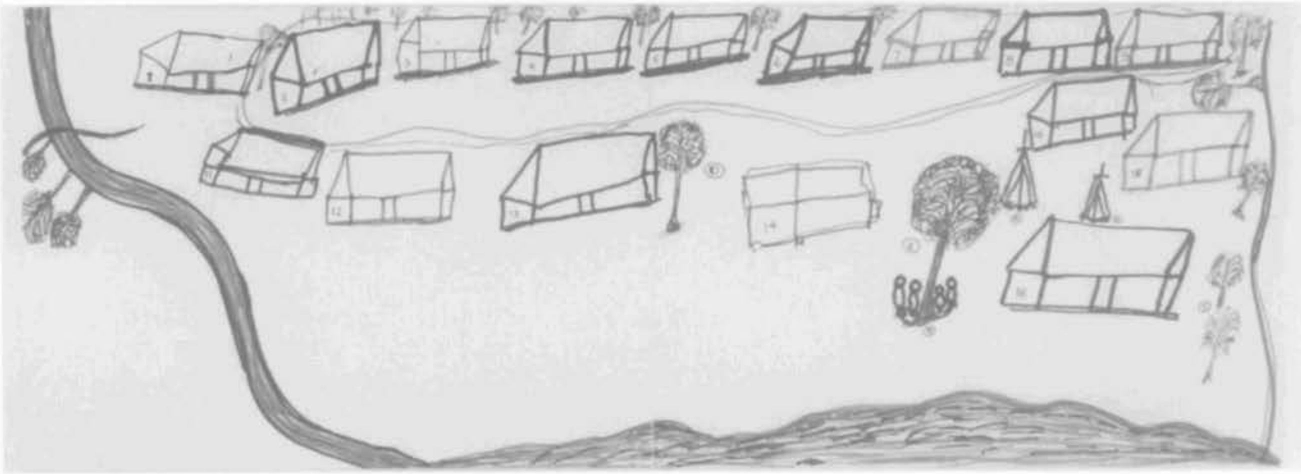


FIG. 10.22. MAP OF BEACH CAMPS AT YIRRKALA BY WANDJUK MARIKA, 1970. Felt-tip pen on paper, made for anthropologist Nancy M. Williams. The numbers on the houses refer to the numbered notes Williams made. Private collection. © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

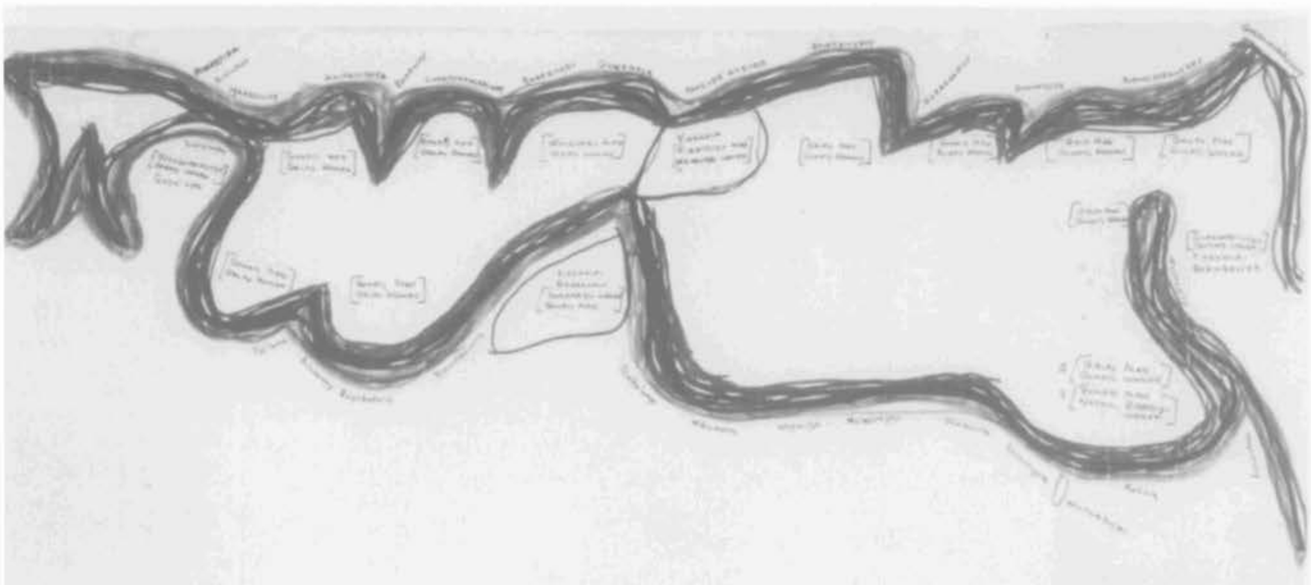


FIG. 10.23. RELATIONSHIPS BETWEEN RESIDENTIAL GROUPS OF BEACH CAMPS SHOWN IN FIGURE 10.22 BY WANDJUK MARIKA, 1970. Felt-tip pen on paper, drawn for anthropologist Nancy M. Williams, showing the same residential groups as in figure 10.22. The relationships between members of households are shown, with clan names of spouses in square brackets and names of sites and localities. Private collection. © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

tralia for people, Aboriginal and non-Aboriginal, to make a quick, rough sketch in the dirt or sand, often using a stick but just as commonly a finger or foot. These are somewhat anomalously (given the dryness of most of Australia most of the time) referred to in English as "mud maps."

There is a tendency for Aboriginal mud maps to be oriented the same way as the country (if one is facing west and describing country to the west, west would be shown at the top of the representation). Those of non-Aboriginals are more likely to be arbitrarily oriented with north at the top (as in a modern atlas). An Aboriginal mud map often also includes parallel lines, each one laid down in accompaniment to a verbal sequence of place-names or as an enumeration of days of travel.

In 1909, near the lower Hanson River in Central Australia, Charles Chewings recorded his experience of an Aboriginal man's practice of drawing in this way:

> Paddy was rather good at making "mud maps." These

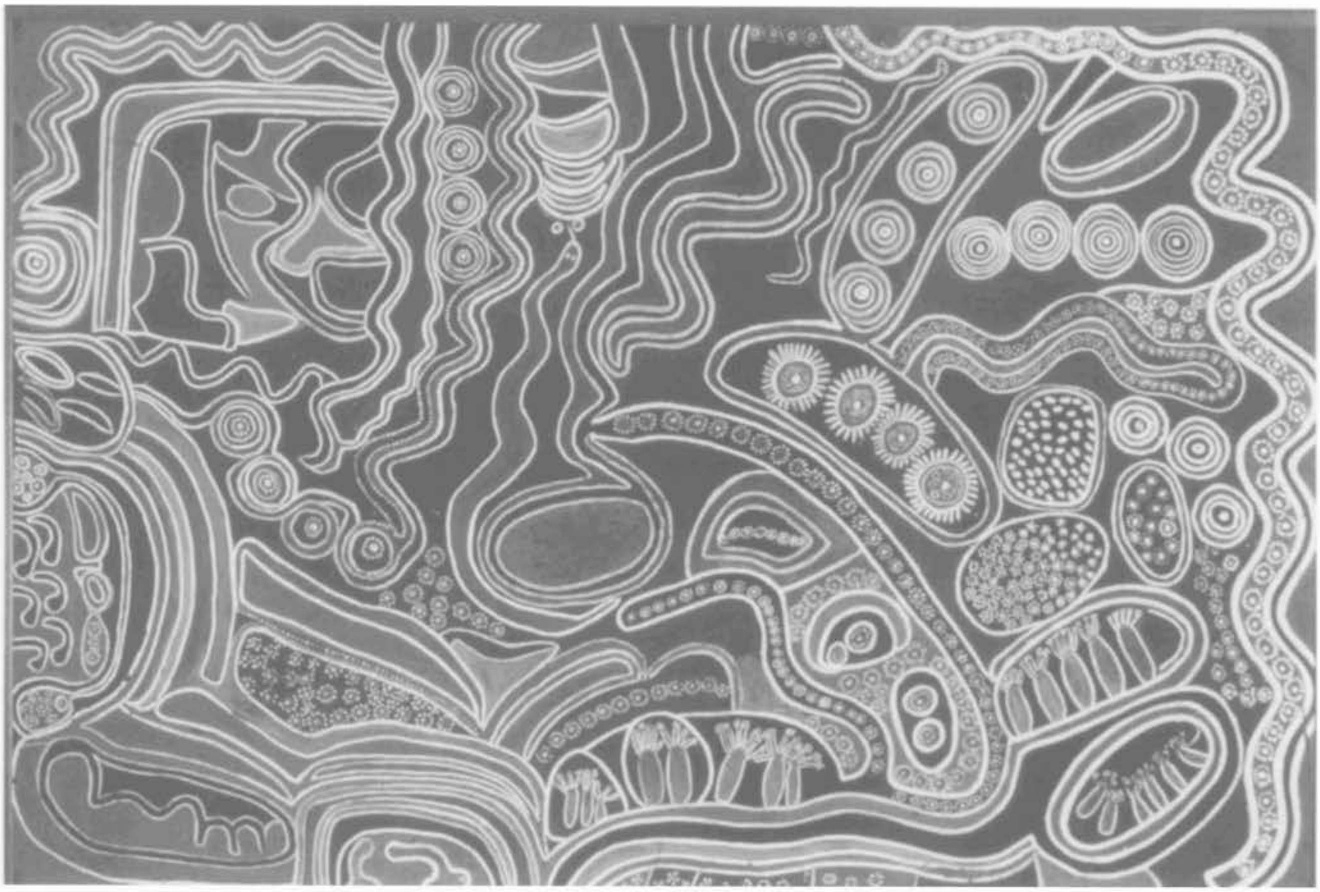


FIG. 10.24. MAP OF THE MURRINH-PATHA COUNTRYSIDE BY NYM PANDAK (BUNDUK), 1959. Natural pigments on composition board.
Size of the original: 89 × 156 cm. Private collection. Photograph courtesy of the South Australia Museum, Adelaide. © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

> are drawn on the ground with a stick, and are the black fellow's way of showing where and how physical features of interest to him are situated in relation to one another. When requested to show what lay beyond, Paddy drew a map showing the course of the Hanson Creek (the native name is Ahgwaanga), also of the large Lander Creek (native name Allallinga) a good many miles to the west. He indicated certain conspicuous hills near the Lander and the sites of certain springs and soakages on the routes he had travelled, and, by marking his various camps, the time it took to travel from water to water. The production of this map of course took much prompting and questioning. I made a sketch of it which I found useful later on.[52]

Tindale noted a similar general tendency for Aboriginal mud maps to concentrate on linear representations of sites separated by recognized walking stages of varying difficulty:

> Often it is difficult for a Western European to enter their world. We are trained on cartographic plans with a compass as aid and relatively accurate determinations as to angle and distance, and by writing in place names and using symbols we share and use a relatively uniform series of conventions. An Aboriginal of the southern part of the Western Desert employs different aids. He has the ground to draw on and may use two basic symbols, the hole and the line. A circular mark or a hole marked on the smoothed sand indicates the place or the water under consideration, and, depending on the circumstances, it may be also the place of origin of a totemic being, a man's own birthplace, or merely the place where the discussion commences. In any case it incorporates the general idea of home or place of residence. The name of the place is announced and thus becomes a point from which narration or delineation starts. A line is drawn from this point by finger or with a stick. In general it is made along a line of movement in the correct compass direction toward an adjoining place. The line usually is kept short; it is

52. Charles Chewings, "A Journey from Barrow Creek to Victoria River," *Geographical Journal* 76 (1930): 316–38, esp. 319–20. I am indebted to David Nash for this quotation. Unhappily, the sketch Chewings refers to appears not to be extant.

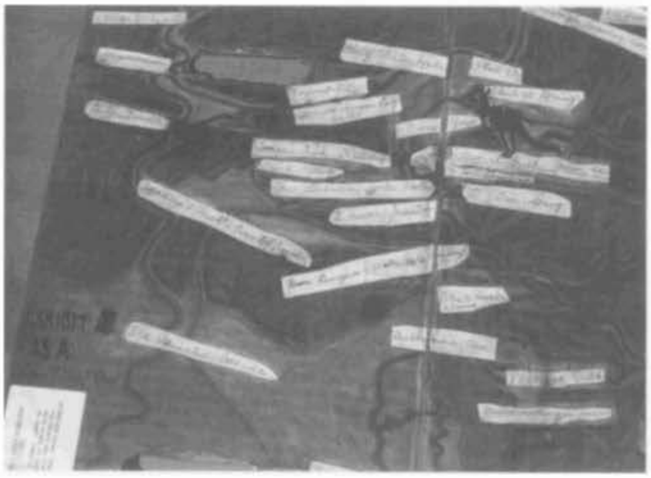


FIG. 10.25. MAP OF RED KANGAROO DREAMING COUNTRY, NICHOLSON RIVER AREA, NORTHERN TERRITORY. Drawn in 1982 by Archie Rockland, an Aboriginal land claimant. Ballpoint pen and pencil on cardboard, with place-names on paper glued on.
Photograph courtesy of the Northern Land Council, Darwin. By permission of the family of Archie Rockland, Queensland.

> a unit distance. It denotes a variable distance measured in our system: one day's travel, the necessary travel distance to the next watering place. A second circular mark or hole is made and its name announced. In native terms this often is a walk; its distance can be defined in terms of one or more "sleeps" or "sit downs"; adjectival descriptions of the journey may define it as close by (e:la), not far, a long way ('parari), or a tiresomely long way away, and so on. Mileages for these categories are from 3 to 5 miles (5 to 8 km.) for close by or 'e:la; 10 miles (16 km.) a normal day's walk, usually this would require no comment; parari might indicate about 20 miles (over 30 km.); anything above that is apt to be a "tiresome distance" ('parari'pakoreŋo). . . . The delineation of a man's tribal or hordal territory by a ground drawing such as this may commence at his birthplace. He marks each place between this and his place of initiation, proceeding along a line touching at each significant water in turn until the all-important site is reached about which there is to be major discussion or to where the talk is taking place. It generally will be found that the main waters appear serially on such a map, little ones may be ignored. In such a map the attentions of the commentator and the audience are focused on the ground, with heads down, slight changes of compass direction may be ignored, and the route often is delineated in one general direction.[53]

Tindale was, as usual, writing essentially about the culture of the classical period. Aboriginal people brought up on pastoral holdings, however, tend to draw mud maps that emphasize the key points in the pastoral landscape–bores, fences, homesteads–as much as they do either natural features or sites of spiritual significance.

One man of Aboriginal and Scottish ancestry, Arthur Liddle, provided anthropologist Frederick Rose with a sketch map on paper showing the layout of his cattle station, Angas Downs, in 1962.[54] Although it does show a couple of "native soaks" (water sources) it is primarily concerned with fences, bores, buildings, and major topographic features such as ranges. It has the same north orientation and basically the same visual conventions as the official pastoral map Rose reproduced in the same volume.[55] A paper sketch of this kind may also be referred to in Australian English as a mud map, regardless of its medium. This example reminds us that it is not so much merely the ancestry of the cartographer as the cultural conventions of Aboriginal practice that makes a map, plan, or icon "Aboriginal" in this context.

Superficially rather similar to mud maps are Aboriginal sand drawings. Particularly in desert Australia, it is commonplace for people telling stories, or even simply conversing, to illustrate the events they are discussing by drawing in the sand or dust where they are sitting. The most detailed account of this practice is Munn's examination of the Warlpiri people's "sand stories," a genre most distinctively and richly engaged in by women.[56] Here, as in their paintings, Warlpiri frequently illustrate on a flat plane spatial relationships between mythic, human, or animal actors and particular places in the course of their narratives. In this sense such sand drawings are maplike. They are distinct from the ground paintings of the same region and the sand sculptures of northeast Arnhem Land, particularly in that they are less elaborate and are not typically constructed as an integral part of ceremonies.[57] They are also distinct from mud maps and crayon drawing maps because they focus more on events and their players and on localized topographies than on a broad-based topography and its features and sites. They are also more explicitly episodic, being erased by a sweep of the hand in preparation for subsequent images. They thus have a syntagmatic character that is lacking in other Aboriginal visual representations apart from the sequences of tableaus presented in rituals.

Plans

Desert sand drawings frequently illustrate secular themes

53. Norman B. Tindale, *Aboriginal Tribes of Australia: Their Terrain, Environmental Controls, Distribution, Limits, and Proper Names* (Berkeley: University of California Press, 1974 [revised from 1940]), 38–39.

54. Frederick G. G. Rose, *The Wind of Change in Central Australia: The Aborigines at Angas Downs, 1962* (Berlin: Akadamie-Verlag, 1965), 130.

55. Rose, *Wind of Change,* facing 14.

56. Munn, *Walbiri Iconography,* 58–88 (note 43).

57. On sand sculptures see pp. 357 n.17 and 411–12.

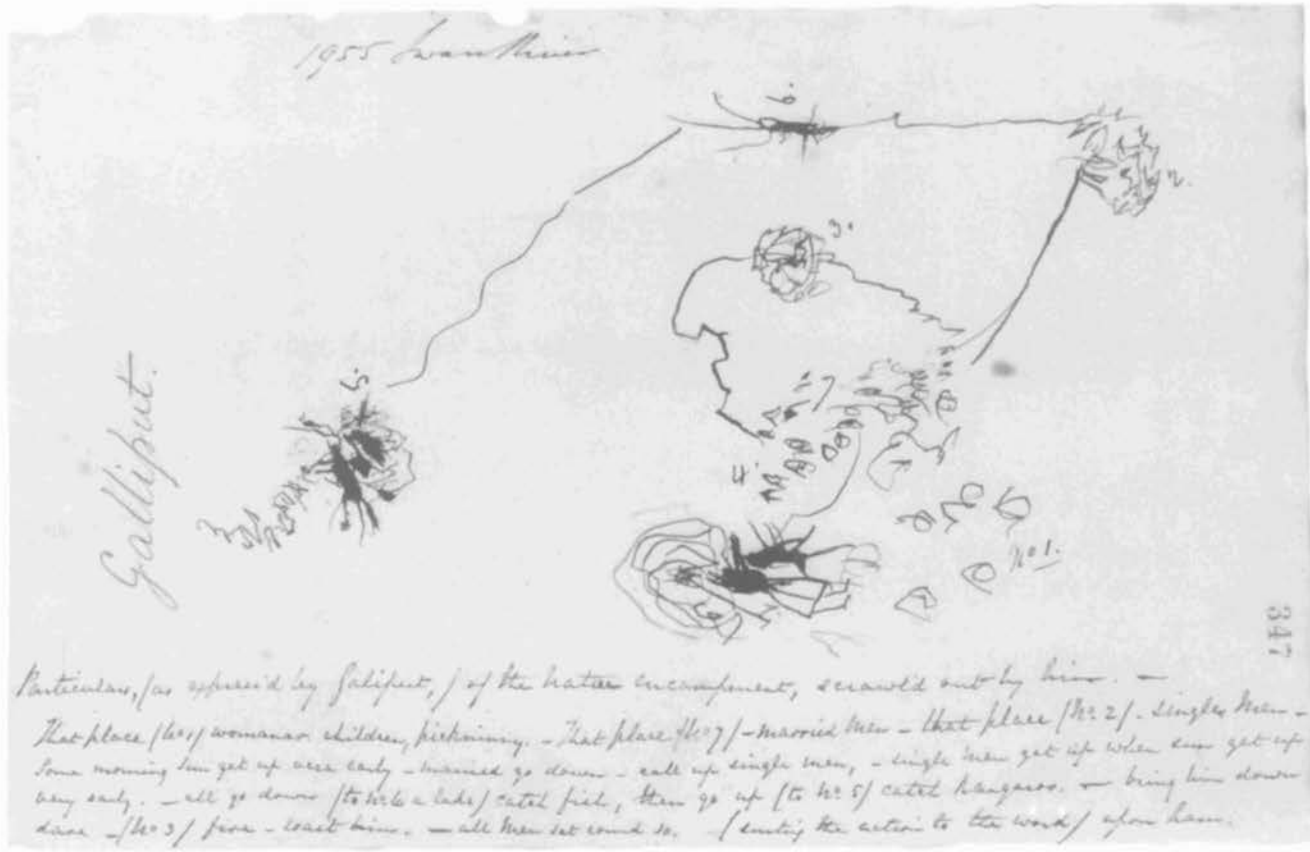


FIG. 10.26. PLAN OF NATIVE ENCAMPMENT. Drawn in quill and ink by Galliput (Galiput, Gyallipert) of King George Sound, dated 28 January/3 February 1833, and attached to a letter from John Morgan to A. W. Hay, Colonial Office, London. Legend (as recorded by J. Morgan of Perth): "Particulars, (as expressed by Galiput) of the Native encampment, scrawl'd out by him. That place (No. 1) womanar [women], children, pickninny [babies]. That place (No. 7)–married men–that place (No. 2) single Men–Some morning sun get up vera [very] early–married go down–call up single men,–single men get up when sun get up very early–all go down (to No. 6 a lake) catch fish, then go up (to No. 5) catch Kangaroo–bring him down dare [there]–(No. 3) fire–roast him–all Men set around so–(suiting the action to the word) upon ham."
Size of the original: 18.5 × 30 cm. Photograph courtesy of the Public Record Office, London (CO 18/13/347).

such as camp layouts during travel stories and the arrangement of people and fires within individual shelters in camps. In that sense they also encompass what I shall call plans. While maps usually have an areal or regional topography as their base, the base of an Aboriginal plan is usually a bush encampment or modern settlement, an individual dwelling, or a vehicle such as a boat.

The oldest surviving Aboriginal plan drawn on paper, in this case with quill and ink, is Galliput's "Map of Native Encampment" from southwest Western Australia, drawn in 1833 (fig. 10.26). Tilbrook tells us that "the artist [of this sketch] Galliput was brought to Perth from King George Sound with another Aboriginal, Manyet, in the *Thistle* in 1833 to promote good relations between the Aborigines of the two places. He had never used a quill and ink before, but sat experimenting as J. Morgan, with whom he was staying, was writing a letter home to England. Morgan was astonished by Galliput's drawing, and praised him and Manyet for their conduct during their visit."[58]

Galliput's is not so much a map of country as a plan of a camp and a couple of nearby resource centers. It is also something like a permanently recorded mud map, a quick sketch rather than a heavily worked, decorated, or infilled formal design, so we can see that a neat distinction between a mud map, a plan, and a map is not always easy.

Another early plan is William Barak's 1898 watercolor painting of Samuel de Pury's vineyard in Victoria, which lies in temperate southeast Australia (fig. 10.27). Here we see a somewhat familiar combination of perspectives: ground features (such as the vineyard) are shown in plan view, while a house, trees, and fences are shown in sec-

58. Lois Tilbrook, *Nyungar Tradition: Glimpses of Aborigines of South-western Australia, 1829–1914* (Nedlands: University of Western Australia Press, 1983), 11.

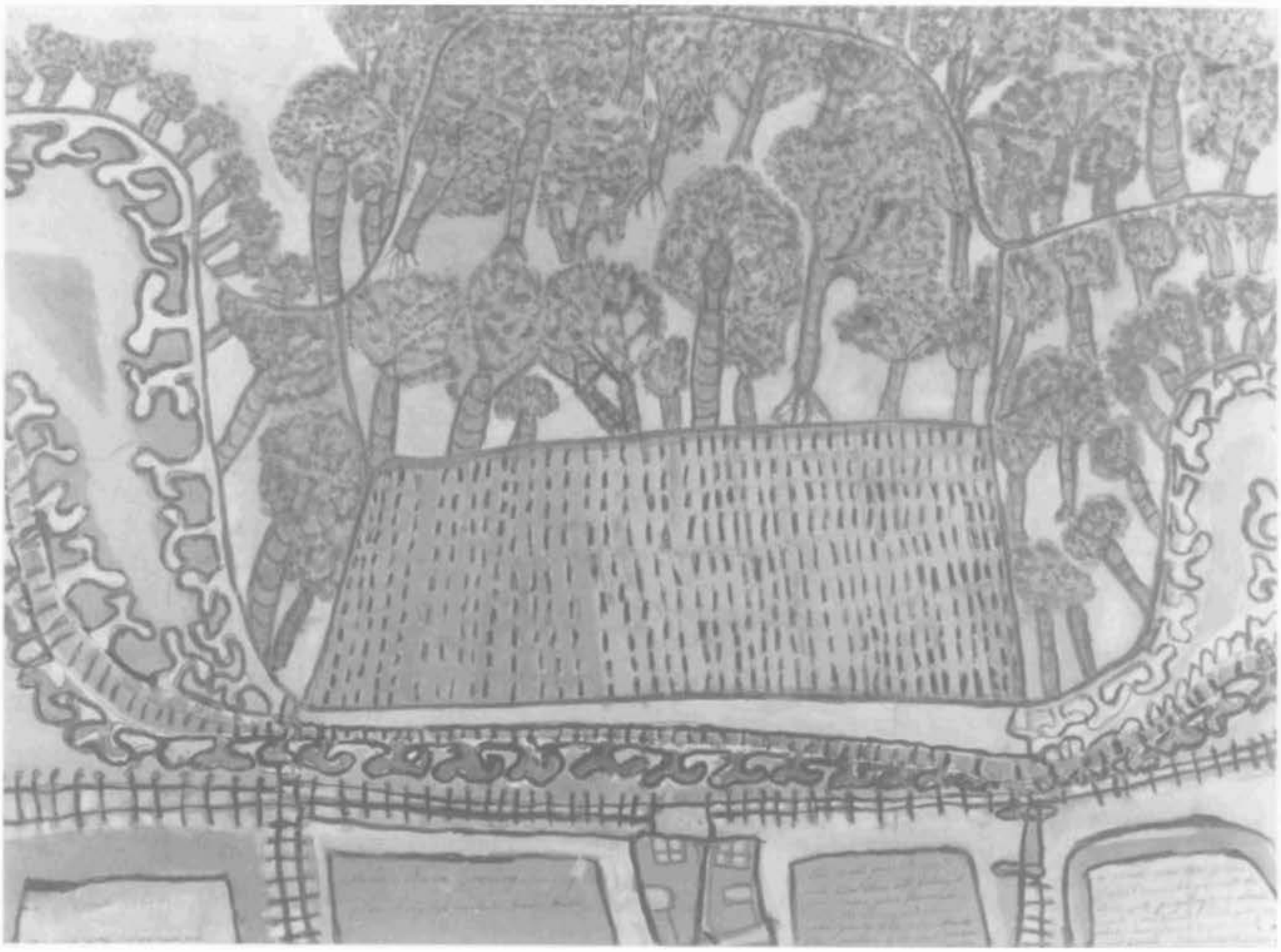


FIG. 10.27. SAMUEL DE PURY'S VINEYARD. Watercolor on paper by William Barak, 1898.
Size of the original: 56 × 75 cm. Photograph courtesy of the Musée d'Ethnographie, Neuchâtel, Switzerland (acc. no. V.1238). Photograph by Alain Germond, Neuchâtel, Switzerland.

tion view. But this is more than just a picture of a vineyard. The Aboriginal geography is also there, as Barak's inscription on the painting indicates. It says in part:

> I send you two picture
> Native Name Gooring Nuring
> The English name is Bald Hill
> this is all your Vineyard[59]

Njien's "Plan of Camp," collected by Ronald Berndt at Ooldea in the desert of southern Central Australia in 1941 (fig. 10.28), sets out in simple fashion some seventy-four shelters or domestic units in the Ooldea camp of the day. In a rather abstracted technique, the plan requires Berndt's notes in order to be unfolded as an account of who was living where in that particular informal settlement.[60]

Wandjuk Marika's layout of Yirrkala Aboriginal village in northeast Arnhem Land (fig. 10.22, above) is a far more formal plan view of a rather different kind of residential community, one with modern institutional housing. Some twenty-three years before he made that plan, Wandjuk, as a young man, together with his father Mawalan, had made many crayon drawings for anthropologist Ronald Berndt, several including plans of residential arrangements such as perpendicular views of stilted house structures, their inhabitants, and their hearths.[61]

Men of this tropical region also provided Berndt with many crayon drawings of ceremonial performances. These show in a stylized way the proxemics of postulants, earth structures, shade huts, pathways, poles, and other features of different ritual events. Berndt published many

59. Andrew Sayers, *Aboriginal Artists of the Nineteenth Century* (Melbourne: Oxford University Press in association with the National Gallery of Australia, 1994), 120.

60. In the Berndt Museum of Anthropology, University of Western Australia, Perth.

61. Illustrated in Ronald Murray Berndt, *Three Faces of Love: Traditional Aboriginal Song-Poetry* (Melbourne: Nelson, 1976), e.g., pls. 2 and 5.

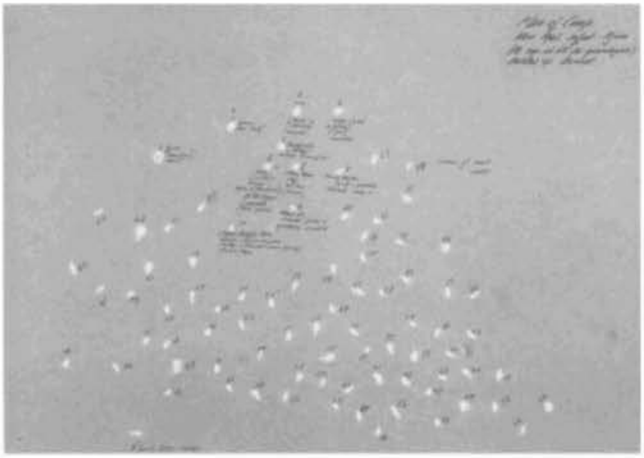


FIG. 10.28. PLAN OF CAMP. Crayon drawing by Njien, Ooldea (southern Central Australia), 1941.
Photograph by J. E. Stanton, courtesy of the Berndt Museum of Anthropology, Perth (P22151).

FIG. 10.29. *CORROBOREE* (CEREMONY). Pencil traces, wash, earth pigments on paper by William Barak, ca. 1898. Dancers are shown in a row across the top.
Size of the original: 56.8 × 80.9 cm. Photograph courtesy of the National Gallery of Victoria, Melbourne (acc. no. 1215B/5).

of them in an era when it was still common practice to place secret-sacred images in print.[62] These kinds of image are not reproduced here, but they fall under the general rubric of plans, not merely of ceremonial grounds but often simultaneously of events as well. In this respect they might be regarded as a type of choreography. A number of nineteenth-century Aboriginal artists who drew and painted on paper, such as William Barak, Tommy McRae, and Mickey of Ulladulla, produced memorable images of ceremonial performances. With few exceptions they show the dancers in a row, in a single plane, across the long axis of the paper (fig. 10.29). These choreographic images share much with plans.

Stone arrangements may also sometimes be classed as plans. The narrative significance of Australia's many Aboriginal stone arrangements is frequently lost in the distant past. Where this significance has been recorded, it generally affirms that the stone arrangements are very like most other Aboriginal traditions of representation: they mark out beings and events in sacred myths that are localized at particular places in the mythic episodes illustrated by the stones.[63] In this sense there is an iconic relation between the stone arrangement and the mythic structure of the "real" landscape. Yet the stone arrangement is itself part of a landscape, and like mythically significant landscape features that non-Aborigines would regard as "natural features," stone arrangements in Aboriginal tradition are most commonly held to have been created not by human beings, but by ancestral Dreaming figures.[64]

By contrast, C. C. Macknight and W. J. Gray have recorded certain stone arrangements at sites in northeast Arnhem Land that were attributed to remembered human ancestors who lived at least a century before their investigation in the late 1960s.[65] Whether these particular stone arrangements originally had religious and performance-oriented purposes, as against primarily secular and explanatory ones, is a matter for speculation. My own guess is that they played a role in ceremonies, like the sand sculptures of Macassan boats that are still constructed in the region.

Aboriginal informants explained to Macknight and Gray that a number of the stone arrangements are the floor plans of Macassan houses, nearby cooking areas, trepang (sea cucumber) processing areas (smokehouses), and so on (fig. 10.30).[66] Others show Macassan praus (trepanging boats), including their sails and rigging and features such as rudders as well as their various internal compartments such as captains' quarters and cabins for the crew, galleys, fireplaces, food stores, and tanks (figs. 10.31 and 10.32). Such images of praus also occur in the

62. See figures in Ronald Murray Berndt, *Kunapipi: A Study of an Australian Aboriginal Religious Cult* (Melbourne: Cheshire, 1951); idem, *Djanggawul: An Aboriginal Religious Cult of North-eastern Arnhem Land* (Melbourne: Cheshire, 1952); and idem, *Australian Aboriginal Religion*, 4 fascs. (Leiden: Brill, 1974).

63. For several examples, see Mountford, *Nomads*, 90–94 (note 14).

64. See, for example, T. D. Campbell and Charles Pearcy Mountford, "Aboriginal Arrangements of Stones in Central Australia," *Transactions of the Royal Society of South Australia* 63 (1939): 17–21.

65. See C. C. Macknight and W. J. Gray, *Aboriginal Stone Pictures in Eastern Arnhem Land* (Canberra: Australian Institute of Aboriginal Studies, 1970).

66. For some centuries before 1907, men from the region of Macassar in the Celebes made annual visits to north Australian shores in their praus to collect, cure, and take home for trade the trepang or sea slug, which is common in tropical Australian shallow waters; see C. C. Macknight, *The Voyage to Marege': Macassan Trepangers in Northern Australia* (Carlton: Melbourne University Press, 1976).

FIG. 10.30. STONE ARRANGEMENT REPRESENTING A MACASSAN HOUSE WITH EIGHT ROOMS AT WURRAWURRAWOI.
Size of the original: ca. 200 × 115 cm. Photograph courtesy of C. C. Macknight.

FIG. 10.31. STONE ARRANGEMENT REPRESENTING A MACASSAN PRAU AT WURRAWURRAWOI.
Size of the original: ca. 800 × 200 cm. Photograph courtesy of C. C. Macknight.

region's traditions of sand sculptures[67] and bark paintings. Typically they show the outer form of the prau in horizontal section and the internal compartments more or less in plan view.[68] The northeast Arnhem Land stone arrangements also include representations of fish traps, which similarly have a parallel in sand sculpture depictions of fish traps in the same region. These are in plan view as well.[69]

It may, of course, be simplistic and ethnocentric of me to use a rather weighted term such as "plan view" or "perpendicular perspective," both here and in my earlier chapter that discusses "icons of country." My intention is to suggest etically a basic visual orientation rather than produce an emic reading of the conventions employed by the makers. I am reminded here of Nancy Munn's discussion of a Warlpiri representation of both the top-branches-outside of a tree and its bottom-roots-inside as two concentrically arranged sets of concentric circles, the former surrounding the latter: "I avoid here such descriptions as 'bird's-eye view,' which imply that the solution is derived from a particular way of looking at the object, or that it shows us the object from a particular perspective. My implication is rather, that the solution derives from the *internal structure* of the representational system, and that we cannot automatically 'read off' from the structure a perspective from which the object is being viewed."[70]

One of the most elaborate Aboriginal plans in existence is a crayon drawing of the port of Macassar, on the island of Celebes in Indonesia, by Munggeraui (Munggurrawuy), collected by Ronald Berndt at Yirrkala in 1947 (plate 22). The artist in this case had never visited Macassar but drew the image from knowledge gained from his

67. Macknight and Gray, *Aboriginal Stone Pictures,* 35 (note 65).

68. See, for example, Mawalan Marika's crayon drawing of a Macassan prau made about 1947, published in Ronald Murray Berndt and Catherine Helen Berndt, *Arnhem Land: Its History and Its People* (Melbourne: F. W. Cheshire, 1954), pl. 12a, and his very similar bark painting of a Macassan prau from 1964, published in Judith Ryan, *Spirit in Land: Bark Paintings from Arnhem Land in the National Gallery of Victoria* (Melbourne: National Gallery of Victoria, [1990]), 6.

69. See Margaret Clunies Ross and L. R. Hiatt, "Sand Sculptures at a Gidjingali Burial Rite," in *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe,* ed. Peter J. Ucko (Canberra: Australian Institute of Aboriginal Studies, 1977), 131–46, esp. 136.

70. Munn, "Spatial Presentation," 219 n. 24 (note 43).

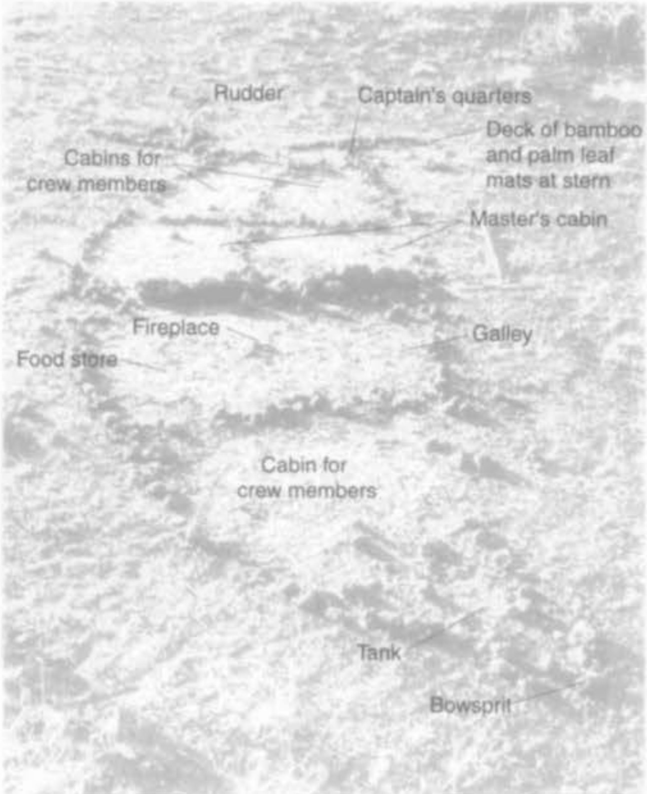


FIG. 10.32. IDENTIFICATION OF PARTS OF MACASSAN PRAU (FIG. 10.31).
After C. C. Macknight and W. J. Gray, *Aboriginal Stone Pictures in Eastern Arnhem Land* (Canberra: Australian Institute of Aboriginal Studies, 1970), fig. 5.

father. It depicts the waterways, jetties, houses, and factory of the port. One house contains Aboriginal men brought back to Celebes after Macassan trepanging visits to Australia.[71] Another house contains what Munggeraui referred to as "white crookmen," European thieves who "steal from Macassans, [and] later sneak to shoot them." Many of the houses bear the personal names of Macassan boat captains added after inquiries by Berndt.[72]

A related image is a 1947 crayon drawing by Mawalan Marika (Mauwalan), also in the Berndt Collection and from the same place and time, which shows the former Macassan settlement at Port Bradshaw in northeast Arnhem Land, with bays and promontories, many praus lying at anchor, and seasonal settlement features on the land (fig. 10.33).[73] What these two drawings illustrate is that, although elements of the regional bark painting style are present in both, such images are set apart from typical clan paintings by the distinctive recombinant templates and cross-hatching styles of the latter.[74] For this reason I regard them not as icons but, broadly speaking, as secular localized maps or plans. The Port Bradshaw image might be regarded equally as a map and as a plan, since it uses a topographic base of a very focused kind and adds to it a number of settlement features.

The Port Bradshaw image is complex. On the island in the center (Wapilina) are shown a Macassan house, Macassan pots, Bayini paddles, a trepang design in ashes, and several tamarind trees, all elements associated with non-Aboriginal influences and importations. Many other features in the image refer to autochthonous mythic themes, but largely without employing the classical iconography of the area. The many bays and promontories marked by Berndt's numbers include many Dreaming-related sites but are shown almost entirely simply as topographic features. This is a radical departure from classical practice.

Aboriginal Maps: Politics and the Law

It is not only sacred designs of the kind discussed in chapter 9 above that evoke Aboriginal passions about images of country. In the 1990s, when the land rights struggle has for two decades been at the center of Aboriginal national and regional politics, Aboriginal maps of a mainly secular kind may be highly charged with feeling. Maps such as those of the Nicholson River Land Claim arise in a complex political environment where contested claims to land exist not only between Aboriginal groups but between them and the state, private industry, and other interests.[75] Documents of all kinds suddenly have a credibility and value not previously imputed to them in Aboriginal discourses. From being merely "white man's way," they have become potentially powerful Aboriginal tokens in transactions involving their own land interests. It is true that this necessity has essentially been imposed from outside. That is, until the arrival of the state, Aborigines had no use for "maps" of the kind I have been describing in this chapter.

Neither did they have a geographical knowledge of the Australian continent as a whole or an explicit continent-wide political identity as a people. Both situations have changed. David Mowaljarlai, an elder of the Kimberley District of Western Australia, has recently produced a map titled "The Body of Australia" (fig. 10.34).[76]

71. These visits were carried out over several centuries until the Australian government brought them to an end in 1907 (Macknight, *Voyage to Marege'* [note 66]).

72. Documentation by Ronald Murray Berndt. A detail of this large and crowded image was reproduced in Berndt and Berndt, *Arnhem Land,* pl. 7 (note 68).

73. Reproduced in Berndt and Berndt, *Arnhem Land,* pl. 2.

74. See Morphy, *Ancestral Connections* (note 5).

75. See also Sutton, forthcoming in the *Oxford Companion to Aboriginal Art and Culture,* on the maps by Bob Holroyd (note 12).

76. David Mowaljarlai and Jutta Malnic, *Yorro Yorro: Everything Standing up Alive: Spirit of the Kimberley* (Broome, Western Australia: Magabala Books, 1993), 205.

FIG. 10.33. MAP OF YALANGBARA BY MAWALAN MARIKA [MAUWALAN]. Northeast Arnhem Land, 1947, crayon drawing. On this complex image, the erstwhile Macassan settlement of Port Bradshaw, Ronald Berndt annotated ninety-four features of the plan. (The details are contained in his field notebook at the Berndt Museum of Anthropology, University of Western Australia.) The image combines a static topographic matrix with indications of movement, both through space and through time. For example, the tracks of those who once moved through the area after arriving from across the sea are shown, as is Fred Gray, a European trepanger who worked in the area in the 1930s. Also depicted are the mythological Djan'kawu Sisters, whose travels occurred in the foundational era or *wangarr* times, the track of the Bayini, light-skinned visitors said to have traveled here before the Macassans started to come to north Australia, and the Macassans themselves.
Size of the original: 61 × 153.5 cm. Photograph by J. E. Stanton, courtesy of the Berndt Museum of Anthropology, Perth (WU7153). © Copyright courtesy Anthony Wallis, Aboriginal Artists Agency, Sydney.

Mowaljarlai's map is highly idiosyncratic and probably unique to his own perception of things. It is highly innovative, yet it is more than a simple case of absorption of non-Aboriginal knowledge. It offers a cartographic statement of the spiritual and kin-based foundations of a pan-Aboriginality that has emerged as a serious political force in Australia, in spite of the smallness of the Aboriginal population. This development is a direct response to the relative powerlessness of Aboriginal people when coming from a stateless traditional background to meet and deal with a highly organized wider society based on the nation-state.

This is not, however, to argue that such a response to an imbalance of power is entirely new. Within the classical Aboriginal religious systems, the creation of religious icons of landscape itself was also characterized by asymmetries of power. Europeans are not alone in characterizing annexations as "redrawing the map." The political control of land and religious control of sacred designs or other symbols were, as far as we can tell, typically inseparable in indigenous Australia so long as ancient traditions persisted.

So acts both of representation and of control are intimately related cartographically, both in the classical Aboriginal systems and in those of the people who colonized and continue to dominate most of their lands. It is clear, however, that these deep resemblances pale in significance when placed next to the major contemporary imbalances within the Australian polity. Aborigines can be required, by courts, to present evidence about their country via an anthropologist's maps. The court, by contrast, cannot be required to treat a ceremony and its sand painting as a "better" account of the landscape and thus choose "icons" over "maps." Or can it?

New native title laws,[77] still largely untested, could be interpreted as requiring that Aboriginal customary rules of evidence be given precedence over those derived from the European tradition. If such is found in a test case, this would be the first official act turning back the tide that has been flowing against classical Aboriginal icons of country, denying their validity and power and ultimately eliciting in their stead the Aboriginal maps typified by those discussed in this chapter, in a struggle over a represented landscape that began with the first Dutch charts of 1606, when Willem Jansz sailed the *Duifken* down the coast of western Cape York Peninsula.

77. Native Title Act of the Commonwealth Parliament of Australia, 1993.

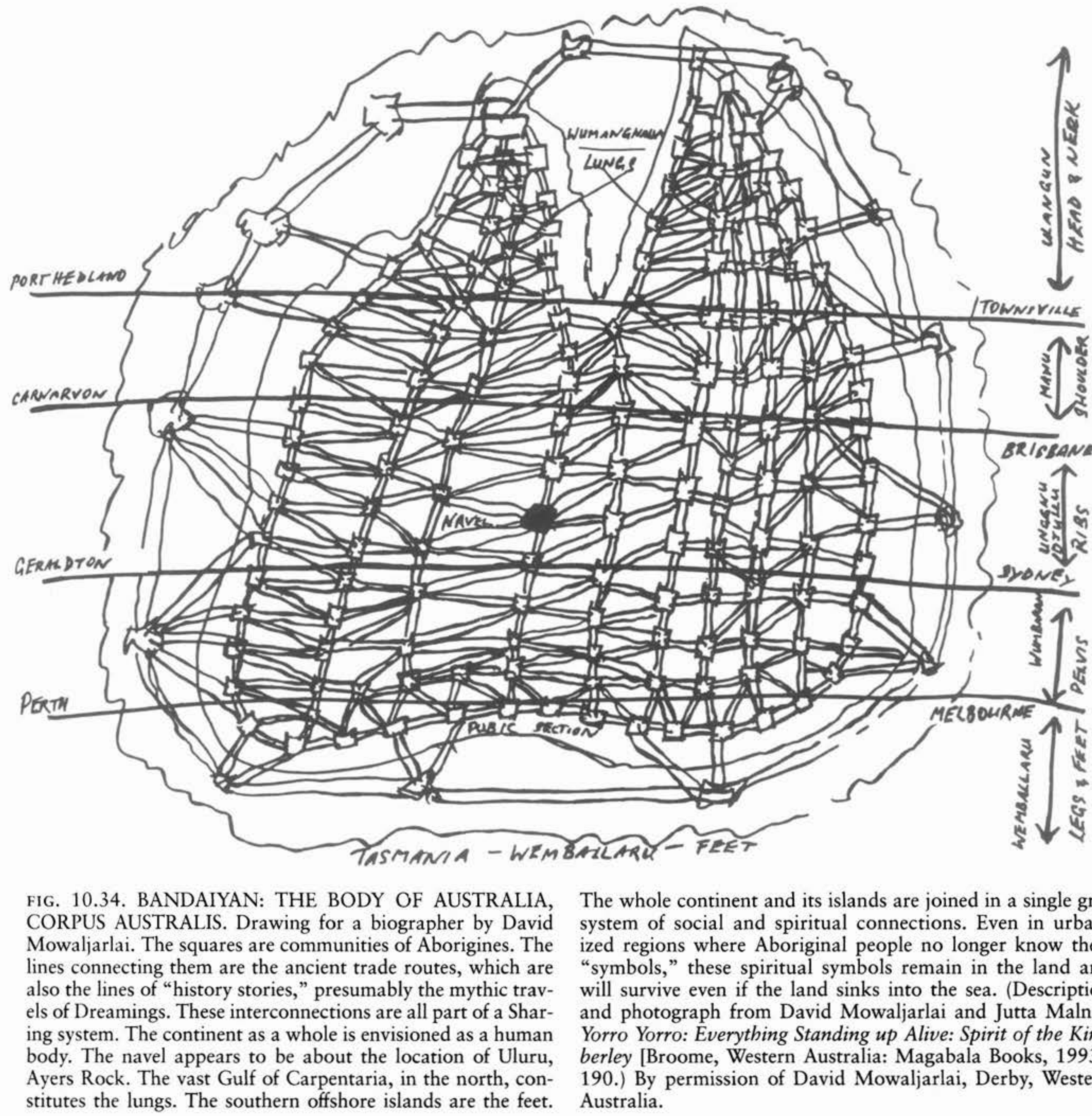


FIG. 10.34. BANDAIYAN: THE BODY OF AUSTRALIA, CORPUS AUSTRALIS. Drawing for a biographer by David Mowaljarlai. The squares are communities of Aborigines. The lines connecting them are the ancient trade routes, which are also the lines of "history stories," presumably the mythic travels of Dreamings. These interconnections are all part of a Sharing system. The continent as a whole is envisioned as a human body. The navel appears to be about the location of Uluru, Ayers Rock. The vast Gulf of Carpentaria, in the north, constitutes the lungs. The southern offshore islands are the feet. The whole continent and its islands are joined in a single grid system of social and spiritual connections. Even in urbanized regions where Aboriginal people no longer know their "symbols," these spiritual symbols remain in the land and will survive even if the land sinks into the sea. (Description and photograph from David Mowaljarlai and Jutta Malnic, *Yorro Yorro: Everything Standing up Alive: Spirit of the Kimberley* [Broome, Western Australia: Magabala Books, 1993], 190.) By permission of David Mowaljarlai, Derby, Western Australia.

APPENDIX 10.1
SOUTH AUSTRALIAN MUSEUM CRAYON DRAWINGS COLLECTION

I have assigned numbers to these bound volumes to make it easy to refer to particular items. Within each volume, individual drawings are on sheets of paper, usually brown paper, and bear a number that is part of a running series for a particular expedition only. Some sheets also have a unique South Australian Museum accession number commencing A-.

Titles assigned to these volumes by museum staff are reproduced here; my additions are in square brackets.

SAM 1: Aboriginal Drawings Gathered in Central, Southern, and Western Australia by Norman B. Tindale, Vol 1 1930–1933.

SAM 2: Aboriginal Drawings Gathered in Central, South, and Western Australia by Norman B. Tindale, Vol 2 1934–1939. [Also contains drawings collected at Macdonald Downs 1930 (some of these collected by Dr. R. Pulleine as well); at Cockatoo Creek in 1931; at Mount Liebig in 1932; and at Ooldea in 1934.]

SAM 3: Aboriginal Drawings from the Pitjandjara People of the Mann and Musgrave Ranges, NW of S.A. [Gathered] by Norman B. Tindale, Vol 1 May–August 1933.

SAM 4: Aboriginal Drawings from the Pitjandjara People of the Mann and Musgrave Ranges, NW of S.A. [Gathered] by Norman B. Tindale, Vol 2 May–August 1933 (also the same from Ooldea 1934).

SAM 5–7: Aboriginal Crayon Drawings of the Ngadadjara and Kindred Tribes. Collected by Norman B. Tindale and C. P. Mountford during the Board for Anthropological Research Expedition to Warupuju, Warburton Range, Western Australia, 26th July–6th September 1935, Expedition K. 3 Volumes.

SAM 8–9: Aboriginal Drawings from North-western Australia Obtained during the U.C.L.A. Anthropological Expedition by Norman B. Tindale 1953. 2 Parts.

SAM 10: Native Maps from North Western Australia Obtained during the U.C.L.A. Anthropological Expedition by Norman B. Tindale 1953–1954. [Includes maps collected and annotated by Dr. J. B. Birdsell.]

Traditional Cartography in the Pacific Basin

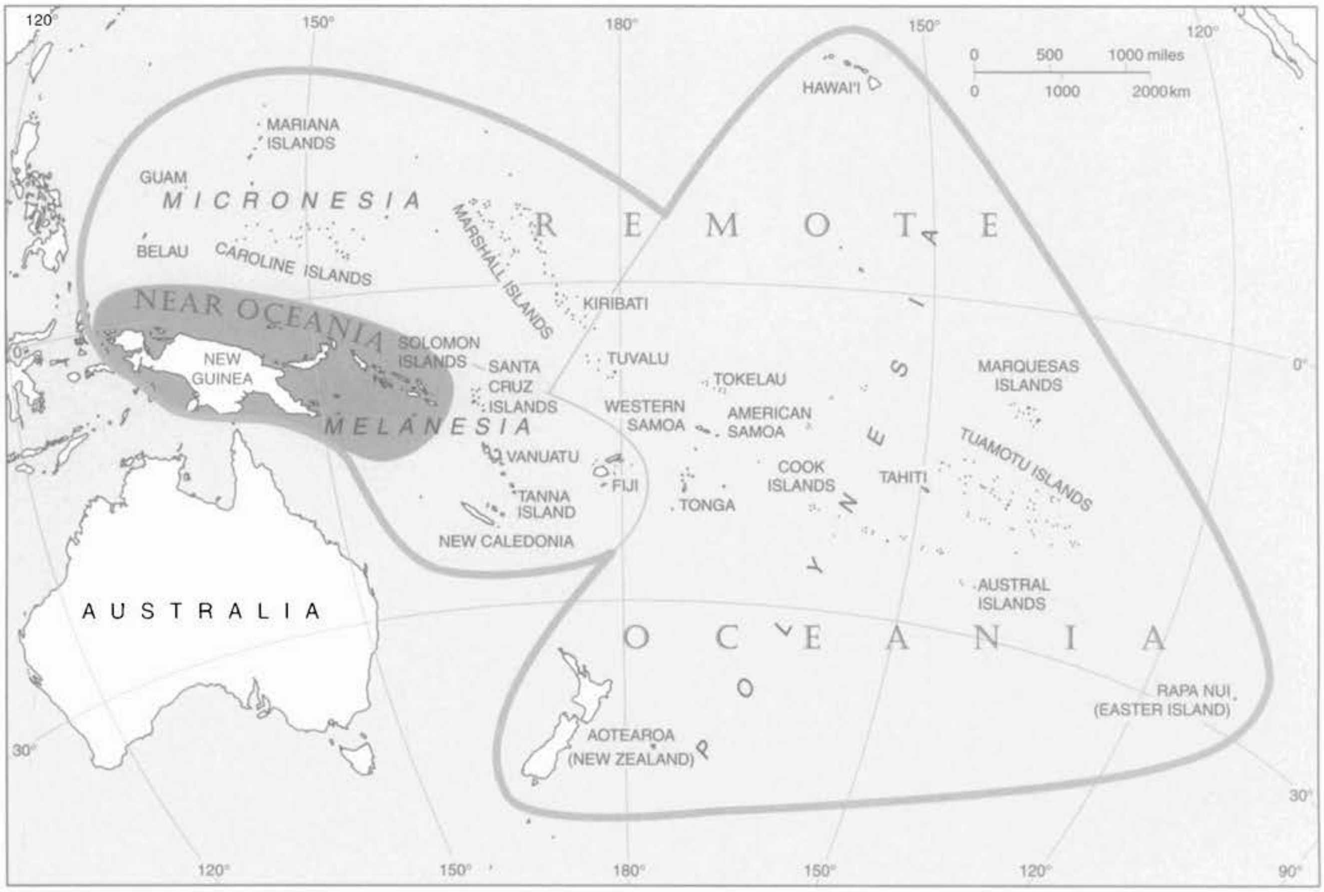


FIG. 11.1. OCEANIA, SHOWING GEOGRAPHIC DIVISIONS OF MELANESIA, MICRONESIA, AND POLYNESIA AND OF NEAR OCEANIA AND REMOTE OCEANIA. Since the 1830s the Pacific islands have been conventionally divided into the three regions of Melanesia, Micronesia, and Polynesia. Largely because this classification ignores cultural boundaries and complexities stemming from the Pacific's long settlement history, prehistorians have recently proposed that the islands be grouped into just two regions: Near Oceania, composed of New Guinea and adjacent islands, which was first settled some fifty thousand years ago during the Late Pleistocene, when New Guinea was part of a Greater Australia; and Remote Oceania for all the islands farther out to sea, which did not begin to be settled until about 2000 to 1500 B.C.

After Ben R. Finney, "Colonizing an Island World," in *Prehistoric Settlement of the Pacific*, ed. Ward Hunt Goodenough (Philadelphia: American Philosophical Society, 1996), 71–116, esp. 72.

11 • The Pacific Basin: An Introduction

Ben Finney

Oceania, the Pacific Island world, is conventionally divided into three regions. Melanesia, originally named for the dark skin color of many of its people, comprises massive New Guinea and the islands extending eastward as far as Fiji. Micronesia is composed of comparatively tiny islands east of the Philippines and north of Melanesia. Polynesia, a multitude of islands large and small, is contained in a vast triangle bounded by Hawai'i on the north, Easter Island (now called Rapa Nui by its Polynesian inhabitants) to the southeast, and New Zealand (now called Aotearoa by its Polynesian inhabitants) to the southwest (fig. 11.1). This tripartite division was first suggested in the early 1830s by the French explorer Dumont d'Urville.[1]

A way to conceptualize the Pacific Island world that makes more sense in terms of migration history and the distribution of seafaring skills is to divide it between Near Oceania and Remote Oceania, a distinction developed by the archaeologist Roger Green.[2] Near Oceania comprises the islands most accessible from Southeast Asia: New Guinea and its immediate outliers. The settlement of this region began perhaps as early as fifty thousand to sixty thousand years ago. At that time the great amount of water locked in the world's glaciers so lowered sea levels that the Southeast Asian mainland extended as far east as Bali, and Tasmania, Australia, New Guinea, and adjacent continental shelves were joined to form a Greater Australia. The consequent narrowed gap between this continental extension of Southeast Asia and Greater Australia, along with the existence of intervisible or nearly intervisible island stepping-stones strewn across this gap, made it feasible for precocious seafarers with perhaps nothing more than rudimentary rafts or dugout canoes to reach the uninhabited landmass to the east. Over the millennia that followed, however, their descendants do not seem to have pushed much farther into the Pacific than the Bismarck Archipelago and Solomon Islands, situated, respectively, immediately to the northeast and east of New Guinea.[3] The settlement of the far-flung islands of Remote Oceania did not really get under way until the second millennium B.C. when people started moving eastward into the Pacific using deep-sea voyaging canoes, ways of navigating far out of sight of land, and a portable system of agriculture that could be transplanted to the oceanic islands. The immediate sources of this movement were almost certainly the Southeast Asian islands of what are now the Philippine and Indonesian nations. By at least 1500 B.C. seafarers, who can be traced from their distinctive pottery called Lapita, had reached the islands of the Bismarck Archipelago off the northeast coast of New Guinea. Within a few centuries they had moved eastward through Melanesian waters beyond the previous frontier of settlement, all the way to the islands of Fiji, Tonga, and Samoa at the western edge of Polynesia. Although some archaeologists believe these seafarers kept moving eastward at the same rapid pace, or even faster, the archaeological and linguistic evidence suggests they may have lingered in this triarchipelago region long enough (five hundred to one thousand years?) for ancestral Polynesian culture and language to emerge from its roots in Lapita culture.[4]

From this region, which is now known as West Poly-

1. In an address before the Geographic Society of Paris and published in Jules Sébastien César Dumont d'Urville, *Voyage de la corvette "l'Astrolabe" . . . pendant les années 1826–1827–1828–1829,* 5 vols. (Paris: J. Tastu, 1830–33), 2:614–16. For a generally useful summary of the peopling of the Pacific, see O. H. K. Spate, *Paradise Found and Lost* (London: Routledge, 1988), 1–30.

2. Roger C. Green, "Near and Remote Oceania–Disestablishing 'Melanesia' in Culture History," in *Man and a Half: Essays in Pacific Anthropology and Ethnobiology in Honour of Ralph Bulmer,* ed. Andrew Pawley (Auckland: Polynesian Society, 1991), 491–502.

3. Jim Allen, Jack Golson, and Rhys Jones, eds., *Sunda and Sahul: Prehistoric Studies in Southeast Asia, Melanesia and Australia* (London: Academic Press, 1977); Jim Allen, Chris Gosden, and J. Peter White, "Human Pleistocene Adaptations in the Tropical Island Pacific: Recent Evidence from New Ireland, a Greater Australian Outlier," *Antiquity* 63 (1989): 548–61; and Jim Allen, "The Pre-Austronesian Settlement of Island Melanesia: Implications for Lapita Archaeology," in *Prehistoric Settlement of the Pacific,* ed. Ward Hunt Goodenough (Philadelphia: American Philosophical Society, 1996), 11–27.

4. Peter S. Bellwood, "The Colonization of the Pacific: Some Current Hypotheses," in *The Colonization of the Pacific: A Genetic Trail,* ed. Adrian V. S. Hill and Susan W. Serjeantson (Oxford: Clarendon Press, 1989), 1–59; Patrick V. Kirch, "Lapita and Its Aftermath: The Austronesian Settlement of Oceania," in *Prehistoric Settlement of the Pacific,* ed. Ward Hunt Goodenough (Philadelphia: American Philosophical Society, 1996), 57–70; and Geoffrey Irwin, "How Lapita Lost Its Pots: The Question of Continuity in the Colonisation of Polynesia," *Journal of the Polynesian Society* 90 (1981): 481–94.

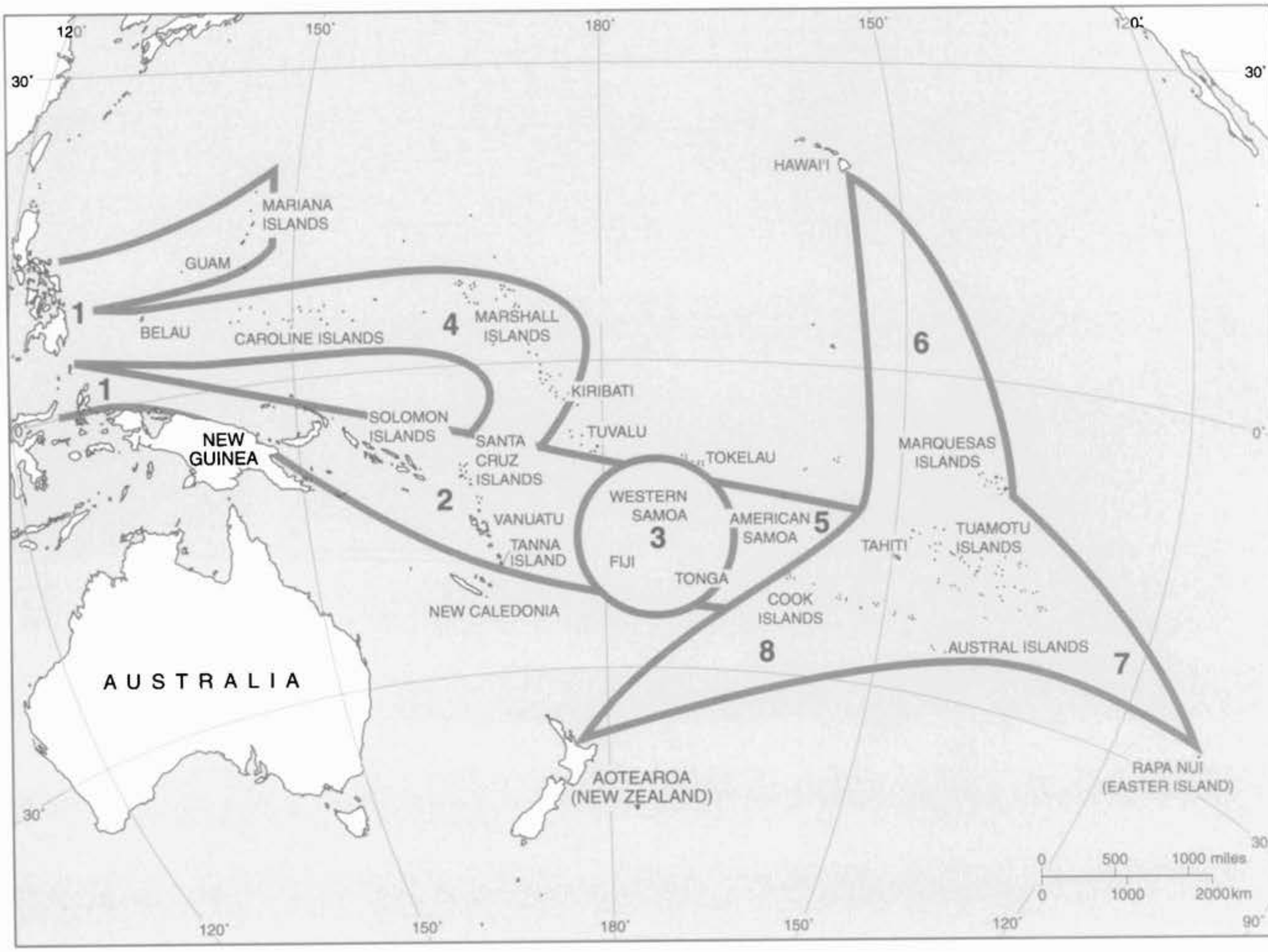


FIG. 11.2. MAIN MIGRATION SEQUENCE OF THE SETTLEMENT OF REMOTE OCEANIA. Estimated dates for each move are: (1) 2000 to 1500 B.C., Austronesians first venture into the Pacific, moving along the north coast and offshore islands of New Guinea, and to Belau (Palau), Yap (Uap), and the Marianas at the western edge of Micronesia; (2) 1500 to 1000 B.C., Austronesians move from the Bismarck Archipelago off the northeast coast of New Guinea to the archipelagoes of Fiji, Tonga, and Samoa at the western edge of Polynesia; (3) 1000 B.C., ancestral Polynesian culture begins to take form in eastern Fiji, Tonga, and Samoa; (4) 1000 B.C., Austronesians move north from eastern Melanesia to colonize the Kiribati (Gilbert Islands), Marshalls, and eastern and central Carolines of Micronesia; (5) 500 B.C.–0, Polynesians begin the colonization of central East Polynesia; (6) A.D. 200 to 750, Polynesians reach Hawai'i; (7) A.D. 400 to 800, Polynesians reach Easter Island; (8) A.D. 800 to 1200, Polynesians reach New Zealand.
After Ben R. Finney, "Colonizing an Island World," in *Prehistoric Settlement of the Pacific*, ed. Ward Hunt Goodenough (Philadelphia: American Philosophical Society, 1996), 71–116, esp. 76.

nesia, the main archipelagoes to the east–the Cook, Society, and Marquesas groups–were settled beginning perhaps as early as 500 B.C.–0. From these central East Polynesian outposts, canoes reached the more peripheral islands, including those that define the Polynesian triangle: Hawai'i, Rapa Nui (Easter Island), and Aotearoa (New Zealand). As in the previous stages of this movement eastward across the Pacific, estimates for the settlement dates of these islands are disputed. Some writers focus on the earliest possible signs indicating human disturbance of pristine island ecosystems, and others judge that colonization has occurred only when there is more widespread and certain evidence of human settlement in the form of habitation sites and shaped artifacts. Accordingly, the estimates for settlement of Hawai'i range from about A.D. 200 to 750; for Rapa Nui, A.D. 400 to 800; and for Aotearoa, A.D. 800 to 1200 (fig. 11.2).[5]

Archaeological and linguistic evidence suggests that Micronesia was colonized in two broad movements. About 1500 to 1000 B.C., seafarers apparently sailed di-

5. Matthew Spriggs and Atholl Anderson, "Late Colonization of East Polynesia," *Antiquity* 67 (1993): 200–217; Patrick V. Kirch and Joanna Ellison, "Palaeoenvironmental Evidence for Human Colonization of Remote Oceanic Islands," *Antiquity* 68 (1994): 310–21; and Atholl Anderson, "Current Approaches in East Polynesian Colonisation Research," *Journal of the Polynesian Society* 104 (1995): 110–32.

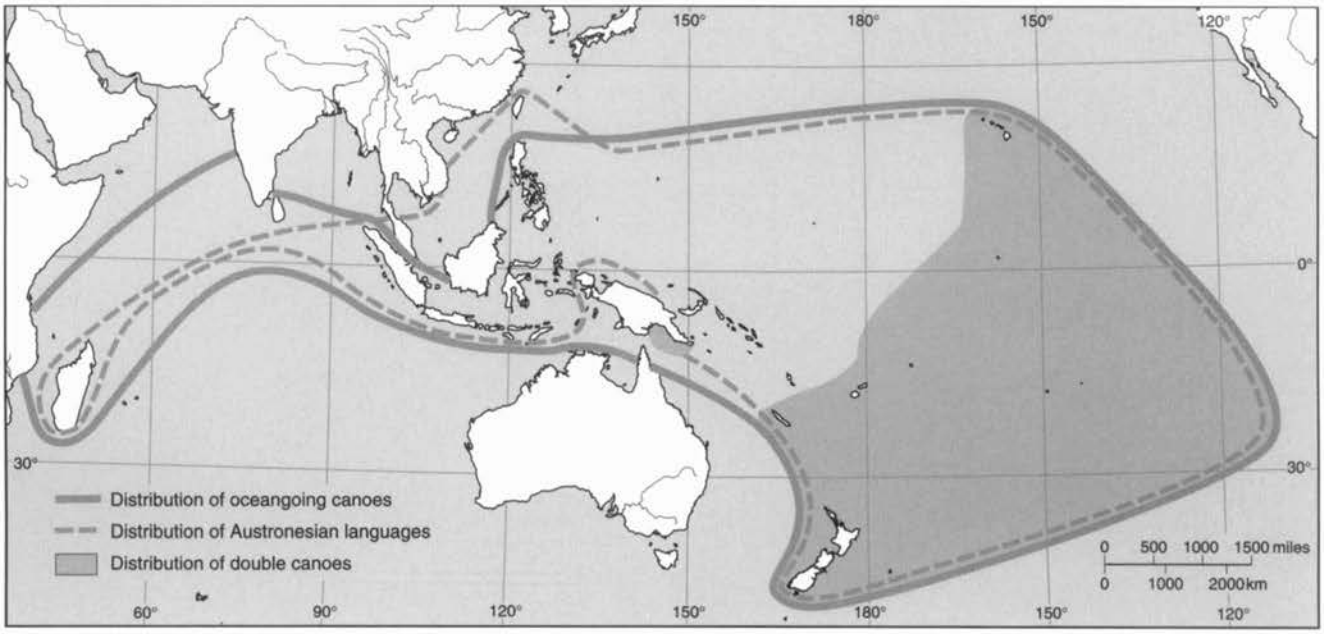


FIG. 11.3. OCEANIC EXPANSION OF THE AUSTRONESIANS. This map shows the distribution of Austronesian languages and oceangoing canoes over two oceans. The development of outrigger and double canoes and ways of sailing them far out to sea enabled Austronesians to spread along the shores of Southeast Asia and to the region's many islands. From Southeast Asia, Austronesians expanded far into the Pacific to find and occupy the islands of Remote Oceania. They also sailed into the Indian Ocean, where they apparently traded with the populations along the shores of South Asia and eastern Africa and then settled the island of Madagascar, where Austronesian languages are still spoken. The presence of outrigger sailing canoes along the coast of southern India, Sri Lanka, and eastern Africa probably bears witness to the visits of Austronesian traders who introduced their craft (but not their languages) to these long-settled areas.
After Ben R. Finney, *Voyage of Rediscovery: A Cultural Odyssey through Polynesia* (Berkeley: University of California Press, 1994), 16.

rectly east from the Philippines to the Mariana Islands, Belau (Palau), and perhaps Yap (Uap), all of which are along the western edge of Micronesia. Then, some centuries later, canoes sailed north from eastern Melanesia to Kiribati (Gilbert Islands) and the Marshall Islands at the eastern end of Micronesia. Some of these pioneers, or their descendants, then turned west to settle the Caroline Islands as far as the already occupied islands of Yap and Belau, thus completing the colonization of this part of the Pacific.[6]

The colonization of Remote Oceania was part of the oceanic expansion of peoples speaking Austronesian languages. A number of linguists and archaeologists trace this expansion from the shores of southern China, whence Austronesian speakers moved first to Taiwan, then south to the Philippines, Indonesia, and the shores of Vietnam and the Malay Peninsula.[7] Those Austronesian pioneers who sailed east to explore and colonize the Pacific did so in canoes made stable by adding an outrigger float to one side of a long, narrow hull to make a single outrigger canoe, or by lashing two such hulls side by side to make a double canoe. Early in the Christian era, other Austronesian voyagers from western Indonesia, probably employing double outrigger canoes stabilized by placing outrigger floats on both sides of a single hull, sailed around the northern periphery of the Indian Ocean (or less probably straight across it) to colonize the then uninhabited island of Madagascar, where the national language, Malagasy, still attests to the Austronesian roots of this migration. This canoe-borne expansion across two oceans made Austronesian the most widespread language family in the world until Western Europeans developed their own seafaring technology and spread Indo-European tongues beyond Eurasia (fig. 11.3).[8]

Three chapters in this volume covering the Pacific Basin recognize elements in both these systems of division. Near Oceania, which comprises the islands most accessible

6. Robert Blust, "The Austronesian Homeland: A Linguistic Perspective," *Asian Perspectives* 26, no. 1 (1984–85): 45–67, and John L. Craib, "Micronesian Prehistory: An Archeological Overview," *Science* 219 (1983): 922–27.

7. Blust, "Austronesian Homeland," and Kwang-chih Chang and Ward Hunt Goodenough, "Archaeology of Southeastern Coastal China and Its Bearing on the Austronesian Homeland," in *Prehistoric Settlement of the Pacific*, ed. Ward Hunt Goodenough (Philadelphia: American Philosophical Society, 1996), 36–56.

8. Ben R. Finney, *Voyage of Rediscovery: A Cultural Odyssey through Polynesia* (Berkeley: University of California Press, 1994), 15–17.

from Southeast Asia–New Guinea and its immediate outliers–is addressed by Eric Kline Silverman in chapter 12, which for the most part concerns Papuan or non-Austronesian societies. Chapter 13 by Ben Finney, on Pacific navigation, covers Remote Oceania, comprising parts of Micronesia, the eastern part of Melanesia, and Polynesia. New Zealand, although normally regarded as part of Polynesia, is treated here in a separate chapter by Phillip Lionel Barton (chapter 14).

12 • Traditional Cartography in Papua New Guinea

Eric Kline Silverman

Social Life, Cosmology, and Politics in Melanesia

The cultural diversity of Melanesia in the southwestern Pacific Ocean is astounding. Regional generalizations are bound to falter: some sociocultural exception to any posited rule will almost assuredly exist. Nevertheless, it is possible at least to sketch some common, nearly pan-Melanesian social and cultural parameters. Since all indigenous representations of space in Melanesia are the product or the reflection of social life, this brief discussion will provide a necessary context for understanding the social generation of local modes of cartography.

The peoples of the first migration from Southeast Asia spread into New Guinea, the larger islands off New Guinea, and Australia, which at that time were connected by a land bridge (fig. 12.1). Despite this common immigrant ancestry, enormous linguistic variation has arisen in the intervening millennia. New Guinea alone contains 750 separate Papuan (or non-Austronesian) languages, making it the most linguistically–and culturally–complex region in the world. The peoples of the second migration of speakers of Austronesian languages into the southwestern Pacific settled in pockets along the coastal areas of New Guinea and then spread eastward, slowly inhabiting Micronesia and Polynesia.

Genetically and linguistically, therefore, the societies of New Guinea and Melanesia have links to Australia, the rest of the Pacific Islands, and Southeast Asia. However, any cultural similarities with Southeast Asia and to a lesser extent Aboriginal Australia have long since disappeared. Cultural affinities with the other Pacific Islands exist–such as seafaring technology and culture and the presence of hereditary chiefs–but only for the coastal pockets of Austronesian language groups in Melanesia. For the most part, this chapter concerns Papuan or non-Austronesian societies. After a general introduction to social life in Melanesia, I ask the question: Are there maps in these oral societies? Then I discuss different "maps" and "mapping" techniques in the region.

Melanesian societies are traditional or prestate in terms of demography, technology, and the ability to harness energy. They are the product not of written contracts but rather of social conventions such as gift exchanges that enable people to continually forge and negotiate relationships and alliances. Gift exchange, first studied by Marcel Mauss, is the basis for the constitution of traditional or prestate societies in particular.[1] Guided by the principle of reciprocity, gift exchange refers to the moral obligation to give, to receive, and to give back various objects such as food, tobacco, and valuables as well as labor and services. As a result, people are enmeshed in a web of obligations whereby they are constantly giving and receiving, thus holding the society together. All societies in Melanesia are at some level a group of people who speak a common language, share the same culture, and form a moral community united by gift exchange.

However, there are other foundations of societies in Melanesia, and although these vary greatly, they can be grouped along the lines of several conventions. Descent and kinship are perhaps the most common principles for determining membership in social groups. Here relationships are defined by connections to ancestors and by connections extended through siblings and other more distant relatives. Many of these groups, typically lineages and clans, trace their genealogy to totemic ancestors who engaged in cosmic creation.[2] These are what Simon Harrison calls "magical" societies.[3] Society and its constituent social groupings are locally understood to rest on inherent cosmological divisions that partition the world into discrete categories. Each category of the world was created by a totemic ancestor. For example, the ancestor

1. Marcel Mauss, *The Gift: The Form and Reason for Exchange in Archaic Societies,* trans. W. D. Halls (New York: W. W. Norton, 1990); original French edition, *Essai sur le don,* 1925.

2. A lineage is a group of people who know their precise genealogical relationship to a common ancestor. A clan is a group of people who posit a genealogical relationship to a common ancestor but do not know the precise links. A clan is typically composed of different lineages. A totem is a nonhuman ancestor who formed a social group–usually a lineage or clan. Totems in Melanesia are commonly plants, animals, spirits, and humanlike heroes who have superhuman powers. The members of a group often have a special religious relationship to their totem; for example, they are prohibited from eating that species of plant or animal or consider items decorated with designs of the totem to be sacred.

3. Simon Harrison, "Magical and Material Polities in Melanesia," *Man,* n.s. 24 (1989): 1–20.

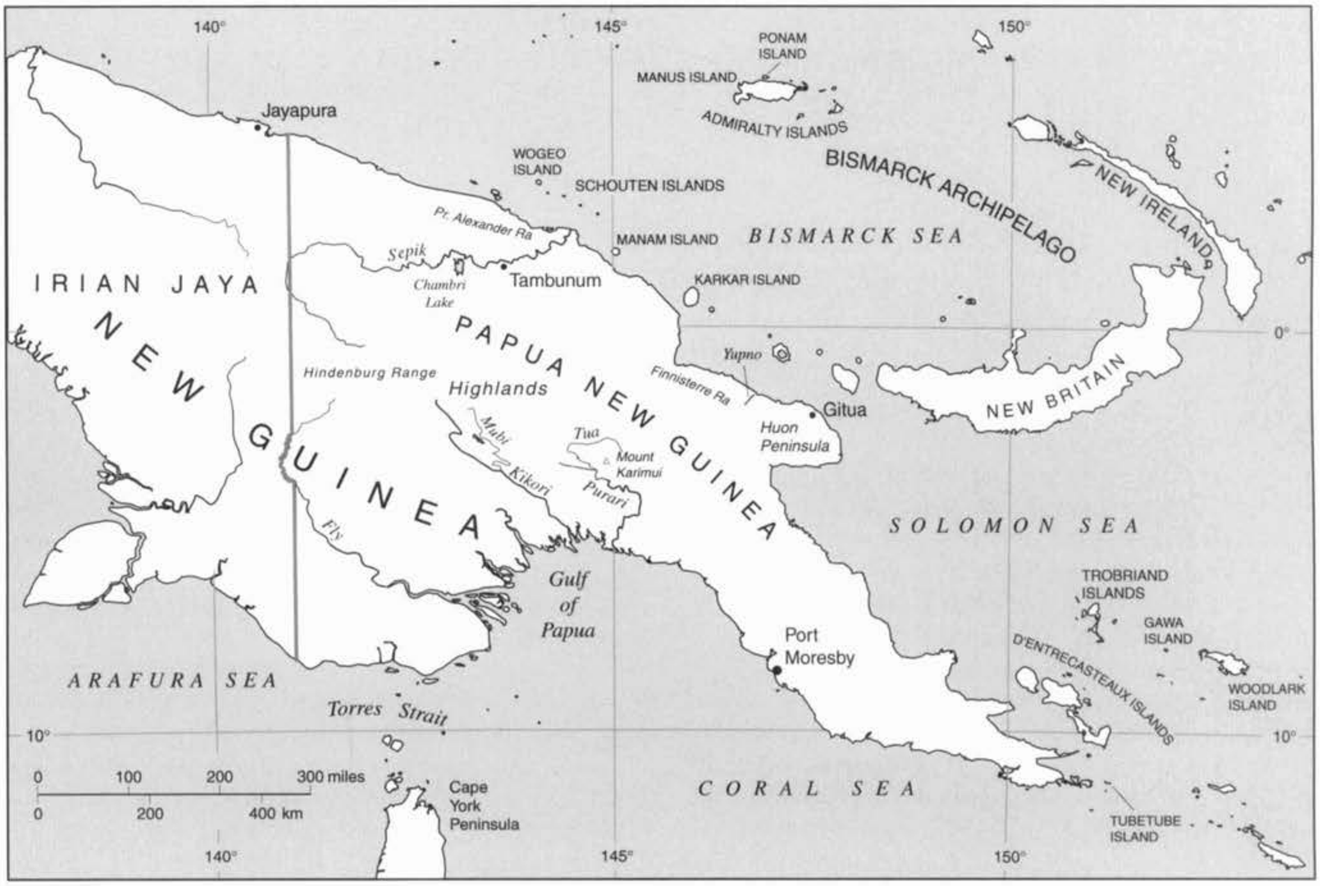


FIG. 12.1. REFERENCE MAP OF PAPUA NEW GUINEA AND SURROUNDING REGION.

of the pig clan, a spirit pig of unusual powers, might have created a portion of the local landscape and all the plants, animals, and topographic features within it. The descent group of the pig clan–those people who are descended from the pig totem–rightfully claim as their legal property that portion of the landscape and all that is within it. They are the custodians of that cosmological category.

"Material" societies are different. The foundation for these societies is represented in terms not of static cosmological divisions but of human action itself.[4] These societies and groups are typically based on residence, affinity or marriage, and work. In other words, "magical" societies justify the existence of groups through totemic ancestors who created portions or categories of the world before the creation of humanity. Human groups, as it were, simply fit into these preexisting categories. In "material" societies, groups justify themselves solely by their coming together as humans for some social reason; there are no prehuman cosmological or "magical" categories in which people align themselves.

Political authority in Melanesia, typically vested in men, is for the most part confined to the local social group, often the village or hamlet. It is unusual for leaders to exercise actual power, as opposed to persuasion, beyond the moral boundaries of their cohorts. In most Melanesian societies political authority is fluid and exists only insofar as other men are willing to conform their aspirations to those of a leader. Most leaders base their authority on successful gift exchange, magical and ritual knowledge, warfare, and trade.[5] Some societies, usually Austronesian-speaking, have more formal political structures, even permanent offices such as chiefs. These are usually determined according to genealogical prominence such as lineage and clan primogeniture.[6]

It is important to understand that throughout Melanesia material wealth, although important, is not the sole determinant of prestige and rank. Authority and influ-

4. Harrison, "Magical and Material Polities."

5. For more detailed discussion of Melanesian forms of leadership, see Maurice Godelier and Marilyn Strathern, eds., *Big Men and Great Men: Personifications of Power in Melanesia* (Cambridge: Cambridge University Press, 1991).

6. Primogeniture is the principle that ascribes prominence to the eldest member of a sibling set. In the case of clans and lineages, political prominence is given to the group that is descended from the senior or eldest ancestor.

ence also arise–in some societies solely arise–from ritual knowledge such as spells, magic, sorcery, and totemic names. Most representations of space in Melanesia are bound to the ritual system as well as to practices for determining the distinctions between social groups and their ancestors. As a form of knowledge, therefore, indigenous maps in Melanesia are primarily political rather than representational. In other words, they are arguments about how the world should be rather than objective constructs of how the world really exists.

The enormous cultural diversity of New Guinea is reflected in the wide range of spatial and cartographic portrayals. From an anthropological perspective all maps, like all forms of knowledge, are culturally embedded. That is to say, there is a definite link between modes of knowledge and the organization of society. Knowledge often reflects the dominant orientations and values of culture. This is especially true for societies that do not have independent educational institutions that strive to create and promulgate knowledge not bound to other aspects of society, such as ideology. In Melanesia, many forms of knowledge are intimately bound to politics and religion. This is often true for knowledge of the landscape and representations of space. Religion and politics determine those spatial features and relationships that are salient and suitable for "mapping." Maps in this sense are often part of a discourse in which men and sometimes women compete for ritual prestige, contest the primacy and importance of the totemic ancestors of rival groups, expand territory and access to resources, and adjudicate various disputes that at some level involve space. I am not just arguing that maps are cultural creations. This much is obvious, since people everywhere perceive space and the landscape through the conceptual frames their culture provides. I am suggesting that within Melanesian cultures maps are often political arguments in the sense that any representation of space is something that can and likely will be used to advance certain claims and deny the validity of rival claims. Although this chapter is primarily an introduction to different maps in Melanesia, it offers an underlying argument–that all mapping and spatial representation is culturally determined.

Are There Maps in Melanesia?

Given that traditional Melanesian societies are oral rather than literate, it is appropriate to ask: Are there maps in the region? Writing enables the fixing of discourse, knowledge, and ideology. Literacy, moreover, especially representational writing, tends to reduce the connotative power of language.[7] If we think about writing–scientific writing in particular, for indeed we in the West often view maps as a form of scientific knowledge–then we realize that ideas flow in a linear fashion, each point building on the previous one and setting up the next statement. The goal of writing is to unpack, as it were, layers of meaning and render them in a sequential, precise fashion. We can see the text as a series of bounded words, conforming to an exact order, arranged on lines. By contrast, orality does not have this linear, visual component. It tends to be far more fluid, ambiguous, and metaphorical than writing. Furthermore, orality depends on the context of its production in ways that writing does not.

In oral cultures, it is difficult to separate the speaker from the "said" or the message maker from the message. Hence listeners are keenly aware of the social context within which knowledge is formulated, and they directly participate in it. The context of production or creation is a part of the message (or map), not something the message tries to escape. All claims in oral societies are thus readily open to contestation. Indeed, they invite it, since the recipients of the message or utterance, by virtue of their constant presence, participate in its creation. Once the oral message is presented, it can be transformed and imbued with unintended nuance more readily than a written map, which for all intents and purposes is a fixed rather than a protean message. As Walter Ong states, "Writing fosters abstractions that disengage knowledge from the arena where human beings struggle with one another. It separates the knower from the known. By keeping knowledge embedded in the human lifeworld, orality situates knowledge within a context of struggle."[8]

By virtue of the fluid nature of Melanesian political systems, which often pivot on the knowledge of esoterica, all claims to spatial information and all maps are political assertions. Although, I would argue, this is true for all societies, it is easier to hide these political dimensions behind a veil of objectivity in literary societies that institutionalize a discursive space where knowledge is supposedly acquired for the mere sake of knowledge. So indeed there are maps in Melanesia, but they tend to be less objective and more argumentive than in our society–arguments about political rivalries, ancestral prominence, ritual power, cosmology, and gender.

Melanesian Maps

This section surveys the different types of maps, protomaps, spatial representations, and symbols in Melanesia.[9]

7. Jack Goody, *The Domestication of the Savage Mind* (Cambridge: Cambridge University Press, 1977); but see Brian V. Street and Niko Besnier, "Aspects of Literacy," in *Companion Encyclopedia of Anthropology*, ed. Tim Ingold (London: Routledge, 1994), 527–62, esp. 532–34.

8. Walter J. Ong, *Orality and Literacy: The Technologizing of the Word* (London: Methuen, 1982), 43–44.

9. There are representational maps by designation or intention and maps that represent space as a secondary quality. In anthropological

I have grouped these into seven heuristic categories: those pertaining to myth, genealogies and society, or objects and those that are verbal, graphic and written, artistic and ritual, or gendered.

This is my own classification rather than any indigenous categorization scheme. Nevertheless it encompasses the range of cartographic expressions in Melanesia and serves as a useful introduction to the topic. It would be enormously difficult if not impossible to correlate indigenous categories of maps and protomaps throughout all the language groups of the region. Furthermore, this degree of linguistic data is in most cases unavailable. To complicate matters, it is unclear how many Melanesian societies, if any, even have a vernacular word for "map." Although I recognize that other anthropologists could derive their own classifications, I believe these categories represent not only indigenous experience but also the trajectory of research in the region up to the present.

The historiography of the topic can be stated briefly. Most discussions of indigenous cartography in Papua New Guinea and Melanesia are embedded in anthropological ethnographies. The material was largely understood to be somewhat incidental to mainstream disciplinary debates and goals. In this regard there is no tradition of this type of research in the region. We have no series of debates, no significant body of theory, and no corpus of well-defined empirical data. Much of the relevant work is recent, or at least post–World War II. Most of the works cited in this chapter can be situated within one of six paradigms. The first is British social anthropology, with its emphasis on social organization and the interrelationships between social groups. The second is American cultural anthropology, with its emphasis on the symbolic content of culture. The first stresses social organization and interaction; the second highlights more elusive issues such as meaning in ritual, myth, and cosmology. The third tradition, arising from early twentieth-century French thought, focuses on the importance of exchange as a mechanism for constituting social integration. A fourth orientation concerns the significance, economic as well as social, of trade relations between cultures and language groups. The fifth orientation is the pervasive issue of gender, which is crucial for all forms of Melanesian and Papua New Guinean social life and culture. The final orientation concerns indigenous modes of history and temporality, which often intersect with concepts of space.

MYTH AS MAP

Throughout Melanesia, mythology is a primary organizer for many aspects of social life and cosmology. As in traditional, oral societies throughout the world, an important feature of many Melanesian myths is spatiality or localization. Typically, Melanesian myths detail the actions and migrations of primordial ancestors who created the landscape and specific locations in the regional world. The myth is an oral map of the local understanding of space and important topographic features, which are commonly either ancestors themselves or their handiwork. Conversely, the viewed landscape makes sense or becomes meaningful through associated myths. In some cases the myths are actual maps, in other cases they are protomaps.

An excellent example comes from the Iatmul of the middle Sepik River.[10] In their cosmology, the universe began as a vast, featureless sea. Eventually a tract of land surfaced in which there was a large pit. Out of this pit emerged the first ancestor spirits, followed by culture heroes who populated the world. These predominantly male ancestors created the rest of the dry land that constitutes the world. These acts of creation occurred through the power of toponymy (naming). By calling totemic names during their primeval migrations, culture heroes created the topographic features of the world. These features are both discrete and linear. They are single, bounded features such as clumps of trees and isolated hills as well as continuous features such as rivers, coastlines, and chains of mountains. Each ancestor's migration route is a path (*yembii*) of totemic names. Paths often, but not always, follow what we would consider to be natural tracks of the landscape–for example, streams and ridges. In this sense the landscape is orally mapped through chains of paired polysyllabic names that are chanted and sung on ritual occasions. These onomastic maps are also vectors of space-time such that any feature of the landscape is a node or moment in an ancestral migration that encodes direction and temporality.[11]

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terminology, the mapping feature of the former is understood from the emic or indigenous perspective to be primary. The latter are often nonvisual, for example, chants, songs, gestures, and linguistic indicators. These could be termed "protomaps." I do not intend to imply an evolutionary sequence such that protomaps necessarily preceded the cognitive and cultural ability to produce "maps." I use the term heuristically to designate cultural productions that contain cartographic qualities but that are not, first and foremost, intended to be maps. Unless otherwise noted, all locations refer to Papua New Guinea.

10. References to Iatmul are based on two fieldwork sessions I conducted in 1988–90 and in summer 1994. Funding was graciously provided by a Fulbright Award, the Institute for Intercultural Studies, the Wenner-Gren Foundation for Anthropological Research, and a DePauw University Faculty Development Grant.

11. Jürg Wassmann, "The Nyaura Concepts of Space and Time," in *Sepik Heritage: Tradition and Change in Papua New Guinea,* ed. Nancy Lutkehaus et al. (Durham: Carolina Academic Press, 1990), 23–35; idem, *The Song to the Flying Fox: The Public and Esoteric Knowledge of the Important Men of Kandingei about Totemic Songs, Names, and Knotted Cords (Middle Sepik, Papua New Guinea),* trans. Dennis Q. Stephenson (Boroko, Papua New Guinea: National Research Institute, 1991); Eric Kline Silverman, "The Gender of the Cosmos: Totemism, Society and Embodiment in the Sepik River," *Oceania* 67 (1996):

In essence, then, the Iatmul landscape is mapped along named paths or vectors of space-time. It is common throughout Melanesia to map space in the form of paths. In other words, locations that appear to be bounded, discrete places are often linked in a definite order in mythic and historical time.[12] The "natural" arrangement of the landscape, we could say, is overlaid with a cultural arrangement linking features that are otherwise disconnected. In many cases the mythic-historical past is embodied in stones, which are frequently the most critical points for conceptualizing space and spatial relationships.[13] Rocks anchor traditional cartography and its recollection in myth. On the island of Tanna, Vanuatu, stones were the original ancestors who were mobile and quarrelsome. They eventually became "silent and immobile . . . a web of redoubtable places whose supernatural powers are still active and rule the world."[14]

Along the north coast of Papua New Guinea there is a regional mythical epic that details the exploits of an elder and a younger brother who created, among other cultural institutions, overseas exchange networks, outrigger canoes, and trade magic.[15] The myth represents not only space but, more important, the social relationships and trade networks that link different geographic zones in the region: the inland bush, the mangrove Sepik estuary, and the islands. As a map, the myth of the two brothers intertwines space and morality. Indeed, the map of space encoded in the myth is an expression of what it means to be a competent adult person–someone who is a good trader, nurtures long-distance relationships, possesses esoteric knowledge, and masters dangerous overseas canoe voyages. The myth also records that the two brothers exploded a mountain, and that pieces drifted down the Sepik River and became the offshore Schouten Islands. As the brothers made their way downriver, they created various locations, houses, and sago palm groves. In this sense the myth also represents specific locations as well as more generalized, spatial notions of morality.

The Mountain-Ok peoples of central New Guinea understand their localized region to have been created by the ancestress Afek. Recorded in myth, her actions created the socially significant landscape. Afek lived long before humanity. Nevertheless, humans inhabit villages and other locations that she created. In mapping space, the myth creates an experiential link between the past and the present. Whereas the mythic map discussed in the previous paragraph is a moral guide to action, this mythic map is a temporal bridge. "Sacred sites are not just the locations of mythic events in the past: they are, for this very reason, also places where things keep on happening."[16] In another part of this region the equivalent myth encodes information in culturally specific idioms about altitude, distribution of flora and fauna, residence mobility, and the association between geographic location and morbidity–for example, the prevalence of malaria in lowland areas.[17]

Trobriand Island myths link geographic locations with specific events during which particular social institutions were created. The entire corpus of Trobriand myth is a geography not only of the region but also of social practices. When the order of mythic events is spatially located, a general pattern emerges along a northwest-southeast axis. According to Harwood, this process serves three functions. The first is cognitive and mnemonic. The second is generative: because of the common spatial patterning, retelling any single myth generates other myths. The third function helps preserve tradition. Tying each mythic element to a specific location prevents change in any one myth and its associated social institution from expanding to other locations and thereby shattering the entire mythic corpus and the culture as a whole.[18]

Related to mythic maps are celestial maps, which are not commonly reported in the anthropological literature

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30–49; and idem, "Politics, Gender, and Time in Melanesia and Aboriginal Australia," *Ethnology* 36 (1997): 101–21.

12. For examples in New Caledonia, see Maurice Leenhardt, *Do Kamo: Person and Myth in the Melanesian World,* trans. Basia Miller Gulati (Chicago: University of Chicago Press, 1979); for examples elsewhere in Papua New Guinea, see Thomas Maschio, *To Remember the Faces of the Dead: The Plenitude of Memory in Southwestern New Britain* (Madison: University of Wisconsin Press, 1994), 182–84.

13. Miriam Kahn, "Stone-Faced Ancestors: The Spatial Anchoring of Myth in Wamira, Papua New Guinea," *Ethnology* 29 (1990): 51–66.

14. Joël Bonnemaison, *The Tree and the Canoe: History and Ethnogeography of Tanna,* trans. and adapted Josée Pénot-Demetry (Honolulu: University of Hawai'i Press, 1994), 116. Bonnemaison notes that the Tannese also image space as outrigger canoes. "Identity and territory went hand in hand: to be human was to be from somewhere, to have a name, and to belong to a 'canoe'" (137). Canoes also seem to be signs for space and locations on Gawa and elsewhere in the Massim region (off the eastern tip of the Papua New Guinea mainland). See Nancy D. Munn, "Gawan Kula: Spatiotemporal Control and the Symbolism of Influence," in *The Kula: New Perspectives on Massim Exchange,* ed. Jerry W. Leach and Edmund L. Leach (Cambridge: Cambridge University Press, 1983), 277–308, and Frederick H. Damon, *From Muyuw to the Trobriands: Transformations along the Northern Side of the Kula Ring* (Tucson: University of Arizona Press, 1990), 172–76 and 204–9.

15. David M. Lipset, "Seafaring Sepiks: Ecology, Warfare, and Prestige in Murik Trade," *Research in Economic Anthropology* 7 (1985): 67–94, esp. 72–73.

16. Dan Jorgensen, "Placing the Past and Moving the Present: Myth and Contemporary History in Telefolmin," *Culture* (Canadian Anthropology Society) 10, no. 2 (1990): 47–56, esp. 51. See also Robert Brumbaugh, "'Afek Sang': The Old Woman's Legacy to the Mountain-Ok," in *Children of Afek: Tradition and Change among the Mountain-Ok of Central New Guinea,* ed. Barry Craig and David C. Hyndman (Sydney: University of Sydney, 1990), 54–87.

17. George E. B. Morren, "The Ancestresses of the Minyanmin and Telefolmin: Sacred and Mundane Definitions of the Fringe in the Upper Sepik," in *Man and a Half: Essays in Pacific Anthropology and Ethnobiology in Honour of Ralph Bulmer,* ed. Andrew Pawley (Auckland: Polynesian Society, 1991), 299–305.

18. Frances Harwood, "Myth, Memory, and the Oral Tradition: Cicero in the Trobriands," *American Anthropologist* 78 (1976): 783–96.

for Melanesia. For the Iatmul of the Sepik River, all stars are owned by clans and lineages as the creation of their totemic ancestors. This is the primary importance of stars. Certain stars are associated with specific directions, but celestial bodies were not traditionally used to indicate direction when traveling through the bush or along the river by canoe. The Boigu, who inhabit the Torres Strait, see the Milky Way in the shape of a *kaygas* or shovel-nosed shark. The head of the shark shows the direction of the tides at night. If it looks east, the current runs west. If the head is in the south and the tail points to the north, the current runs east.[19]

GENEALOGIES AND SOCIETY AS MAPS

All Melanesian societies have one or more systems for remembering and determining genealogies. Many of the genealogical systems correspond to space and locations, often through migrations. Let us return to the Iatmul example. All individuals are given patrilineal personal names, which are also totemic–names of either specific primordial ancestors or the phenomena they created during their primeval perambulations. On the one hand, this means that all people living in the village collectively embody the totality of totemic space. On the other hand, the genealogy of any specific person is a protomap of a portion of totemic space in that the names of his or her relatives and ancestors will often refer to topographic features in a common region. Thus a man's name might refer to a river–say, Korosameri, a tributary of the Sepik River. The names of his siblings, parents, grandparents, and other relatives, including his children, have been drawn from features and events that occurred in the area of that river. These include sago palms, hills, valleys, villages, and such. As one reconstructs the genealogy of Korosameri the person, one recalls significant spatial features in the region of Korosameri the river.

In fact, I suggest that society as a whole is an embodiment of space or a form of social map. This occurs in at least two modalities. First, as discussed above, society as a collectivity of individuals can represent the totality of social spaces that were created by ancestors during their migrations. This occurs when living people embody, often through names, ancestors and their locations. The Iatmul village of Tambunum, for example, is divided into residence wards that correspond to lineages and clans. On one level, each individual represents a region or an area through the genealogical process described above. On another level, however, each lineage or clan is the progeny of an ancestor who created "paths" of the world. The division of the society into descent groups and the village into wards corresponds to the wider cosmological map of the world.

Second, many Melanesian peoples divide their world according to the social groups that inhabit different regions or migrated from them. The Sio, for example, who inhabit the north coast of the Huon peninsula, partition their world into four quadrants in accordance with precontact trading partners.[20] From the mountain villagers of the southern interior, the Sio traded pots for taro, sweet potatoes, bananas, bows and arrows, pigs, dogs, bark cloth, and tobacco. From the west they received wooden bowls, black pigments, and almonds, among other things. From the northern offshore islands in the Bismarck Archipelago the Sio traded for hand drums and betel nut mortars. To the east, along the coast, is Gitua village, which manufactures pots like the Sio. The link between these different peoples and directions was often the Siassi traders, who acted as middlemen. Each direction in the local world was associated with a distinct ethnic or language group and certain items of exchange. The village has a patrilineal moiety system: two social groups whose membership is based on paternity. The two divisions or moieties trace their ancestry respectively to Pasa and Mburu, the original ancestors, who divided the original Sio Island into a smaller seaward section and a larger landward section. These two groups are divided into another, geographic division: the eastern half, or the weather side during the southeast trade winds, and the western half, corresponding to the weather side during the northwest monsoon. Both locally (within the village) and externally (outside the village) the Sio partition their world into quadrants and divisions that map ethnicity, seasonality or weather, and objects onto geography.

OBJECTS AS MAPS

Various artifactual representations of space also serve as maps or protomaps in Melanesia. As discussed above, the Iatmul understand space in terms of ancestral migrations encoded in paths of names. Mnemonically, these paths are recorded in objects. Among eastern Iatmul, paths of names are represented by short pegs inserted in the stem of a palm frond called a *tsagi-mboe* (fig. 12.2). Farther upriver, among central and western Iatmul, spatial paths of names are expressed by knots in *kɨrugu* cords (fig. 12.3).[21]

19. *Boigu: Our History and Culture* (Canberra: Aboriginal Studies Press, 1991), 29–30. Celestial maps are common among the seafaring, outrigger canoe peoples of Micronesia and Polynesia; see David Lewis, *We, the Navigators: The Ancient Art of Landfinding in the Pacific*, 2d ed., ed. Derek Oulton (Honolulu: University of Hawai'i Press, 1994), 82–122; see also chapter 13 below.

20. Thomas G. Harding, *Kunai Men: Horticultural Systems of a Papua New Guinea Society* (Berkeley: University of California Press, 1985), 23, and idem, *Voyagers of the Vitiaz Strait: A Study of a New Guinea Trade System* (Seattle: University of Washington Press, 1967), 115–17.

21. Wassmann, "Nyaura Concepts," and idem, *Song to the Flying Fox* (both note 11).

FIG. 12.2. EASTERN IATMUL MAN HOLDING A *TSAGI-MBOE* IN TAMBUNUM VILLAGE. The man, Agumoimbange, is the hereditary leader of a lineage. Each peg represents a path of totemic names that corresponds to a path in the landscape.
By permission of Eric Kline Silverman.

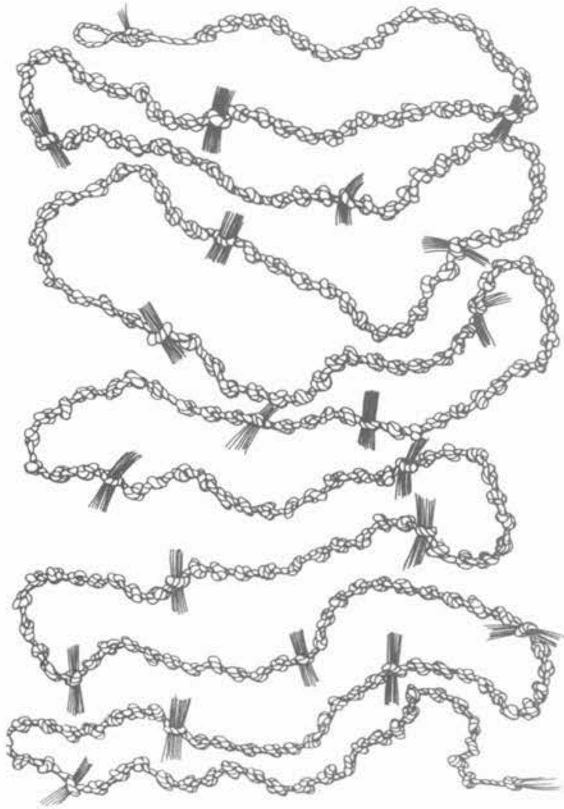


FIG. 12.3. CENTRAL AND WESTERN IATMUL *KɨRUGU* (KNOTTED CORD). This knotted cord has the same mnemonic function as the *tsagi-mboe* in figure 12.2. Each cord is six to seven meters long. The larger knots are specific locations in an ancestral migration route. The smaller knots are the names of totems associated with each location. This cord, which belongs to a specific lineage, is associated with Palingawi, an ancestral crocodile.
By permission of Dr. Verena Keck, Universität Basel, Switzerland.

Among the Wopkaimin of the interior Hindenburg Mountains in central New Guinea, trophy arrays of animal bones are another unique form of Melanesian mapping. The individual bones that compose these maps refer to specific locations in the local landscape. But they are also grouped into registers according to a broader cultural division of space into three zones: hamlets, bordered by gardens and secondary forest, all encircled by rain forest (fig. 12.4). The different levels of the registers, which contain bones of the same species, refer to these different topographic regions.[22]

Ponam Islanders arrange ceremonial exchange gifts (food, valuables, household goods) into displays that diagram the social relations or networks between groups.[23] In essence the displays are maps of society. However, the displays also represent the spatial location of social groups–the land they actually inhabit or where they should be located according to the sponsors of the ceremony. In this sense these gift displays represent the inter-

22. David C. Hyndman, "Back to the Future: Trophy Arrays as Mental Maps in the Wopkaimin's Culture of Place," in *Signifying Animals: Human Meaning in the Natural World,* ed. Roy G. Willis (London: Unwin Hyman, 1990), 63–73, and idem, "The Kam Basin Homeland of the Wopkaimin: A Sense of Place," in *Man and a Half: Essays in Pacific Anthropology and Ethnobiology in Honour of Ralph Bulmer,* ed. Andrew Pawley (Auckland: Polynesian Society, 1991), 256–65.

23. James G. Carrier and Achsah H. Carrier, "Every Picture Tells a Story: Visual Alternatives to Oral Tradition in Ponam Society," *Oral Tradition* 5 (1990): 354–75. Similar displays occur in various ritual exchanges on the island of Gawa. In one ritual context, plates of cooked pork and other food are offered to separate hamlets of the community. The plates "are laid out on the ground in a swath from roughly southeast to northwest according to the actual, relative position of each receiving hamlet. . . . Thus, the dispersed hamlets are represented in the model of a relational, directionally sequenced and linear whole within the community center." See Nancy D. Munn, *The Fame of Gawa: A Symbolic Study of Value Transformation in a Massim (Papua New Guinea) Society* (Cambridge: Cambridge University Press, 1986), 193–95 and esp. 204.

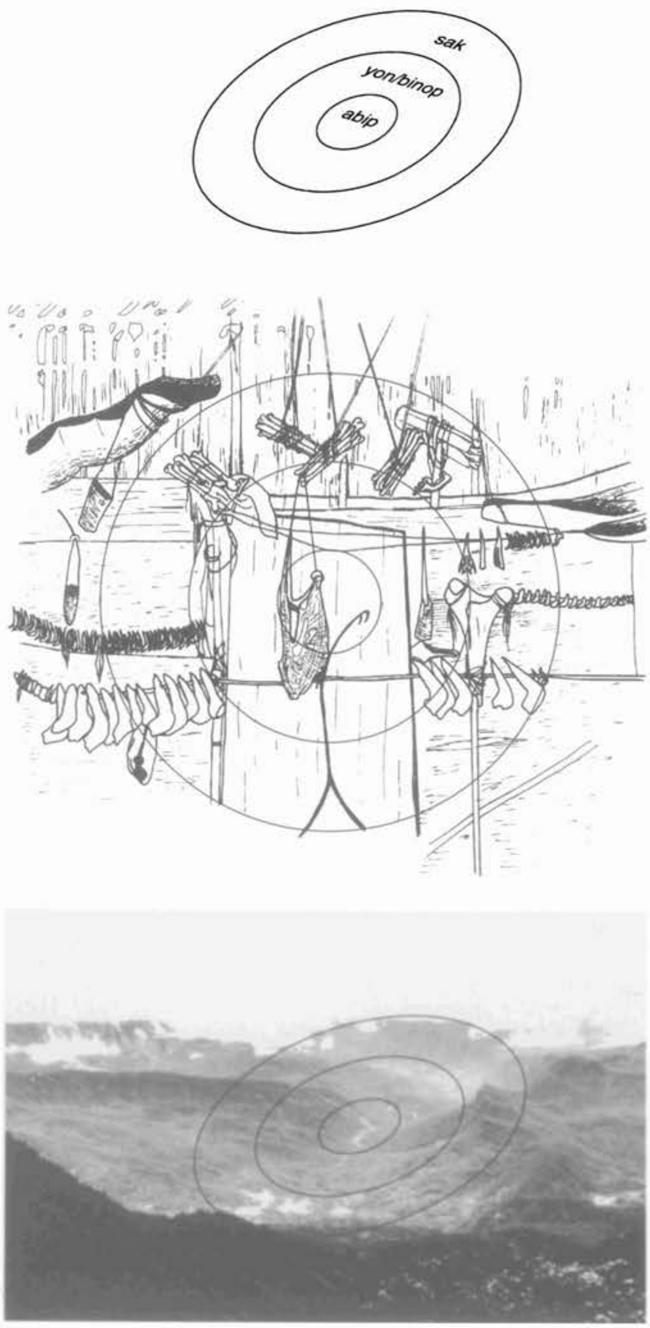


FIG. 12.4. WOPKAIMIN TROPHY ARRAYS OF ANIMAL BONES. The middle drawing represents the actual appearance of the trophy array; notice the different levels or registers of individual bones of the same species. The three concentric circles correspond to the tripartite division of the regional landscape: hamlets (*abip*), bordered by gardens (*yon*) and secondary forests (*binop*), all encircled by rain forests (*sak*).
After David C. Hyndman, "The Kam Basin Homeland of the Wopkaimin: A Sense of Place," in *Man and a Half: Essays in Pacific Anthropology and Ethnobiology in Honour of Ralph Bulmer,* ed. Andrew Pawley (Auckland: Polynesian Society, 1991), fig. 6. Photograph and permission courtesy of David C. Hyndman, University of Queensland, Brisbane.

section of social relations and space. They are actual or potential maps of sociality and geography.

Objects that are exchanged in regional networks also convey a sense of spatiality and thus can be considered a type of protomap. Let us examine the Huli, for example, a highland New Guinea society. In their "sacred geography," the Huli divide the world into specific regions. The main axis of this geography is the *dindi pongone,* a subterranean root or vine composed of an intertwined python and cane, oriented roughly north-south.[24] At certain points in the landscape, this mystical root touches the surface of the earth in the form of ritual sites and rivers. The Huli understand themselves to be at the center of this regional world. Theirs, however, is a world in a state of constant decline or dissipation of fertility, as evidenced by periodic earthquakes, famines, and social upheavals. To avert the general decay of cosmic fertility, Huli carry items available only in the lowlands to shrines in the upland region of their territory. There, ritual leaders subsist on these lowland foods, such as sago, sago grubs, bandicoots, fish, and water from specific rivers and lakes. In the overall context of regional trade, the quantities of these ritual items are meager, but they are symbolically important. Because of their central location, the Huli are ritual leaders who maintain the fertility of the cosmos. All directions and regional exchanges are understood in terms of the Huli-centric sacred geography and its north-south, python-cane magical axis.[25]

In another region of highland New Guinea, a variety of objects were exchanged: bird plumes, marsupial furs, green scarab beetles, cassowaries, native salt, pigments, pigs, and shell valuables. Many of these goods flowed in specific directions that were crosscut by the flow of other goods. In this regard, each item indexed both a direction or region and a specific social group. The object was a protomap insofar as its culturally constructed meaning, in part, arose from its sociotopographic place of origin and its direction of movement.[26]

In the Massim area, the site of the famous insular kula exchange first reported in depth by Malinowski, kula valuables–shell necklaces and armbands–are another form of indigenous protomap.[27] Prestige is accorded to men who successfully exchange the ornaments between

24. Stephen Frankel, *The Huli Response to Illness* (Cambridge: Cambridge University Press, 1986), 16–26.

25. Chris Ballard, "The Centre Cannot Hold: Trade Networks and Sacred Geography in the Papua New Guinea Highlands," *Archaeology in Oceania* 29 (1994): 130–48, esp. 142.

26. Christopher Healey, *Maring Hunters and Traders: Production and Exchange in the Papua New Guinea Highlands* (Berkeley: University of California Press, 1990), 170–233.

27. See especially Bronislaw Malinowski, *Argonauts of the Western Pacific: An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea* (London: Routledge and Kegan Paul, 1922). For recent work and a bibliography on the kula sys-

the islands of the region. The goal is not to retain the shells but to acquire them only for a time and then to transfer them to other kula partners. The necklaces circulate clockwise, the armbands move counterclockwise. The entire kula system is envisioned as a circle composed of individual paths. The valuables themselves, in a sense, are protomaps of direction (clockwise or counterclockwise) and of the different paths they have traveled. Over time, individual ornaments acquire unique and valued histories that encode this spatial information. These histories are publicly known throughout the kula ring, since they lend the valuables additional prestige. The more extensive the exchange and hence spatial history of a kula necklace or armband, the greater its value.

There are few kula shells of the highest grade or value. "Men of substance in kula strive to obtain each of these shells at least once during their career, and others know whether they have achieved this or not. . . . There is thus a general correlation between the beauty, notability and age of shells, and the seniority and fame of transacters."[28] The highest grades of shells have histories that extend for several generations. They are known throughout the kula ring and have been exchanged around the entire ring enough times to become famous and to have acquired a personal name.[29] Inasmuch as a man could not fake his career in kula exchange–any more than he could fake his beauty, name, or age–the same can be said for kula ornaments.

Shields in the Trobriand Islands also represent space in a complex, graphic fashion. Trobriand society is matrilineal; children are born into the descent groups of their mothers, not their fathers. The importance of maternity is emphasized by local conception ideology whereby pregnancy does not result from heterosexual intercourse; the male role is denied. Rather, conception arises from women's being impregnated by matrilineal *baloma* ancestor spirits who float over the sea from Tuma, the land of the dead.

The Trobriand shield (fig. 12.5) has three symbolic codes. First, there are the indigenous mythological and totemic explanations of the design elements (fig. 12.6). Second, the shield represents an X-ray view of human copulation, a representation that seems to call into question local conception ideology. In figure 12.7, the figure on the left clearly shows the sexual act, whereas the figure on the right shows female genitalia. Third, the Trobriand shield expresses a complex relation between religion, sexuality, and geography. In figure 12.7, the figure on the left is Topileta, gatekeeper of the Underworld, who has large flappy ears (depicted on the shield) and an insatiable sexual appetite. Tuma, the Underworld (figure on the right), is the island where Trobriand men collect cowrie shells. But it is also said that "man's penis . . . dwells in Tuma, the vulva, the land of the cowrie shell." Thus we see the juxtaposition of sexual intercourse, specifically female genitalia, and a geographic-religious location. Furthermore, "Tuma, the world *below,* is said to be a reflection of the society of the world *above,* Boyowa. . . . Implied in the design is the symbolic equation: Tuma = Topileta = Boyowa. For what takes place in Tuma (reincarnation) implies procreation (Topileta) in the upper world, Boyowa."[30] Tuma is the land of the dead; this location privileges reincarnation from matrilineal spirits. Topileta, we have seen, is an image of sexual intercourse or procreation, not asexual reincarnation. This results in actual sexual reproduction in the land of the living, or Boyowa. In other words, the shield juxtaposes an image of sexual intercourse with a trifold map of the cosmos: the lower world of the dead, the upper world of the living, and the intervening gatekeeper of the Underworld.

But there is more. Evidence from mythology, the meaning of Trobriand place-names (e.g., certain locations have the names of clitoris, semen, and copulation), and regional variations in behavior that stress either masculinity or femininity suggest that the Trobriand Islands were organized according to north (male) versus south (female) and east (male) versus west (female) polarities. These directional polarities parallel the cosmological opposition depicted on the shields between, first, male and female, and second, generative fertility (via the lower maternal land of the dead) and the upper masculine land of heterosexuality.[31]

The Daribi of the Mount Karimui area use the sun as a reference point for conceptualizing the moral valences of space. As the main "road" of the culture, the westward movement of the sun as well as flowing water leads to the place of the dead. As Roy Wagner puts it, "The directionality of the world is that of man's own life, so that sunset and the inexorable motion of water take on the significance of human mortality."[32] Moreover, men are associated with upper directions, women with lower

tem, see Jerry W. Leach and Edmund L. Leach, eds., *The Kula: New Perspectives on Massim Exchange* (Cambridge: Cambridge University Press, 1983).

28. Munn, "Gawan Kula," 304 (note 14).

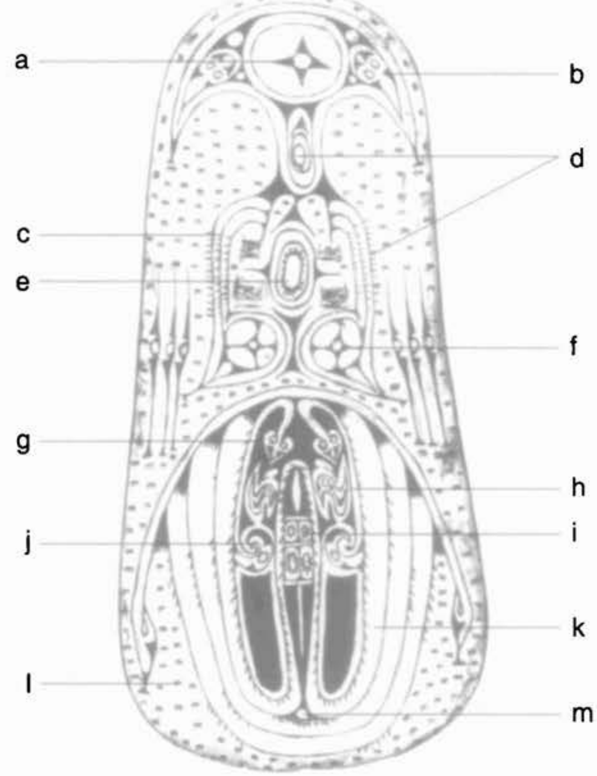
29. Shirley F. Campbell, "Attaining Rank: A Classification of Kula Shell Valuables," in *The Kula: New Perspectives on Massim Exchange,* ed. Jerry W. Leach and Edmund L. Leach (Cambridge: Cambridge University Press, 1983), 229–48.

30. Patrick Glass, "Trobriand Symbolic Geography," *Man,* n.s. 23 (1988): 56–76, esp. 60–61.

31. Glass, "Symbolic Geography," 70–71.

32. Roy Wagner, *Habu: The Innovation of Meaning in Daribi Religion* (Chicago: University of Chicago Press, 1972), 113. Wagner writes: "Daribi say that 'the sun and the water go to the same place'; water is thought to rise in the east . . . and on top of Mount Karimui, the various peaks of which are designated as the sources (*gomo*) of the major local streams, and flow westward. It moves to the north of the mountain, gradually accumulating in the Tua River, until it flows away to the west. The fact that the river then turns and flows eastward to the south

FIG. 12.5. TROBRIAND SHIELD DESIGN. The oval, carved wooden shield is colored with red, black, and white.
Size of the original: 70.5 × 31.5 cm. Copyright the British Museum, London (+6317).



- a *Kubwana*, Venus or the morning star that rises when *sikwaikwa* birds and *lekoleko* (fowls) begin to crow.
- b *Kaiuna* or three-headed snakes.
- c *Saina* or decorative lines.
- d *Sasona*, small fish found in creeks and in shallow waters on the beach.
- e *Siwai*, a species of flat fish.
- f *Ubwala* or stars of lesser importance visible in the morning hours.
- g Heads of snakes.
- h *Vikia* or frigate birds caught by the snakes.
- i *Haia* or rings of shell used in series as earrings.
- j *Sikwaikwa*, a bird the size of a starling that gives a sharp short call before sunrise.
- k *Ludakaidoga*, the rainbow.
- l Multiplicity of marks representing holes pierced by spears in the shield.
- m *Buli-buli*, the tail of the manucodia.

FIG. 12.6. INDIGENOUS EXEGESIS OF THE TROBRIAND SHIELD DESIGN (FIG. 12.5). This diagram depicts the various design elements of the shield in figure 12.5 and their indigenous referents. They generally refer to mythology and totems. This level of meaning–the conscious, verbally articulated level–attends to individual motifs rather than a single theme or pattern.
After Patrick Glass, "Trobriand Symbolic Geography," *Man*, n.s. 23 (1988): 56–76, esp. fig. 1.

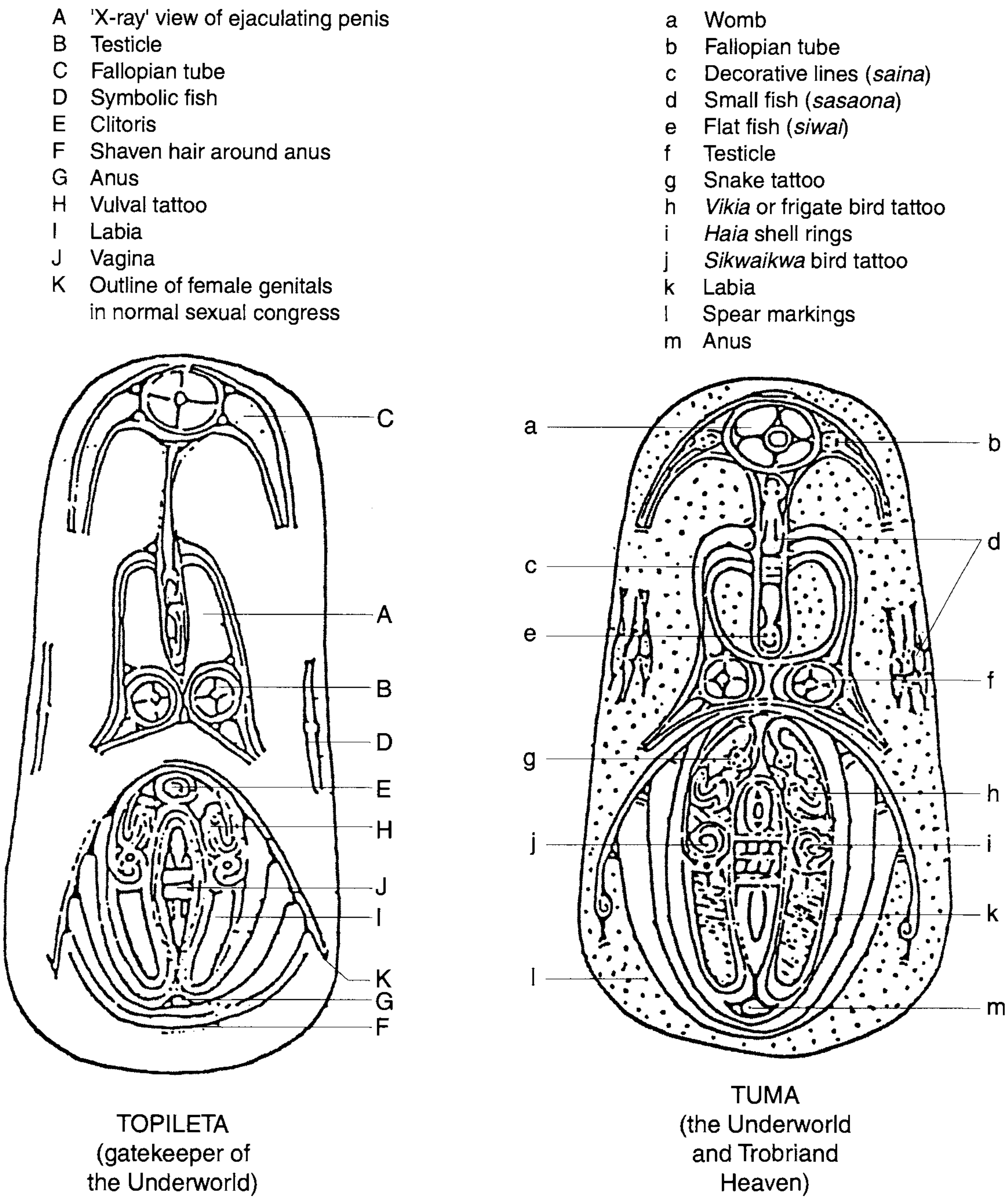


FIG. 12.7. TROBRIAND SHIELD DESIGN: X-RAY INTERPRETATION AND COSMOLOGICAL-GEOGRAPHIC CODE. This diagram highlights the shield design as it pertains to the human anatomy (compare figs. 12.5 and 12.6). In particular, the diagram on the left illustrates sexual intercourse, while the diagram on the right represents female genitalia and associated tattoos.

The diagram also represents the cosmological or religious dimension of the shield design. The figure on the left represents Topileta, the gatekeeper of the Underworld. He has large flappy ears and a voracious sexual appetite; both elements are represented in the design. The figure on the right is Tuma, the island Underworld and Trobriand heaven. The two figures represent respectively sexual intercourse and procreation in the land of the living versus asexual reincarnation in the land of the dead. This opposition is reflected in various locations in Trobriand geography having male or female gender associations.

After Patrick Glass, "Trobriand Symbolic Geography," *Man*, n.s. 23 (1988): 56–76, esp. figs. 2 and 3.

spaces. Daribi map space and therefore human action through a cosmological system that hinges on two axes: male-female and life-death. This spatial system is represented on a microcosmic scale by the Daribi house. Whereas men live in the direction of sunrise, women inhabit spaces associated with sunset, death, and stagnant water. "The 'direction' of life, coming and going, bringing in, preparing, and finally discarding or excreting food, is along the central, east-west corridor,"[33] the front of the house being toward the east, the rear door facing west. Inside the house, men live in the upper and frontal areas (*oboba*), which are associated with the direction of sunrise, trees, and *sezemabidi* or arboreal and largely masculine tree spirits. Women live in the rear, lower areas of the house (*iba*), the spaces associated with the direction of sunset, water, the dead, and the *izara-we,* jealous and dangerous women who live underground. Overall, as Wagner notes, there is a correspondence between space, gender, houses, and the alimentary system of the human body that forms, in my terminology, a multivalent protomap.[34]

VERBAL MAPS

Melanesian societies map space in verbal modes such as poetry, song, and chant. Orality itself is a type of map that encodes space, location, direction, and place. Many non-Austronesian languages (and likely Austronesian ones as well) have elaborate systems of spatial deixis wherein events, actions, persons, and things must be located in space in order to be articulated through language. Spatial deixis refers to linguistic markers (e.g., bound morphemes) and words that orient the speakers or the topic of conversation in space. These locational markers often involve such directions as east-west (perhaps following the course of the sun or rivers), upward-downward, and here-there. For example, in the Wahgi language, all things are located, Michael O'Hanlon says, "as up- or down-river from the speaker, as towards the river, away from it, or across it; as on higher or lower ground. These precise orienting terms are used even within the house. . . . In contrast, far distant places (to which Wahgi business men and women and politicians now regularly travel) are all classified as lying in the same direction: Port Moresby, Sydney, and New York are all described as 'down-river and below.'"[35] In some cases, such as the highland Wahgi, deixis is anchored to a specific topographic region like a valley, thus rendering the linguistic notation of direction problematic outside that localized region.[36]

Earlier I discussed totemic names and chants that are a form of map for the Iatmul. Among the Kaluli of the Papuan Plateau, songs sung during the Gisaro ceremony are a form of verbal, musical map. These nostalgic songs contain numerous references to locations in the region. Each location that is mentioned in a song is linked to the life of a deceased or absent person. The songs map socially significant spaces through "the interweaving of geography and personal allusion."[37] The "tracks" formed by the songs do not necessarily follow existing trails, although they sometimes do. The landmarks that form the track of a song are often topographic features–trees, streams, ridges–but also include culturally rather than naturally salient spaces such as clan-owned lands and social paths formed by marriage between two groups. These maps add an element of pathos to space and location. In fact, a song is considered a failure if it does not make the listeners weep.[38]

During long-distance kula voyages from the island of Tubetube, helmsmen's songs constituted a verbal map of the region. These songs consisted of lists of places interspersed with phrases describing the movement of the boat. They also contained indicators of the canoe's proximity to land, such as the direction of flying birds. Tubetube helmsmen's songs begin with a wailing sound (Aeeee!) that is repeated between each named place. One song goes:

Aeeee!
Dabwelo [name of an island] koina [to it]
Aeeee!
Koyagaugau [name of an island] tagitai [we see it]
Aeeee!

and so forth. Sometimes other phrases are interspersed between the names of the islands, such as village names and landing places. Poetic phrases are also included, such as *kalitamena ipigapigabu* (literally, "in the sea it is sparkling," which may refer to phosphorescence in the wake of the canoe, or simply the reflection of light on the

of Mount Karimui, thus diverging from the course of the sun, is generally ignored or held to be inconsequential" (111).

33. Wagner, *Habu,* 123.

34. Wagner, *Habu.*

35. Michael O'Hanlon, *Paradise: Portraying the New Guinea Highlands* (London: British Museum Press, 1993), 14. See other examples in James F. Weiner, *The Empty Place: Poetry, Space, and Being among the Foi of Papua New Guinea* (Bloomington: Indiana University Press, 1991), 72–78; Volker Heeschen, "Some Systems of Spatial Deixis in Papuan Languages," in *Here and There: Cross-Linguistic Studies on Deixis and Demonstration,* ed. Jürgen Weissenborn and Wolfgang Klein (Amsterdam: John Benjamins, 1982), 81–109; and Alfred Gell, "The Language of the Forest: Landscape and Phonological Iconism in Umeda," in *The Anthropology of Landscape: Perspectives on Place and Space,* ed. Eric Hirsch and Michael O'Hanlon (Oxford: Clarendon Press, 1995), 232–54.

36. Michael O'Hanlon, personal communication, 1994.

37. Edward L. Schieffelin, *The Sorrow of the Lonely and the Burning of the Dancers* (New York: St. Martin's Press, 1976), 184.

38. Edward L. Schieffelin, "Mediators as Metaphors: Moving a Man to Tears in Papua, New Guinea," in *The Imagination of Reality: Essays in Southeast Asian Coherence Systems,* ed. A. L. Becker and Aram A. Yengoyan (Norwood, N.J.: Ablex, 1979), 127–43.

waves). When the song refers to long distances between islands, birds are often mentioned to indicate the relative closeness of land.[39]

GRAPHIC AND WRITTEN MAPS

Despite the absence of literacy, traditional Melanesian societies did have forms of graphic maps. Typically these maps were regionally bounded and centered on some culturally salient location. As in most societies, the group is usually at the center of the map or worldview, whereas other groups or societies, often speaking different languages, are at the periphery. A Iatmul man in 1994 drew me a map of the world in the dirt. It centered on the pit out of which emerged the first cosmological spirits and ancestors. Ancestral migrations that created the paths of the world were depicted as vectors radiating in all directions from the center.

The Mejprat of Irian Jaya have a somewhat similar system. They understand a region to consist of two divisions: the river, or "hosts," and the bush, or "guests." This division is crosscut by a moiety system that regulates marriage. The region was united by the *wor n'su,* a tunnel system radiating from a center. The mouths of the tunnels are ritual places, organized like points on the compass.[40] These locations and tunnels are grouped into pairs of brother and sister "ropes" that are ultimately descended from the first opposite-sex human sibling pairs. Visually this spatial system was represented by signs painted on the chests of neophytes during male initiation, which depict "the regional system as a centre of two circles or diamond shaped figures from which eight (or four) tunnels radiated" (fig. 12.8).[41]

The Yupno, inhabiting the Finisterre Mountains, map their local universe as an inclined oval valley bounded on all sides by mountains (figs. 12.9 and 12.10). This map contains bodily imagery. The world is oriented by the course of the Yupno River, which flows eastward into the sea, through the only opening of the valley. The river

> is regarded as the creator Morap, "the one who dwells in abundance." Above ("West") is the source from which humanity originated, washed ashore in bamboo pipes (*teet,* the term which also stands for "right") by the Yupno River, literally "the one which washes everything ashore and deposits it on the banks"; at the bottom ("East") where the Yupno flows into the sea, is the land of the dead, the island of Nomsa, "the thing which rises like a fern stalk from the sea. . . . The source of the river (above and at the back) is Morap's head, the estuary (below and to the front) is his feet. Morap is looking downstream.[42]

Furthermore, this regional spatial representation is replicated by the Yupno house, which is oval, with a single opening at the front and a long fireplace running down the middle.

FIG. 12.8. EXAMPLES OF MEJPRAT SIGNS DEPICTING THE *WOR N'SU* (TUNNEL SYSTEM). These three signs were painted on the chests of male neophytes during initiation ceremonies. Each sign represents the local regional system that is united by the *wor n'su* tunnels. The tunnels radiate from the center of the region, as depicted in the diagrams.
After John-Erik Elmberg, *Balance and Circulation: Aspects of Tradition and Change among the Mejprat of Irian Barat* (Stockholm: Ethnographical Museum, 1968), fig. 10.

Not surprisingly, this closed or bounded map of the Yupno world is now changing. The maps in figure 12.11 were drawn by male elders who had never left their territory, in response to the request, "Please draw on this ground the territory where you live, where the people live who talk the same language as you."[43] Compare these bounded maps with those drawn in response to the same request by men who had left the region for a short time to visit the coast (fig. 12.12). In figure 12.13, by contrast, showing maps drawn by middle-aged and young men who had worked on plantations or lived in cities, we see shifts toward geometric rendition and almost planimetric precision. The geometric shift could be the result of increased familiarity with literacy and the kinds of precision that are required in the context of Western-oriented business, plantation administration, and the angular architecture of Western buildings and cities. The representational maps might have resulted from increased familiarity with different regions (a sense of "nature" divorced from "culture") and the notion of what could be termed planimetric representation. In both cases, the cartographic shift

39. Martha Macintyre, personal communication, 1994.

40. In the Trobriand Islands, key points of the compass are indicated by the axes of the chief's house and the chief's yam house (Damon, *From Muyuw to the Trobriands,* 193 [note 14]).

41. John-Erik Elmberg, *Balance and Circulation: Aspects of Tradition and Change among the Mejprat of Irian Barat* (Stockholm: Ethnographical Museum, 1968), 102–3.

42. Jürg Wassmann, "The Yupno as Post-Newtonian Scientists: The Question of What Is 'Natural' in Spatial Description," *Man,* n.s. 29 (1994): 645–66, esp. 658.

43. Jürg Wassmann, "Worlds in Mind: The Experience of an Outside World in a Community of the Finisterre Range of Papua New Guinea," *Oceania* 64 (1993): 117–45, esp. 129–45. Although Wassmann remarks that the Yupno did not traditionally draw maps in the soil (129), this discussion of Yupno maps seems appropriate.

FIG. 12.9. YUPNO MAN DRAWING THE "WORLD." The rugged terrain of the Yupno Valley is bounded by mountains, literally "fences," on three sides. Villages are situated in small adjacent valleys or on mountain ledges. The valley is the "world" in the traditional Yupno view. Its oval shape has one opening, which is to the east where the Yupno River (the middle line) flows to the sea. The smaller ovals depict fenced-in villages.
By permission of Dr. Verena Keck, Universität Basel, Switzerland.

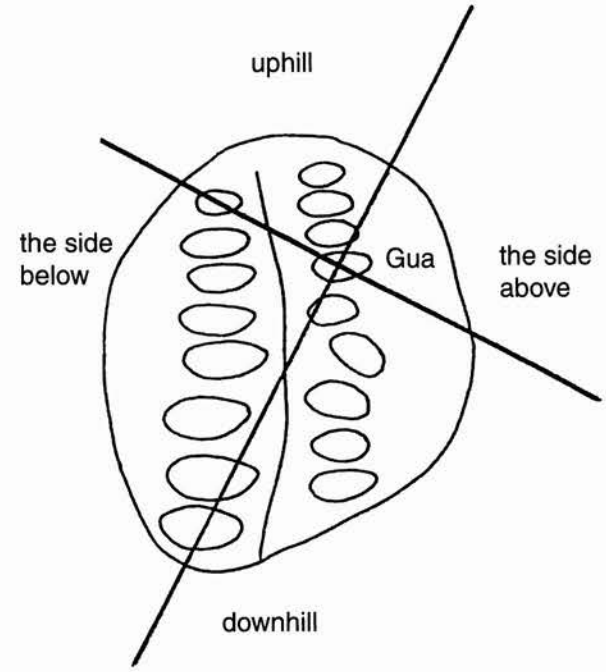


FIG. 12.10. THE YUPNO'S LOCAL UNIVERSE. The drawing represents the valley from the perspective of Gua village as a bounded oval surrounded by mountains. Uphill is west–not north, as in the usual orientation of Western maps–and the Yupno River flows east. Thus the local world is divided into quadrants based on the flow of the river and a general north-south inclination of the land.
Courtesy of Dr. Verena Keck, Universität Basel, Switzerland.

can be traced to greater knowledge of practices and regions outside the traditional territory. Finally, the maps in figure 12.14 were created by children lacking any school education, and they are reminiscent of those drawn by male elders who had not traveled. The children's maps do not express the same level of cosmological knowledge as those of male elders (e.g., the circular encompassment of the entire region), nor do they express the influences of the outside world–openness, angularity, regimentation, and planimetric representation (compare also a map of the region, fig. 12.15).[44]

Among the Chambri of the middle Sepik River, Gewertz elicited "a series of drawings executed by Yarapat to illustrate Chambri land claims. He drew these maps in my presence, rejecting the first two as inadequate but pleased with the accuracy of his final version."[45] His first map arranged villages not according to geographic location but in terms of traditional alliances and exchange patterns, in other words, economic and ritual reciprocity (fig. 12.16). The second map, which Yarapat drew as a correction to his first map, incorporated geographic location and distinguishes between Chambri villages and hamlets in the Sepik Hills (fig. 12.17). The third map again is geographically anchored, but now the distinction is between Chambri villages and their Iatmul rivals, with whom there have been ongoing land disputes (fig. 12.18).

44. Wassmann comments on the production of these maps: "Although the Yupno do not traditionally draw in the soil, nor mark short routes in the soil in order to support a simple route description, all men, without exception, complied with the request without problems. Women, however (girls excepted) could not be moved to participate in the task. All participants drew their territory with a little stick on an even soil surface. As a rule, they were alone; no conversations were allowed. No help was offered, neither by the anthropologist nor by any fellow Yupno. At most, the question was repeated once" ("Worlds in Mind," 129).

45. Deborah B. Gewertz, *Sepik River Societies: A Historical Ethnography of the Chambri and Their Neighbors* (New Haven: Yale University Press, 1983), 144–48, esp. 144.

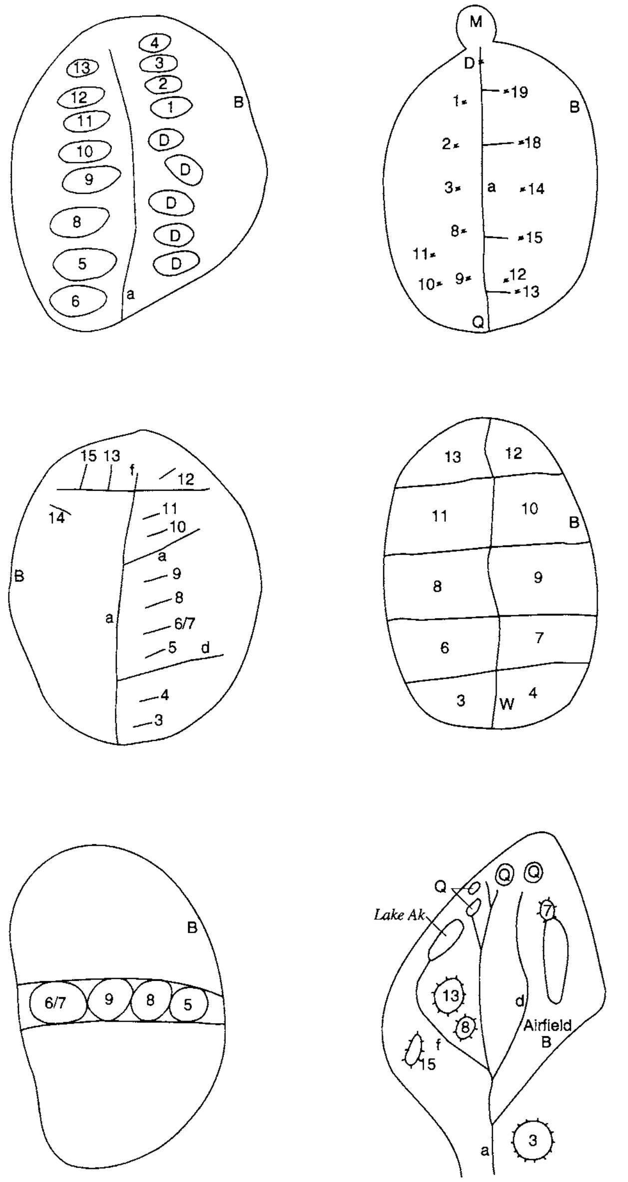


FIG. 12.11. YUPNO MAPS DRAWN BY MALE ELDERS. These six maps were drawn by Yupno men whose lives were confined entirely to the local region. The men were asked to draw the area where they and others who spoke the same language lived. Of particular importance is that each map is clearly bounded by the Finisterre Mountains in accordance with the traditional cosmology (see fig. 12.10). The central features are the river and villages, represented as ovals.

For figures 12.11–12.14, the numbers 1–20 represent twenty Yupno settlements, other non-Yupno villages are labeled D; the most important rivers are labeled in lowercase letters a–g, other rivers are labeled F; W indicates a path; Q a spring; M the sea; and B mountains (fences). See figure 12.15.
After Jürg Wassmann, "Worlds in Mind: The Experience of an Outside World in a Community of the Finisterre Range of Papua New Guinea," *Oceania* 64 (1993): 117–45, esp. fig. 1 (A1–A6).

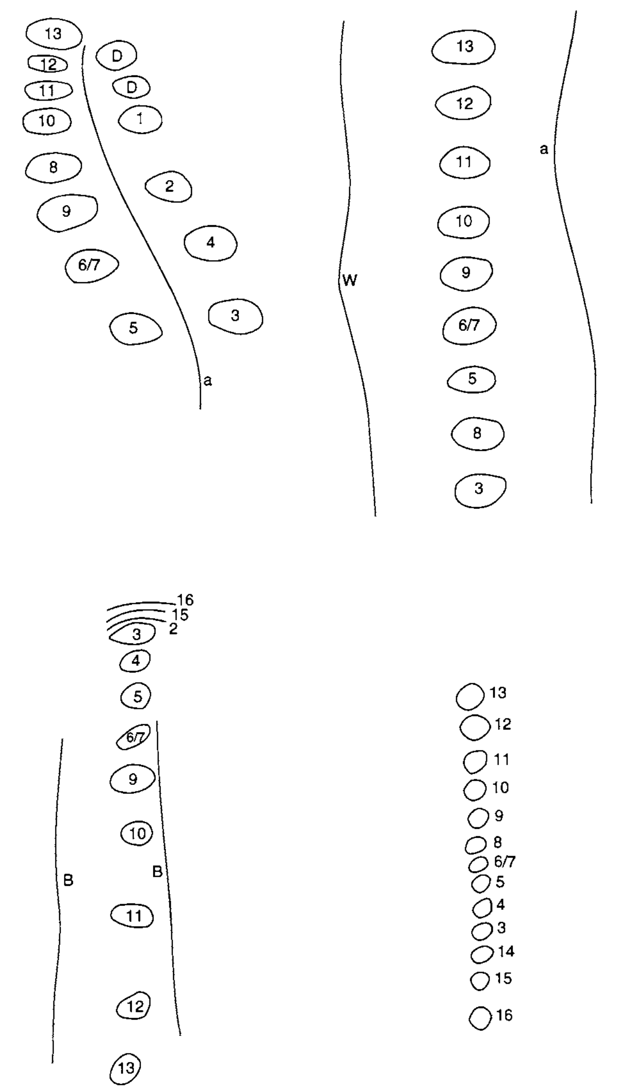


FIG. 12.12. YUPNO MAPS DRAWN BY MEN WHO HAD VISITED THE COAST. These four maps, drawn by men with limited experience outside the region, lack the closed boundaries of the maps in figure 12.11 but still retain a traditional orientation–the river and a line of bounded villages. See also figure 12.15.
After Jürg Wassmann, "Worlds in Mind: The Experience of an Outside World in a Community of the Finisterre Range of Papua New Guinea," *Oceania* 64 (1993): 117–45, esp. fig. 1 (B1–B4).

Each of the three maps is accurate, but the spatial accuracy obtains only in a specific context of political claims and relations of power. In other words, each of the three maps is an attempt to illustrate the relevant geographic and social relationships for advancing claims about the loss of Chambri land to rivals. The first map illustrates social relationships largely in terms of egalitarian exchanges between hereditary trading villages. The second map, which now encompasses actual geographic locations, sets off Chambri lands from those of the Sepik Hills. The third and final map clearly was intended to illustrate geographically rightful Chambri lands and intru-

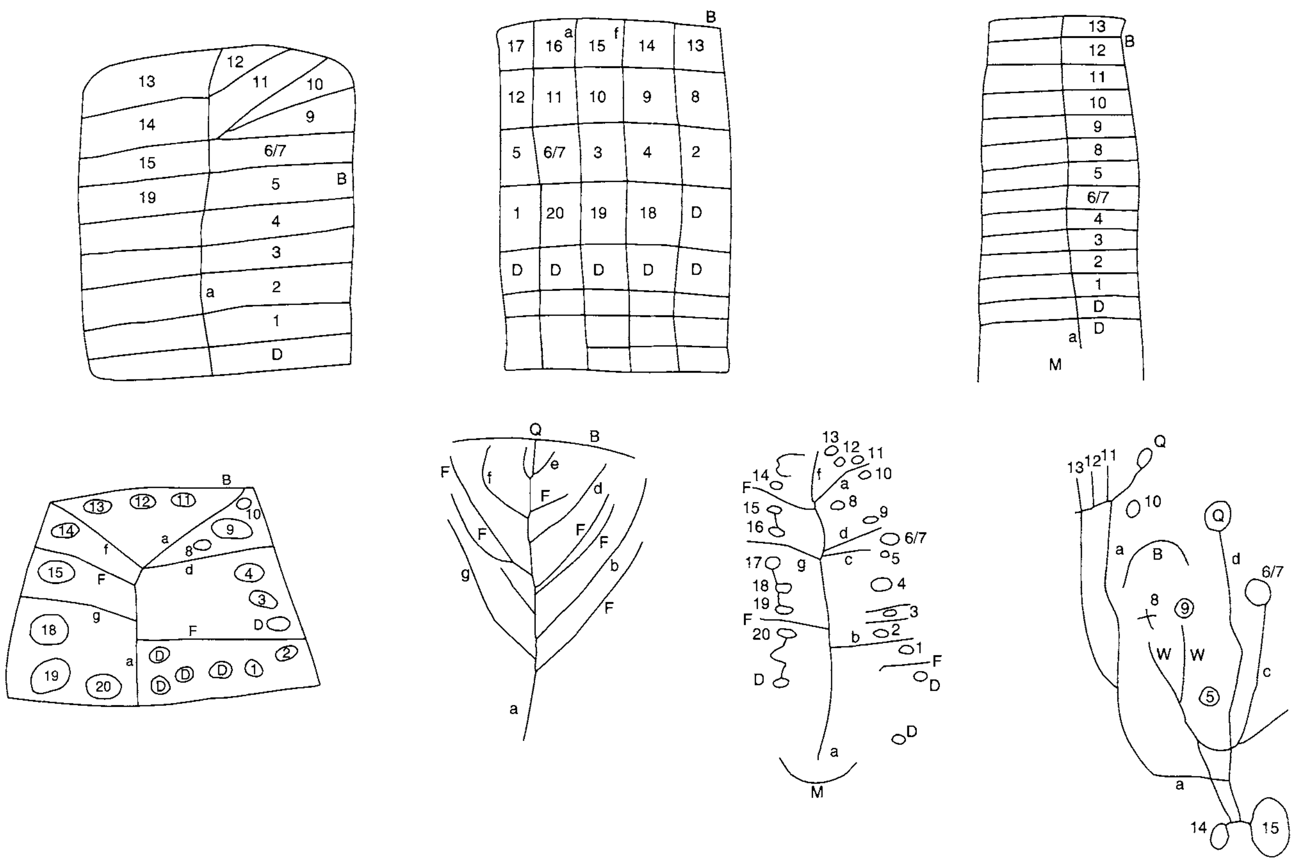


FIG. 12.13. YUPNO MAPS DRAWN BY MEN WHO HAVE EXTENSIVE EXPERIENCE WORKING ON PLANTATIONS AND LIVING IN CITIES. These maps stress two cartographic shifts. The first four maps express increased familiarity with geometric regularization and linearity; these maps, we could say, are more literary. The last three maps are representational in that they attempt to depict the region as it exists in nature rather than mediated entirely by cultural conventions. See also figure 12.15.
After Jürg Wassmann, "Worlds in Mind: The Experience of an Outside World in a Community of the Finisterre Range of Papua New Guinea," *Oceania* 64 (1993): 117–45, esp. fig. 1 (C1–C7).

sions into those lands by Iatmul rivals. This map, Yarapat hoped, would persuade Papua New Guinea land courts to decide future land cases in favor of the Chambri. Despite the incorporation of literacy, these Chambri maps still reflect the constant and fluid nature of traditional representations.[46]

ARTISTIC AND RITUAL MAPS

What I term artistic and ritual maps are also found in Melanesia and Papua New Guinea. Like many of the examples discussed above, these maps are created through what are primarily noncartographic practices. In other words, the representation of space is not the primary focus of the object or event. Hence, these are dramatized protomaps.

Iatmul use four paint colors to adorn human bodies during ceremonies as well as for ritual art: white, black, red, and yellow. The colors form a type of protomap in two respects. First, individual colors refer to specific locations where the pigment is found, since each occurs in only a few places. Any color thus indexes a finite number of spaces. In the context of ritual, however, the geographic evocation of colors is narrowed to a specific lineage or clan–the group that is sponsoring the ritual and whose bodies and sacred objects are painted. These lineage and clan-owned locations are nodes in the ancestral migration routes of the descent group. The color evokes totemism and, specifically, ancestral migrations, which have temporal, spatial, and directional dimensions. When people see the color within the context of art and ritual, they are reminded of these locations and migrations as well as of the ancestors who created them.[47]

46. Gewertz, *Sepik River Societies*, 148.

47. On New Ireland, Malangan funerary art is also related to the memory of the landscape and to land-use rights. The sculptures are not maps per se; you cannot read the landscape from them. But the same

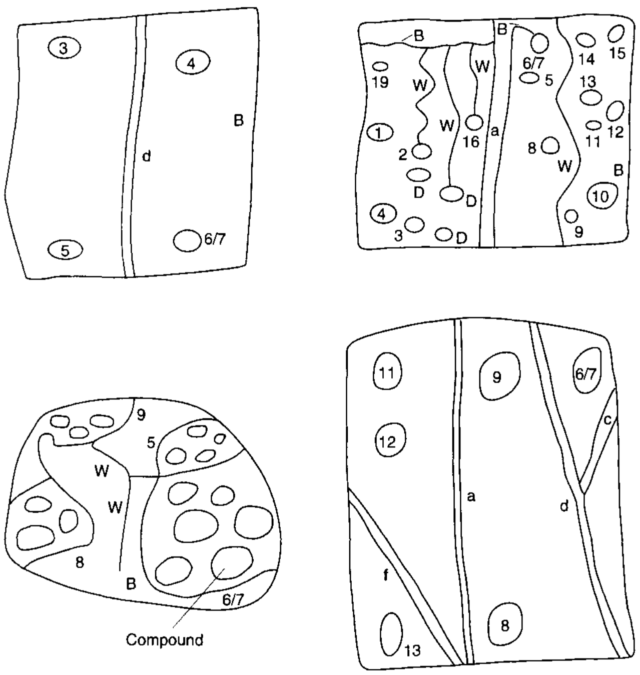


FIG. 12.14. YUPNO MAPS DRAWN BY UNSCHOOLED CHILDREN. These children's maps represent the region as a simple, limited, and bounded space with a central riverine axis and oval villages. They are similar to those drawn by male elders who spent their whole lives within the region (fig. 12.11 above). See also figure 12.15.
After Jürg Wassmann, "Worlds in Mind: The Experience of an Outside World in a Community of the Finisterre Range of Papua New Guinea," *Oceania* 64 (1993): 117–45, esp. fig. 1 (D1–D4).

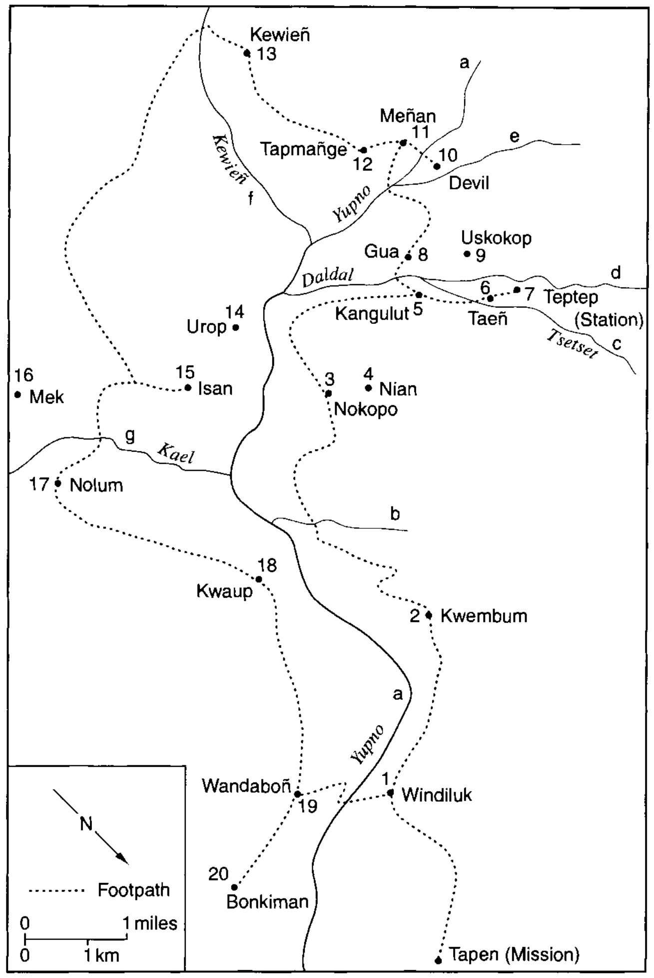


FIG. 12.15. REFERENCE MAP FOR FIGURES 12.11, 12.12, 12.13, AND 12.14. The numbers 1–20 represent Yupno settlements and the letters a–g represent the most important rivers.
After Jürg Wassmann, "Worlds in Mind: The Experience of an Outside World in a Community of the Finisterre Range of Papua New Guinea," *Oceania* 64 (1993): 117–45, esp. 130.

The same can be said for the shell ornaments that adorn dancers and art, since these objects are only found along the coast. They are acquired through gift exchange along two main routes. First, there is down-the-line exchange from the north coast, across the Sepik Plains, to the river. Second, Iatmul travel down the river to visit trading partners in coastal and lower Sepik villages. Like paint colors, therefore, shell ornaments evoke space and thereby form a type of map. But shells tend to evoke not so much ancestral-totemic space as contemporary space, travel, and distance.

One set of prehuman Iatmul ancestors that emerged from the primordial pit are *mai* spirits. These clan- and lineage-specific spirits exist in trios as either elder brother–younger brother–father or brother–sister–father. They created villages along their totemic paths before the emergence of humans. During the *mai* ritual, the masked and costumed dancers who represent the spirits emerge from behind a raised platform and sing totemic songs through bamboo voice modulators as they dance. The backdrop for the platform is a representation of three mountains woven from leaves and bamboo (plate 23). As a map, these three mountains represent the three regions of the world that were created by village ancestors: the land to the north of the Sepik River, the land to the south, and land in the aquatic part of the world (the river and ocean). Each of the three major clans of the village claims one mountain representing a region of the world, which was created by its ancestors. Iatmul represent land as mountains, since the original state of the universe was water, out of which land appeared. Land is constantly being threatened by erosion from the Sepik River, and thus tall mountains are an image of terrestrial stability. Moreover, the horizon of the Sepik River is framed by the interior

mnemonic templates govern the memory of images and the landscape (Susanne Küchler, "Landscape as Memory: The Mapping of Process and Its Representation in a Melanesian Society," in *Landscape: Politics and Perspectives,* ed. Barbara Bender [Oxford: Berg, 1993], 85–106).

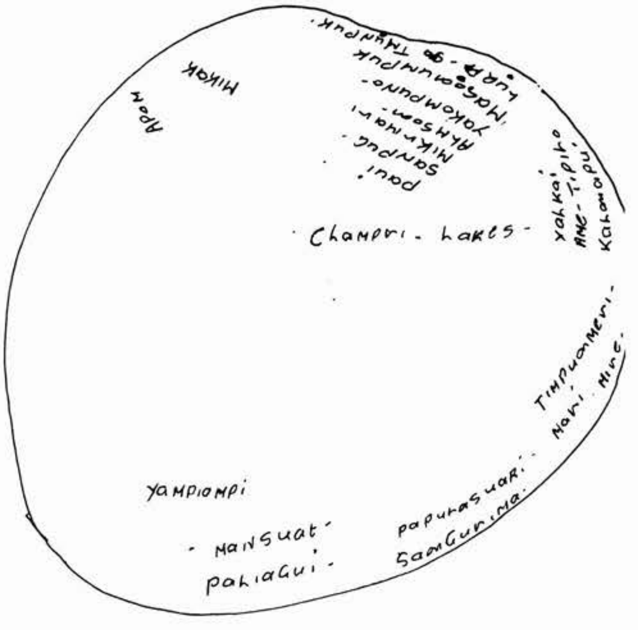


FIG. 12.16. CHAMBRI MAN'S MAP OF VILLAGES WITHOUT CONSIDERATION OF GEOGRAPHIC LOCATION. This map portrays villages and hamlets as trading partners or sets of alliances. They are arrayed in a rough circle around the village of Yarapat (the mapmaker). The map depicts how villages are grouped in social space according to the Melanesian logic of reciprocity: proximity is measured by social closeness, not by space per se. Hence this map does not represent actual geographic location.
From Deborah B. Gewertz, *Sepik River Societies: A Historical Ethnography of the Chambri and Their Neighbors* (New Haven: Yale University Press, 1983), 145.

FIG. 12.17. CHAMBRI MAN'S MAP OF VILLAGES AND HAMLETS INCORPORATING GEOGRAPHIC LOCATION. This map, which is a revision of the map in figure 12.16, begins to depict locations in actual geographic orientation. In this map the center portrays the true geographic locations of islands in Chambri Lake. Outside the lake, however, space is still depicted in terms of social relations, namely, the distinction between the Chambri (mapped geographically) and villages in the Sepik Hills (mapped only in accordance with "distance" from Chambri locations). In essence, then, the center of this map represents geographic space, whereas the surrounding villages are simply mapped according to the logic "not-Chambri," or "peripheral."
From Deborah B. Gewertz, *Sepik River Societies: A Historical Ethnography of the Chambri and Their Neighbors* (New Haven: Yale University Press, 1983), 146.

highlands to the south and the Prince Alexander Mountains to the north. Similarly, the offshore islands such as Wogeo and Manam Islands, visible from the coast and the mouth of the Sepik, are tall volcanoes. In this sense the representation of the three regions of the world as mountains is both geographic and idiomatic.[48]

Another ritual mode of mapping occurs during the *ida* festival of the Umeda, who inhabit the interior West Sepik Province. This elaborate masquerade occurs in four stages. At each stage there is an association between an animal, a mode of human experience (e.g., eating, copulating, killing), a part of the body, a phase of the human life cycle, and most important for our purposes, space conceptualized as a continuum from "inside" to "outside." This continuum is divided into four categories, each correlated with social space. Thus the progression from inside to outside involves the ritual passage through the social categories of people you eat with, people you hunt with, potential marriage and sexual partners, and people who essentially live outside your moral universe and thus are eligible as homicide victims. In this framework, the ritual map dramatizes not actual geographic space but rather social space that is understood in terms of a spatial metaphor of inside-outside. Even in nonritualized contexts, this type of spatial mapping is common in Melanesia (fig. 12.19).[49]

GENDERED MAPS

In many Melanesian societies there is a key relation between gender and the cultural construction of space. As a social practice and a cognitive scheme, gender is a type of lived map. To begin, let me emphasize that many cartographic representations in Melanesia are the result of male action within the ritual domain. To a large degree, Melanesian ritual entails male claims about human and cosmological fertility and reproduction. Moreover,

48. Baskets made by Murik women of the Sepik estuary often have dyed patterns and pleats that symbolize tides, rocks, and islands (Kathleen Barlow, "Women's Textile Arts and the Aesthetics of Domestic Life among the Murik of Papua New Guinea," paper presented at the American Anthropological Association annual meeting, San Francisco, 1996).

49. Richard P. Werbner, *Ritual Passage, Sacred Journey: The Process and Organization of Religious Movement* (Washington, D.C.: Smithsonian Institution Press, 1989), 149–54.

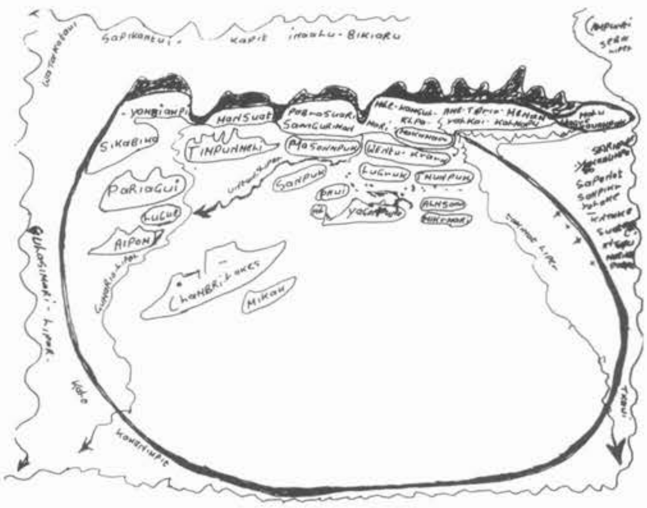
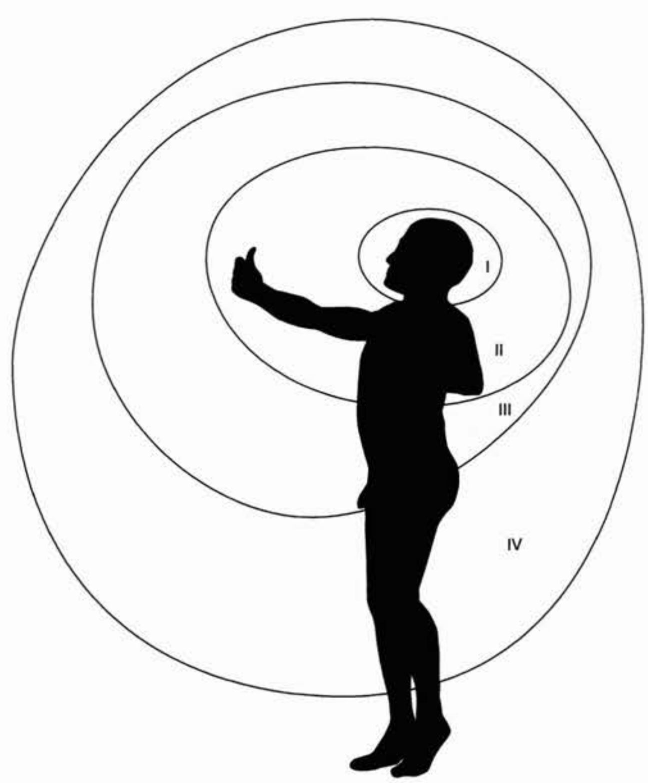


FIG. 12.18. CHAMBRI MAN'S MAP OF CHAMBRI VILLAGES AND IATMUL RIVALS. This, the final map drawn by Yarapat, expands the depiction of locations in geographic space to an entire region. It sets off Chambri villages from their Iatmul rivals, who are off to the right of the map; the four x's divide the two rival groups as they exist in geographic space. However, that Yarapat does not mark the boundary between Chambri villages and the Sepik Hills (above, center) shows that social distance remains a part of the depiction of space. Still, in this map, unlike the first one, there is an attempt to depict rival and allied villages in terms of location rather than simply as pairs.
From Deborah B. Gewertz, *Sepik River Societies: A Historical Ethnography of the Chambri and Their Neighbors* (New Haven: Yale University Press, 1983), 147.



	Mode of experience	Category of character	Microcosm	Macrocosm	Space	Time
I	Eat	Fish	Head	Eating partners	Insiders	Youth
II	Shoot	Arrows	Arms	Hunting partners		
III	Copulate	Cassowaries	Penis/pelvis	Sexual partners		
IV	Kill	Mud men	Torso	Killing nonpartners	Outsiders	Age

FIG. 12.19. STAGES OF THE UMEDA *IDA* RITUAL. The ritual is performed by the Umeda of the interior West Sepik Province. Each of the four stages occurs along a continuum from "inside" to "outside." These spatial divisions are encoded as parts of the body, social relationships, time, mythological figures, and salient modes of local experience. Space or relative location, we could say, is an organizing scheme for the important dimensions of Umeda culture.
After Richard P. Werbner, *Ritual Passage, Sacred Journey: The Process and Organization of Religious Movement* (Washington, D.C.: Smithsonian Institution Press, 1989), fig. 30.

many societies understand men to have stolen ritual *sacra* from women in the distant past.[50] When indigenous maps are part of the wider esoteric system that is owned or controlled by men, they can be said to be ideological statements about men's often exclusive contribution to reproductive power and fertility. These verbal and nonverbal statements become meaningful only when juxtaposed to what are believed to be female powers.

Gender influences space in other respects. Many Melanesian societies have paths within and outside the village or hamlet that are reserved exclusively for one gender. Women are forbidden, for example, to walk along the main paths in Iatmul villages that lead to the all-male cult house. Instead, they have their own paths. In Mekeo villages, bachelors and widowers are not to walk along the main path in the center of the village during daylight.[51]

The Foi, who inhabit the Mubi Valley, understand the Mubi River to be the main geographic axis of orientation. This absolute spatial marker flows southeast. The flow of the river is a metaphor for the course of human life: both move toward the sunrise and the place of ghosts. By contrast, the source of the river is associated with red sunsets, life-giving powers, and sexually attractive youth. The movement of pearl shells parallels the flow of the river. These valuables, which are obtained at the source of the river, are used in marriage exchanges and thus enable life and sociality. Generally speaking, upstream has a male inflection, whereas the river flows in a feminine direction. Similarly, Foi delineate male and female space within domestic houses. This gendered map of the Mubi Valley also has a somatic or alimentary metaphor: the source is as-

50. Alan Dundes, "A Psychoanalytic Study of the Bullroarer," *Man*, n.s. 11 (1976): 220–38; Terence E. Hays, "'Myths of Matriarchy' and the Sacred Flute Complex of the Papua New Guinea Highlands," in *Myths of Matriarchy Reconsidered*, ed. Deborah B. Gewertz (Sydney: University of Sydney Press, 1988), 98–120.

51. Epeli Hau'ofa, *Mekeo: Inequality and Ambivalence in a Village Society* (Canberra: Australian National University Press, 1981).

sociated with the mouth and eyes, whereas the direction of death is associated with the anus. Finally, a relative upper-lower division overlays the absolute male-female partition of the valley. Things that are above are associated with male hunting; things that are below conjure female fishing and horticulture.[52]

Conclusion

Overall, this chapter has provided a heuristic scheme that introduces and organizes the variety of ways traditional Melanesian societies represent space and create protomaps and maps. Two themes emerge. First, indigenous mapping techniques are the product of culture. They are socially embedded in the salient themes and categories used to organize social life. I have followed the noted symbolic anthropologist Clifford Geertz, who wrote: "The concept of culture I espouse . . . is essentially a semiotic one. Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs."[53] I have argued that indigenous maps in Papua New Guinea and Melanesia are guides constructed by and for local people as they navigate through culture, social life, and the lived environment. Their maps are not just about space but are ultimately about culture. There may indeed be universal, cross-culturally valid forms of mapping, but indigenous experience is localized rather than universal. Local lives have local meanings. Like all forms of knowledge, maps can be fully understood only with reference to local realities.

Second, the oral nature of traditional Melanesian societies and the relation between knowledge and power often situates indigenous maps in a contested political space. This, I believe, is understood by most Melanesians and Papua New Guineans. Social life is a complex web of meanings. But meanings are often the product of contests over material and symbolic capital–of competition over resources and prestige. Maps represent these competitions insofar as they are fashioned by men and sometimes women who have vested interests in the social construction and allocation of space, location, direction, and topography. Indigenous mapping is not objective, and thus cartographic discourse is part of wider social practices through which Melanesian and Papua New Guinean lives are imbued with meaning, passion, and strategy.

52. James F. Weiner, *The Heart of the Pearl Shell: The Mythological Dimension of Foi Sociality* (Berkeley: University of California Press, 1988), 46–50. For similar spatial divisions along the lines of gender, see Wagner, *Habu*, 43–44 (note 32), and Brenda Johnson Clay, *Pinikindu: Maternal Nurture, Paternal Substance* (Chicago: University of Chicago Press, 1975), 86.

53. Clifford Geertz, *The Interpretation of Cultures* (New York: Basic Books, 1973), 5. See also Eric Kline Silverman, "Clifford Geertz: Towards a More Thick Understanding?" in *Reading Material Culture*, ed. Christopher Tilley (Oxford: Basil Blackwell, 1990), 121–59.

13 • Nautical Cartography and Traditional Navigation in Oceania

BEN FINNEY

MENTAL CARTOGRAPHY

The navigational practices of Oceanians present somewhat of a puzzle to the student of the history of cartography. Here were superb navigators who sailed their canoes from island to island, spending days or sometimes many weeks out of sight of land, and who found their way without consulting any instruments or charts at sea. Instead, they carried in their head images of the spread of islands over the ocean and envisioned in the mind's eye the bearings from one to the other in terms of a conceptual compass whose points were typically delineated according to the rising and setting of key stars and constellations or the directions from which named winds blow. Within this mental framework of islands and bearings, to guide their canoes to destinations lying over the horizon these navigators applied vital information obtained by watching with the naked eye the stars, ocean swells, steady winds, island-influenced cloud formations, land-nesting birds fishing out at sea, and other cues provided by nature.

Among the few places in the Pacific where traditional navigation is still practiced are several tiny atolls in the Caroline Islands of Micronesia. In his study of traditional Carolinian navigation, anthropologist Thomas Gladwin captured the essence of how at sea a master navigator relies solely on his senses and a mental image of the islands around him. "Everything that really matters in the whole process goes on in his head or through his senses. All he can actually see or feel is the travel of the canoe through the water, the direction of the wind, and the direction of the stars. Everything else depends upon a cognitive map, a map which is both literally geographical and also logical."[1] A number of geographers, psychologists, and other scholars have written about how people form "cognitive maps" or "mental maps" of the world around them.[2] But whereas most of these studies have focused primarily on the general processes by which children and ordinary adults form and utilize images of their surroundings, this chapter explores the highly structured ways professional navigators from the Pacific Islands mentally charted the environment of sea, islands, swells, winds, stars, and other features vital to their art, and then employed these formal images and their own sense perceptions to guide their canoes over the ocean.

The idea of physically portraying their mental images was not alien to these specialists, however. Early Western explorers and missionaries recorded instances of how indigenous navigators, when questioned about the islands surrounding their own, readily produced maps by tracing lines in the sand or arranging pieces of coral. Some of these early visitors drew up charts based on such ephemeral maps or from information their informants supplied by word and gesture on the bearing and distance to the islands they knew.

Furthermore, on some islands master navigators taught their pupils a conceptual "star compass" by laying out coral fragments to signify the rising and setting points of key stars and constellations. Once their pupils had mastered the star compass, they were required to imagine a series of "island charts" by mentally placing successive islands at the center of the compass and then reciting the islands, reefs, and other navigationally important features to be found by sailing along each star bearing. In the Marshall Islands, and only there, navigators skilled at reading the way islands disrupt the patterning of the deep ocean swells made "stick charts" depicting islands and their effect on the swells. These charts were used to teach students and as mnemonic aids to be consulted before a voyage. Yet when these navigators set sail, they did not take with them any such physical representations of islands, star positions, or swell patterns to aid them in their task. A wealth of ethnographic evidence, which began accumulating with the observations of Captain James Cook and other early explorers, in conjunction with contem-

1. Thomas Gladwin, *East Is a Big Bird: Navigation and Logic on Puluwat Atoll* (Cambridge: Harvard University Press, 1970), 195.

2. For example, Peter Gould and Rodney White, *Mental Maps*, 2d ed. (Boston: Allen and Unwin, 1986); Benjamin Kuipers, "The 'Map in the Head' Metaphor," *Environment and Behavior* 14 (1982): 202–20; William Bunge, *Theoretical Geography*, 2d ed. (Lund, Sweden: Gleerup, 1966), 39–52; Dedre Gentner and Albert L. Stevens, eds., *Mental Models* (Hillsdale, N.J.: Lawrence Erlbaum, 1983); Gary L. Allen et al., "Developmental Issues in Cognitive Mapping: The Selection and Utilization of Environmental Landmarks," *Child Development* 50 (1979): 1062–70; and David S. Olton, "Mazes, Maps, and Memory," *American Psychologist* 34 (1979): 583–96.

porary research carried out at sea with the few surviving traditional navigators and with islanders who are now learning this ancient art, indicates how these seafarers mentally charted their oceanic world.

Not surprisingly, standard histories of cartography focused on physical map artifacts have largely ignored the way Oceanic navigators mentally charted the islands, stars, and swells. To be sure, the fascinating stick charts showing how islands disrupt ocean swells have been mentioned in such works.[3] But these devices were used by navigators from only one archipelago and, like other physical representations made by Pacific navigators, were not employed at sea. How these navigators conceptualized the location of islands, set their course toward them, dead reckoned along the way, and then made landfall–all without consulting any physical charts while at sea–has, however, been extensively discussed in the historical and anthropological literature dealing with the colonization of the islands, canoe voyaging, and techniques of navigation.[4] In addition, an effort I initiated in the 1960s to reconstruct ancient voyaging canoes, relearn traditional ways of navigating, and then test these over the long sea routes of Polynesia has further focused interest on this subject.[5] This chapter draws on what we have learned from historical, anthropological, and experimental investigations of Pacific Island navigation to bring this fascinating Oceanic tradition into the discussion of the general development of cartography on our planet.

After introductory remarks on the early European exploration of the region, I examine the first bits of cartographic evidence of indigenous geographical knowledge of Pacific Islanders to be brought to the attention of the Western world. These came in the form of four charts–one from Polynesia and three from Micronesia–drawn by early Western explorers and missionaries based on geographical information supplied by island navigators.

These charts alerted the outside world that these Stone Age navigators could locate considerable numbers of islands within a wide radius of their own. But they did not provide any insights into the way the navigators themselves mapped the islands, ocean swells, star paths, and all the other features of their oceanic environment vital to the practice of their craft. To inquire into indigenous nautical cartography, we must first appreciate the general principles by which these consummate navigators guided their canoes. Following an outline of these principles, this chapter reviews the navigational methods and associated cartographic practices of two distinct, though related, navigational traditions from Micronesia, selected because the documentation on them by far exceeds that available on other Pacific systems. The first, from the Caroline Islands, is an essentially celestial system that involves various ways of mapping the stars and islands, both on the ground and in the mind, and of using the way the bearings among these change throughout a voyage to elegantly chart the progress of a canoe toward its destination. The second, from the Marshall Islands, focuses on the sea rather than the sky. The navigators there took a general Oceanic technique–detecting the presence of an island before it can be seen by the way it disrupts the regular ocean swells–and developed it into a highly sophisticated method for finding their way among the atolls of their archipelago. It was they who made the famous stick charts to represent and teach the way swells are reflected, refracted, and diffracted by islands in their path.

The European Penetration of Remote Oceania

When Magellan made the first known crossing in 1520, he was not just exploring the ocean he christened the Pacific. His goal was to find a new route to the spices grown on the islands scattered off the southeastern tip of Asia. For more than two centuries thereafter, it was primarily the desire to gain access to the riches of Asia that drove Europeans to cross this widest of the world's oceans–not any passion for exploration per se. Even the establishment by the Spanish of annual trading voyages between their possessions in the Philippines and those of the New World added little to the outside world's know-

3. For example, Leo Bagrow, *History of Cartography,* 2d ed., rev. and enl. R. A. Skelton (Chicago: Precedent, 1985), 27–28; Norman J. W. Thrower, *Maps and Civilization: Cartography in Culture and Society* (Chicago: University of Chicago Press, 1996), 4–7; Gordon R. Lewthwaite, "Geographical Knowledge of the Pacific Peoples," in *The Pacific Basin: A History of Its Geographical Exploration,* ed. Herman Ralph Friis (New York: American Geographical Society, 1967), 57–86, esp. 73–74; and Michael Blakemore, "From Way-Finding to Map-Making: The Spatial Information Fields of Aboriginal Peoples," *Progress in Human Geography* 5 (1981): 1–24, esp. 19–20.

4. For example, Jack Golson, ed., *Polynesian Navigation: A Symposium on Andrew Sharp's Theory of Accidental Voyages,* rev. ed. (Wellington: Polynesian Society, 1963); David Lewis, *We, the Navigators: The Ancient Art of Landfinding in the Pacific,* 2d ed., ed. Derek Oulton (Honolulu: University of Hawai'i Press, 1994); Gladwin, *East Is a Big Bird* (note 1); Ward Hunt Goodenough, *Native Astronomy in the Central Carolines* (Philadelphia: University Museum, University of Pennsylvania, 1953); Andrew Sharp, *Ancient Voyagers in the Pacific* (Wellington: Polynesian Society, 1956); and the many entries listed in Nicholas J. Goetzfridt, comp., *Indigenous Navigation and Voyaging in the Pacific: A Reference Guide* (New York: Greenwood Press, 1992).

5. David Lewis, "Ara Moana: Stars of the Sea Road," *Journal of the Institute of Navigation* 17 (1964): 278–88; Will Kyselka, *An Ocean in Mind* (Honolulu: University of Hawai'i Press, 1987); Ben R. Finney, "Rediscovering Polynesian Navigation through Experimental Voyaging," *Journal of Navigation* 46 (1993): 383–94; idem, *Voyage of Rediscovery: A Cultural Odyssey through Polynesia* (Berkeley: University of California Press, 1994); idem, "Voyaging Canoes and the Settlement of Polynesia," *Science* 196 (1977): 1277–85; and idem, "Colonizing an Island World," in *Prehistoric Settlement of the Pacific,* ed. Ward Hunt Goodenough (Philadelphia: American Philosophical Society, 1996), 71–116.

ledge of the Pacific and its peoples. In fact, for more than two centuries galleons sailed across the Polynesian triangle on the leg from Mexican ports to Manila without realizing they were traversing one of the great cultural provinces of the world. The few exploratory voyages into the Pacific during this era could not be called scientific, for their leaders were searching for rich lands thought to lie there. Examples include the attempts in the sixteenth and seventeenth centuries by Alvaro Mendaña de Neira, Pedro Fernández de Quirós, Jakob Le Maire, Willem Schouten, and others to find Terra Australis Incognita, the great continent that cosmographers of that era thought must lie in the southern reaches of the Pacific.[6]

When European navigators did chance upon islands in the middle of the ocean, they were surprised to find that virtually every one was already inhabited. On islands lying thousands of miles out to sea from any continental shore they were perplexed to find thriving populations that had no ships, charts, or navigational instruments. How, wondered these proud navigators from the other side of the world, could people who apparently had none of the equipment essential for deep sea voyaging have reached islands spread over an ocean that, to quote one of Magellan's chroniclers, was "so vast that the human mind can scarcely grasp it"?[7]

Europeans consequently offered a variety of ingenious hypotheses to explain how the islands they found had come to be populated. When, for example, the second Mendaña expedition made landfall in 1595 on the Marquesas Islands some four thousand nautical miles[8] to the west of Peru, the expedition's navigator, Pedro Fernández de Quirós, judged the people there to be "without skill or the possibility of sailing to distant parts."[9] To account for their presence on these remote islands, Quirós posited that just to the south of the Marquesas there must be a long chain of closely spaced islands extending eastward from Asia that had enabled people of such limited technology to penetrate so far into the ocean.[10] Similarly, when on Easter Day 1722 the Dutch navigator Jacob Roggeveen happened across the speck of land he thereby christened Paasch Eylandt (Rapa Nui), he was at such a complete loss to explain how Stone Age people with only small, frail canoes at their disposal could be living on such an isolated island that he proposed they must have been separately created there by God.[11] Even as late as 1772, the French navigator Julien Crozet conjured up a sunken continent to explain how peoples so similar in language and culture could be living on islands strewn two thousand miles across the South Pacific, from Tahiti to Aotearoa (New Zealand). Since they did not seem to have the means to sail long distances, he concluded they must be survivors of a race once spread over a vast continent that subsequently broke up and sank in a tremendous volcanic cataclysm, sparing only those living on mountaintops high enough to remain above sea level and thereby become islands.[12]

The real European discovery of the islands of Remote Oceania did not begin until the dawn in the late eighteenth century of what Goetzmann has called the second great age of discovery.[13] By then better ships and navigational methods, as well as new ideas about nutrition, had made it easier to undertake prolonged voyages of exploration. Of greater importance for our purposes was a new attitude toward exploration. Driven by Enlightenment goals, this was the era when explorers from England, France, and Spain, and later Russia and the United States, sailed the Pacific to chart the islands and study their flora, fauna, and inhabitants as well as to pursue geopolitical goals.

Captain James Cook opened this new era of Pacific exploration with three grand voyages made between 1769 and 1778, during which this quintessential Enlightenment explorer charted scores of islands previously unknown to the outside world. Among other things, he learned enough of the languages and customs of the peoples he encountered to literally discover Polynesia by recognizing that all the peoples living on the islands bounded by Hawai'i, Rapa Nui (Easter Island), and Aotearoa (New Zealand) belonged to the "same nation."[14] On his first voyage, in 1769, Cook was sent by the Admiralty to the island of Tahiti, which had been "discovered" two years before by another British navigator, Samuel Wallis. There his task, which had been formulated by the Royal

6. J. C. Beaglehole, *The Exploration of the Pacific* (London: A. and C. Black, 1934), 69–165.

7. Maximilian Transylvanus, in a letter to the cardinal-archbishop of Salzburg written in 1522, cited in James Cook, *The Journals of Captain James Cook on His Voyages of Discovery,* 4 vols., ed. J. C. Beaglehole, Hakluyt Society, extra ser. nos. 34–37 (London: Hakluyt Society, 1955–74), vol. 4, *The Life of Captain James Cook,* by J. C. Beaglehole, 109 and n. 1.

8. Hereafter, all distances given in miles refer to nautical miles. One nautical mile equals 1.15 statute (land) miles and 1.85 kilometers.

9. *La Austrialia del Espíritu Santo,* 2 vols., trans. and ed. Celsus Kelly, Hakluyt Society, ser. 2, nos. 126–27 (Cambridge: Cambridge University Press, 1966), 2:309.

10. Pedro Fernández de Quirós [Queirós], *The Voyages of Pedro Fernandez de Quiros, 1595 to 1606,* 2 vols., trans. and ed. Clements R. Markham, Hakluyt Society, ser. 2, nos. 14–15 (London: Hakluyt Society, 1904), 1:152.

11. Jacob Roggeveen, *The Journal of Jacob Roggeveen,* ed. Andrew Sharp (Oxford: Clarendon Press, 1970), 101, 153–54.

12. Julien Marie Crozet, *Nouveau voyage à la Mer du Sud,* ed. Alexis Marie de Rochon (Paris: Barrois, 1783), 48 and 153–55.

13. William H. Goetzmann, *New Lands, New Men: America and the Second Great Age of Discovery* (New York: Viking, 1986), 1–5.

14. Ben R. Finney, "James Cook and the European Discovery of Polynesia," in *From Maps to Metaphors: The Pacific World of George Vancouver,* ed. Robin Fisher and Hugh Johnston (Vancouver: University of British Columbia Press, 1993), 19–34, esp. 20.

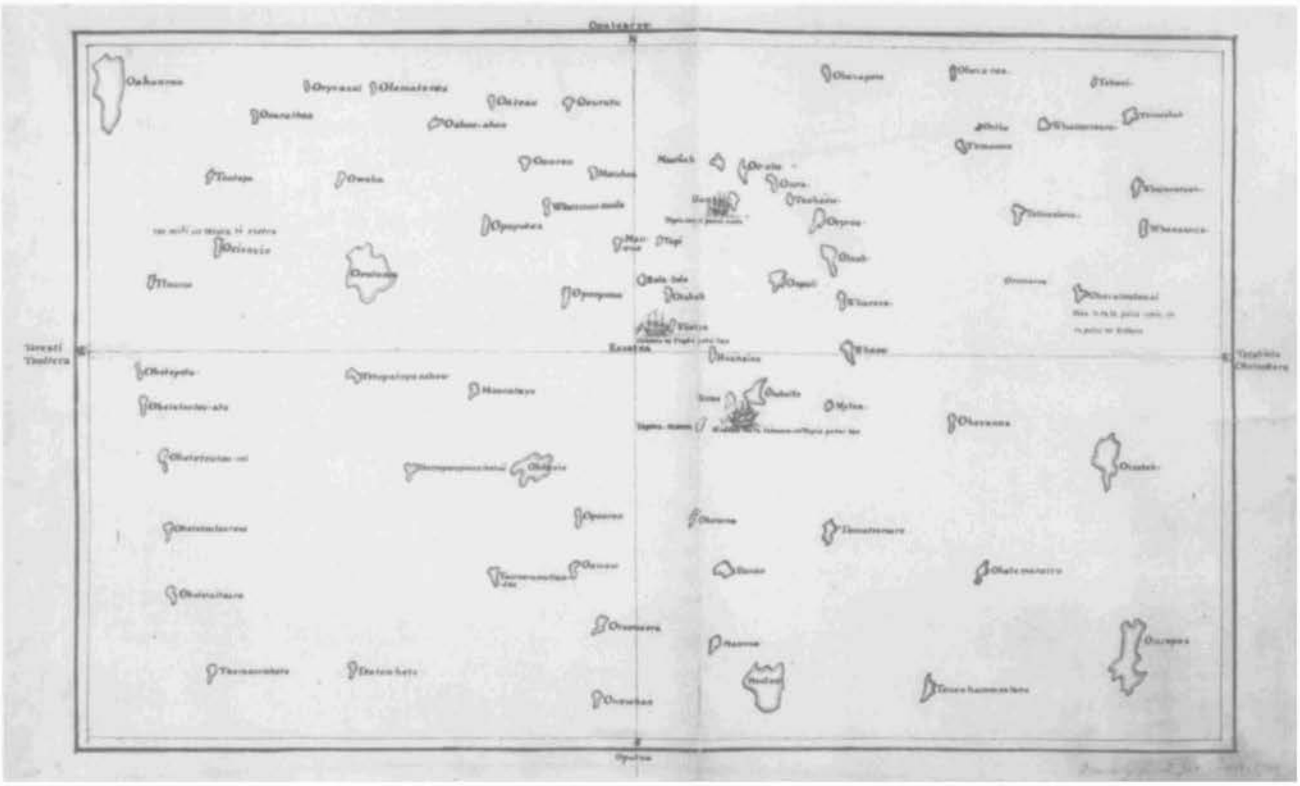


FIG. 13.1. "TUPAIA'S CHART" (COOK VERSION). This chart represents the geographical knowledge of a remarkable Tahitian named Tupaia. It was drafted in 1769 by Lieutenant James Cook during his historic visit to Tahiti and neighboring islands. The chart, which apparently is a copy of a lost original, shows Tahiti at the center with seventy-four islands arranged around it. Many of the islands cannot now be exactly identified, however, and among those that can be identified many were misplaced, apparently because the British did not properly understand Tahitian directional terms. After restoring the islands in question to their proper position, it can arguably be said the chart indicated that Tupaia had a wide, if inexact, knowledge of islands spread over forty degrees of longitude and twenty degrees of latitude, an oceanic realm larger than that of the continental United States.
Size of the original: ca. 21 × 33.5 cm. By permission of the British Library, London (Add. [Banks] 21,593.c).

Society, was to observe the transit of Venus across the face of the sun as part of an international effort to determine the distance between the earth and the sun. Although Cook was not satisfied with the accuracy of his observations, he did become excited by what he learned from the Tahitians about their seafaring skills, the range of their voyaging, and their extensive knowledge of the islands in their part of the Pacific.

Early Charts Drawn by European Explorers and Missionaries

Tupaia's Chart of Polynesia

When Cook reached Tahiti aboard HMS *Endeavour,* he and his chief scientist, the naturalist Joseph Banks, did something virtually without precedent among previous European navigators who ventured into the Pacific. They stayed put for months, made friends with the people, and learned the rudiments of their language. One of their new acquaintances was a man named Tupaia, a priest, adviser to high chiefs, and fount of indigenous knowledge on geography, meteorology, and navigation. Among other things, this Tahitian polymath told Cook about the many islands surrounding Tahiti and described how he and his fellow Tahitians sailed to and from them, sometimes remaining at sea for weeks at a time. Cook admired the Tahitians' canoes and readily accepted the possibility that "these people sail in those seas from Island to Island for several hundred Leagues, the Sun serving them for a compass by day and the Moon and Stars by night."[15] He was therefore predisposed to believe Tupaia and pressed him for more precise geographical information, which he thought might be useful for future explorations of the South Seas. The Tahitian responded by dictating a long

15. Cook, *Journals,* vol. 1, *The Voyage of the Endeavour, 1768–1771,* 154, 291–94 (note 7).

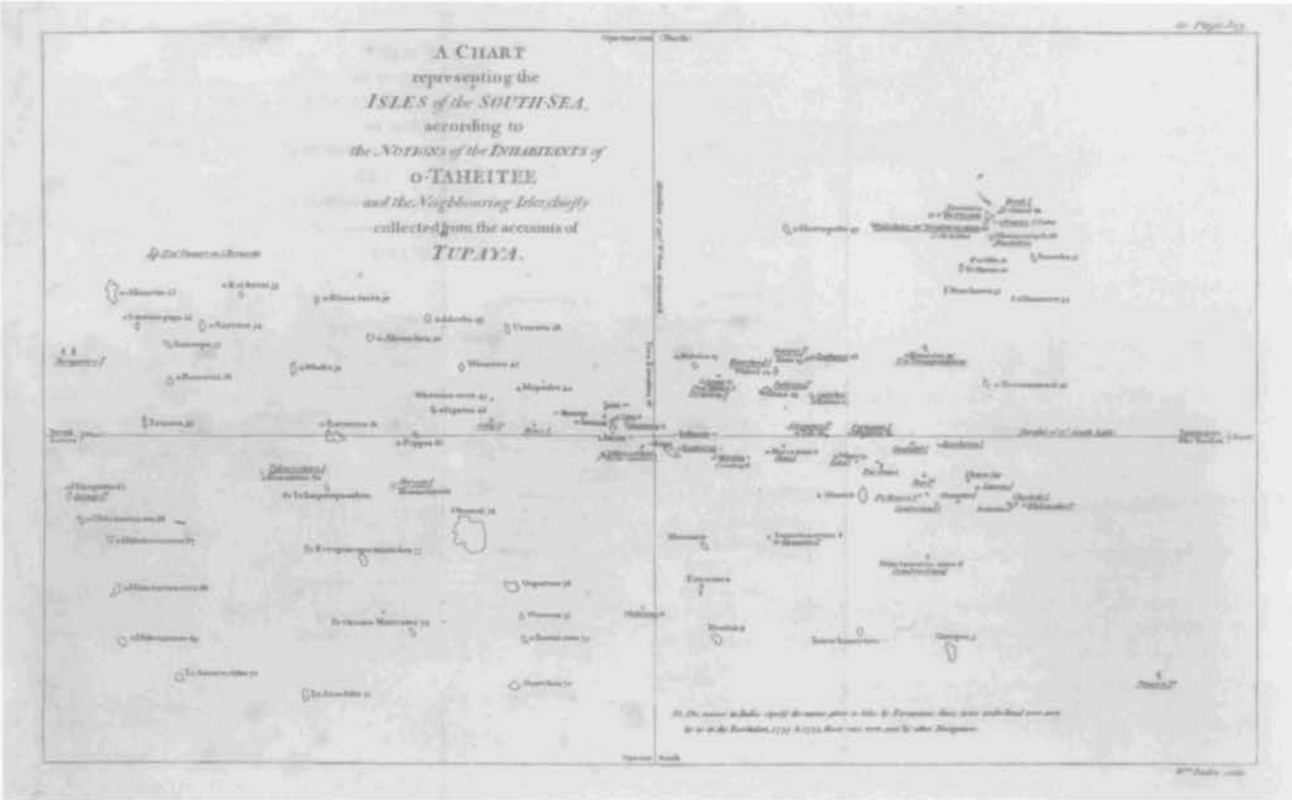


FIG. 13.2. "TUPAIA'S CHART" (FORSTER VERSION). Johann Reinhold Forster, the naturalist on Cook's second expedition to Tahiti, had this version drafted from a copy he received from Lieutenant Pickersgill, who served with Cook on his first Pacific voyage. It differs from Cook's version in the placement, size, and spelling of some islands. Forster also labeled those islands visited by Europeans with their European names.
From Johann Reinhold Forster, *Observations Made during a Voyage Round the World* (London: Robinson, 1778), opp. 513. Photograph courtesy of the Library of Congress, Washington, D.C.

list of islands from which a chart was drawn depicting the location of seventy-four of them relative to Tahiti (fig. 13.1).[16]

This most famous example from the Pacific of a chart drawn by Westerners but based on indigenous geographical knowledge has been widely discussed over the past two centuries because it arguably indicates that Tahitians knew about islands spread over more than forty degrees of longitude and twenty degrees of latitude–an oceanic realm larger than the continental United States. This, however, is a liberal reading of the chart, for there are many problems with the identification and placement of the islands depicted, particularly those more than a few hundred miles from Tahiti, raising serious questions about the quality of Tupaia's geographical knowledge as well as the process by which his mental map of the islands surrounding Tahiti was transferred onto paper.

It is not even clear who drew the original chart, which apparently has not survived. Cook wrote in his journal about a chart that had been "drawn by Tupia's [Tupaia's] own hands," yet the earliest version of it that survives today bears the legend "Drawn by Lieut. James Cook 1769."[17] Johann Forster, the naturalist on Cook's second voyage into the Pacific who took a great interest in the chart and its Tahitian source, published an entirely different account of how the chart was drawn. He reported that after Tupaia had "perceived the meaning and use of charts, he gave directions for making one according to his account, and always pointed to the part of the heavens, where each isle was situated, mentioning at the same time that it was either larger or smaller than Taheitee, and likewise whether it was high or low, whether it was peopled or not, adding now and then some curious accounts relative to some of them."[18] Unfortunately, Forster neglected to specify who did the drawing.

16. Cook, *Journals*, vol. 1, *The Voyage of the Endeavour, 1768–1771*, 291–94.

17. Cook, *Journals*, vol. 1, *The Voyage of the Endeavour, 1768–1771*, 293–94 and n. 1, and James Cook, *The Journals of Captain James Cook on His Voyages of Discovery: Charts and Views Drawn by Cook and His Officers and Reproduced from the Original Manuscripts*, ed. R. A. Skelton (Cambridge: Cambridge University Press, 1955), viii, chart XI.

18. Johann Reinhold Forster, *Observations Made during a Voyage Round the World* (London: Robinson, 1778), 511.

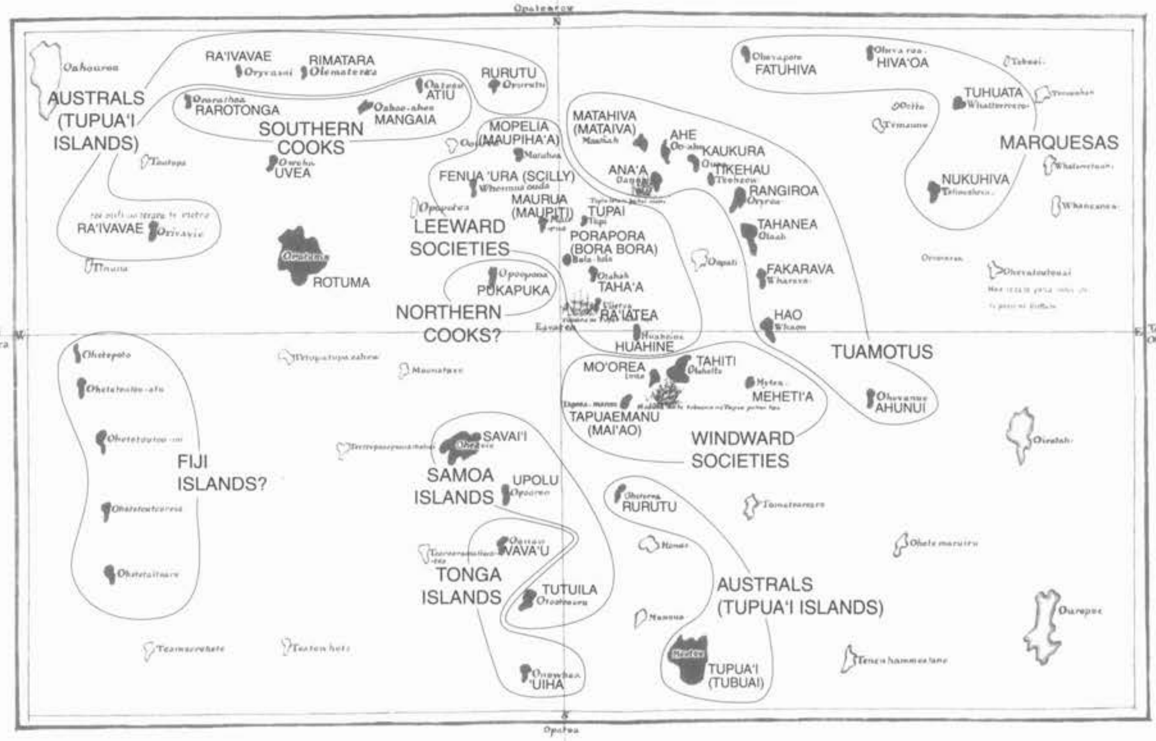


FIG. 13.3. IDENTIFIED ISLANDS ON COOK'S VERSION OF "TUPAIA'S CHART" AND THEIR GROUPING BY ARCHIPELAGO. The islands that can be identified with varying degrees of certainty are shaded and labeled in block letters with their current names. Problems with Cook's spelling of the island names dictated to him by Tupaia, along with Tupaia's apparent use of archaic or alternative names for many islands, makes it difficult to identify more than about forty-five of the seventy-four islands on Tupaia's chart. Grouping the identified islands by archipelago, and then comparing their placement with the actual distribution of islands and archipelagoes (fig. 13.4), shows that many of the islands unknown to Europeans were misplaced on the chart, perhaps because the English misunderstood the Tahitian words for south and north and reversed them in drawing the chart and interpreting Tupaia's directions.

Whatever the case, until the publication in 1955 of Cook's version, discussion of Tupaia's chart primarily revolved around an apparently third-generation copy published by Forster in 1778 (fig. 13.2).[19] The naturalist reported that he had it engraved from a copy of the original chart, which had been lent to him by Lieutenant Richard Pickersgill, an officer from Cook's first Pacific voyage. He also wrote that he had compared Pickersgill's copy with another copy held by Banks and found that the two differed only in a few details. The second copy consulted was almost certainly the one drawn by Captain Cook himself, for we know that after their voyage Banks kept Cook's version, and that on Banks's death it was transferred to the British Museum, where it lay buried for a century and a half.

After the publication of Forster's engraving, Tupaia's chart was generally viewed as evidence of far-ranging indigenous geographical knowledge, an interpretation made credible by tales told about his navigational feats. The Tahitian joined the *Endeavour* for the return to England at the invitation of Banks, who apparently wanted to learn more about his extensive knowledge of geography, astronomy, and navigation as well as (one suspects from reading Banks's journal) to introduce him to London society as a native savant. After leaving Tahiti, Tupaia piloted the *Endeavour* through the leeward Society Islands just to the west-northwest of Tahiti and then on to Rurutu, a small volcanic island three hundred miles to the south.[20] Tupaia gained further fame among his Eng-

19. However, some Continental scholars writing in German followed still another third-generation copy, a crude one made by Johann Forster's son George, in which the Tuamotu and Marquesas Islands have been left out in order to include a detailed legend in the upper right quadrant. See, for example, Richard Andree, *Ethnographische Parallelen und Vergleiche* (Stuttgart: J. Maier, 1878), 207, and Bruno F. Adler, "Karty pervobytnykh narodov" (Maps of primitive peoples), *Izvestiya Imperatorskago Obshchestva Lyubiteley Yestestvoznanya, Antropologii i Etnografii: Trudy Geograficheskago Otdeliniya* (Proceedings of the Imperial Society of the Devotees of National Sciences, Anthropology, Ethnography: Transactions of the Division of Geography) 119, no. 2 (1910), 195–96.

20. Cook, *Journals*, vol. 1, *The Voyage of the Endeavour, 1768–1771*, 140–57 (note 7), and Joseph Banks, *The Endeavour Journal of Joseph Banks, 1768–1771*, 2 vols., ed. J. C. Beaglehole (Sydney: Angus and Robertson, 1962), 1:312–33.

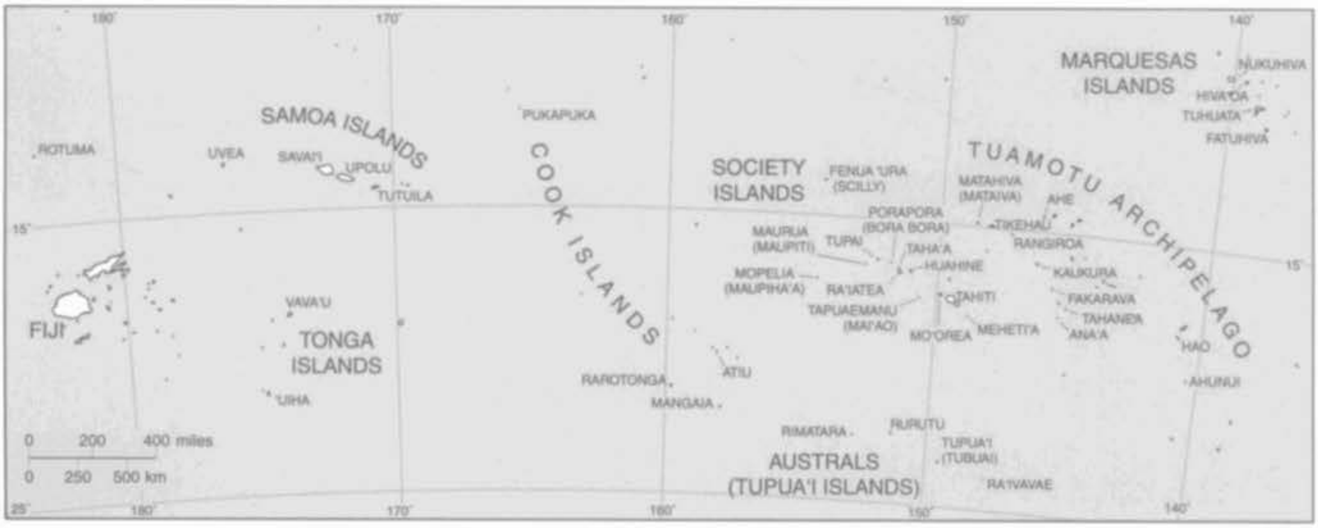


FIG. 13.4. MODERN MAP OF THE REGION COVERED BY TUPAIA'S CHART. Only those islands that can be identified on Tupaia's chart with some certainty are labeled.

lish hosts by demonstrating his dead reckoning skills during the long voyage across the Pacific to Aotearoa (New Zealand), around Australia, and then to Java. Whenever they asked him to indicate the bearing back to Tahiti, to their astonishment they found on checking their compass and charts that he "could always point out the direction in which Taheitee was situated" no matter what had been the twists and turns of the ship's track.[21]

But the Tahitian expert never reached England. Tupaia, who had not been well during the voyage, fell seriously ill and died while the *Endeavour* was in dry dock in the pestilential port of Batavia (now Jakarta). Although Banks had not fully plumbed the depths of his colleague's knowledge, Forster's engraving of Tupaia's chart and the accounts cited above of his navigational skills were enough to establish respect in European scientific circles for Tahitian geographical knowledge and navigational skill. Yet as Western explorers began to fill in the blank spaces of their own charts of the Pacific with islands precisely fixed in terms of latitude and longitude, it became obvious that although some of the readily identifiable islands on Forster's version of Tupaia's chart seemed to be located more or less correctly in relation to Tahiti, others were drawn far from their true positions. There then followed a long succession of attempts to make sense of this enigmatic chart by attempting to decipher more of the island names and to explain why so many islands were not placed where they should be on the chart.[22]

Deciphering Cook's transcriptions of island names is made easier by first stripping away the initial O from many of them, for it simply means "it is." Then Cook's often atrocious renderings of what Tupaia told him have to be converted into the more phonetic spellings used today. Following these steps, Cook's "Otaheite" is easily identified as Tahiti. Yet many islands remain unidentified even after making such orthographic conversions–perhaps because Tupaia often used archaic Tahitian titles for distant islands that are now known by entirely different names. Thus it is possible to identify, and just tentatively in a good number of cases, only about forty-five of the seventy-four islands on the chart (fig. 13.3). Grouping these by archipelago makes it clear that something is very wrong with the chart. Whereas some islands are more or less correctly placed in relation to Tahiti, others have somehow drifted far from where they should lie (see fig. 13.4). The person who made the most sense of this confusion was Horatio Hale, a young philologist on the United States Exploring Expedition, which cruised the Pacific from 1838 to 1842 and spent considerable time at Tahiti. To Hale, the key was to be found in the Tahitian directional terms printed at the top and bottom of Forster's chart (and Cook's as well, though Hale had no way of knowing that): *opatoarow* and *opatoa*, which can be written more phonetically as *apato'erau* and *apato'a*. Hale contended that Cook and his colleagues, who had only a rudimentary knowledge of Tahitian, assumed that since *to'erau* signified the north or northwest wind and *to'a* the wind from the south, *apato'erau* must mean north and *apato'a* south. Hale claimed the reverse.

21. Forster, *Observations*, 509, 531 (note 18).

22. Of the many attempts to make sense of Tupaia's chart and the list of islands he dictated to Cook, among the best are Greg M. Dening, "The Geographical Knowledge of the Polynesians and the Nature of Inter-island Contact," in *Polynesian Navigation: A Symposium on Andrew Sharp's Theory of Accidental Voyages*, ed. Jack Golson, rev. ed. (Wellington: Polynesian Society, 1963), 102–53, and Gordon R. Lewthwaite, "The Puzzle of Tupaia's Map," *New Zealand Geographer* 26 (1970): 1–19. The following analysis leans heavily on these two papers.

Apato'erau signifies south, the point toward which the north wind blows, while *apato'a* refers to north, the point toward which the south wind blows.[23] He further proposed that with this reversal of north and south firmly fixed in their minds, Cook, Banks, and Pickersgill then "overlooked Tupaia while he was drawing, and suggested corrections, which his idea of their superior knowledge induced him to receive against his own convictions."[24]

Following Hale's scenario, imagine the confusion in the *Endeavour*'s great cabin. Tupaia has grasped the meaning of the nautical charts he has seen and probably is as eager to transfer his knowledge of the islands onto paper as the British are to have this valuable information charted. Cook places a sheet of drawing paper on his chart table and along the upper border carefully prints the word *opatoarow,* which he mistakenly thinks means north, and also prints *opatoa* along the lower border on the equally false assumption that it stands for south. (The Tahitian phrases at the right and left edges of the chart appear to correctly designate east and west with terms for sunrise and sunset.) Tupaia then draws Tahiti in the center, after which he starts marking out the islands around it, giving the name of each, its distance in sailing days, and its bearing both verbally and by pointing in the appropriate direction. (Or, following Forster's assertion that Tupaia did not draw the chart, the Tahitian gives these directions to a draftsman who then draws the islands on the chart.) The British, laboring under their reversal of crucial Tahitian directional terms, then force many islands to be shifted either to the north or south of where Tupaia envisions them to lie. The Tahitian expert, who from his long service to high chiefs must have learned when to defer to authority, unfortunately goes along with this cartographic malpractice, allowing, for example, islands in the Australs and Cooks, which are actually to the south and southwest of Tahiti, to be placed to the northwest and, conversely, islands of the Samoan and Tongan groups to be shifted well south of their actual locations. The only islands that the British allow to be drawn in correct relation to Tahiti are those they are already acquainted with from their own voyage and those of previous European navigators–notably those in the leeward Societies, northern Tuamotus, and the Marquesas group.

However, even if we compensate for the directional confusion Hale postulates, it is apparent that the quality of Tupaia's geographical knowledge falls off markedly with increasing distance. Since Tupaia was born on Ra'iatea in the leeward Societies and spent much of his life on Tahiti, it is not surprising that all the islands of the Society group appear on the chart in more or less correct relation to one another. Coverage of the nearby northeast Tuamotus is next best, which is consonant with evidence from the European contact era of frequent trading back and forth between there and Tahiti. Coverage of the next most distant islands, those ranging from about 300 to 750 miles from Tahiti (the southeastern Tuamotus, Marquesas, and the Cook Islands) is much patchier, and that of the islands at the western end of the chart (Samoa, Tonga, Rotuma, and Fiji) can at best be described as very sketchy, which is understandable since these lie 1,200 to 1,700 miles from the Societies.

One of the main unresolved issues concerns the source of Tupaia's knowledge of islands more than three hundred miles or so from Tahiti, particularly the most distant ones at the western end of his chart. Did it reflect information gained from active voyaging to and from them by Tahitian sailors, or was it derived passively from ancient legends and the more recent testimony of castaways from these islands who, after being lost at sea because of navigational error or stormy weather, had accidentally drifted onto Tahitian shores?

Key to resolving the issue is an analysis of a conversation Tupaia and Cook had on board the *Endeavour.* As the ship left the leeward Societies, Cook headed south to take up the second task the Admiralty had given him: the search for the continent many theoreticians thought must lie in the temperate latitudes of the South Pacific. According to Cook's own words, "Tupia" (as he spelled Tupaia's name) objected to this southward course:

> Since we have left Ulietea [Ra'iatea] Tupia hath been very disireous for us to steer to the westward and tells us that if we will but go that way we shall meet with plenty of Islands, the most of them he himself hath been at and from the description he gives of two of them they must be those discover'd by Captain Wallice [Samuel Wallis, the captain of the first European ship to reach Tahiti] and by him call'd Boscawen and Kepple Islands, and these do not lay less than 400 Leagues to the westward of Ulietea; he says that they are 10 or 12 days in going thither and 30 or more in coming back and that their Paheas [from *pahi,* Tahitian for voyaging canoe], that is their large Proes [from *prahu,* a Malay word for sailing canoe] sails much faster then this Ship; all this I beleive to be true and therefore they may with ease sail 40 Leagues a day or more.[25]

Considering the wind conditions prevailing across Polynesia and the sailing characteristics of voyaging ca-

23. The authoritative missionary dictionary by John Davies, *A Tahitian and English Dictionary* (Tahiti: London Missionary Society's Press, 1851), 28, followed Hale's definitions. However, later dictionaries have defined *apato'erau* and *apato'a* as Cook implicitly did.

24. Horatio Hale, *Ethnography and Philology: United States Exploring Expedition, 1838–42* (Philadelphia: Lea and Blanchard, 1846), 122–24. Despite his interpretive breakthrough, Hale did not attempt to redraw Tupaia's chart and instead simply reproduced Forster's engraving.

25. Cook, *Journals,* vol. 1, *The Voyage of the Endeavour, 1768–1771,* 156–57 (note 7).

noes, as recently determined through extensive sea trials my colleagues and I conducted throughout Polynesia with the reconstructed double canoe *Hōkūle'a,*[26] the estimates given by Tupaia for sailing to the "plenty of Islands" lying to the west and then back again point clearly to round-trip voyages made between the Society Islands and West Polynesia. This region lies 1,200 to 1,600 miles west of the Societies and is composed of the archipelagoes of Samoa, Tonga, and eastern Fiji and a number of outlying islands, including the two cited by Cook, Boscawen and Kepple (Tafahi and Niuatoputapu), which are along the northern fringe of the Tonga group.[27]

Tupaia's statement that it took thirty days or more to sail back to the Societies also makes good sense, for the return must be made against the direction whence the trade winds usually blow. As much as Cook admired the graceful lines and workmanship of the Tahitian voyaging canoes, he apparently realized that tacking them long distances against the easterly trade winds and accompanying ocean currents would have been impractical.[28]

Cook was evidently puzzled by this problem until Tupaia told him that Tahitian sailors avoided such long windward passages by waiting for austral summer when the trade winds are frequently interrupted by westerly winds favorable for sailing to the east, then exploiting these wind shifts to work their way home.[29] Because these westerlies are typically episodic, however, occurring in brief spells as troughs of low pressure moving eastward and interrupting the trade wind flow, canoe voyagers probably could not normally have made it from West Polynesia to the Societies in one jump. It is likely that earlier eastbound voyagers usually had to combine favorable winds from at least two spells of westerlies, taking shelter at an intervening island or tacking as best they could whenever the trade winds resumed.[30] This waiting for and then exploiting successive spells of westerlies could easily have taken the thirty days or more that Tupaia said were needed to return from the western islands to the Societies.

Had Tupaia recovered from the illness that struck him at Batavia and reached England, where Banks, Cook, or other interested parties from the *Endeavour* who had learned Tahitian could have talked with him at length, further light might have been shed on this and other issues concerning his chart. Furthermore, it might also have been possible to learn more about how Tahitians envisioned the island field where they voyaged and how they applied that knowledge in navigation. But that was not to be, and unfortunately, on subsequent voyages into the Pacific neither Cook nor his accompanying scientists made the acquaintance of another learned Polynesian like Tupaia who could have filled in the missing information. Then, with the devastating mortality from imported diseases, the disruptions wrought by foreign traders and colonial occupation, and the subsequent adoption by the surviving islanders of Western sailing vessels, the magnetic compass, and other nautical instruments, the practice of indigenous navigation disappeared so quickly in the Society Islands and other parts of Polynesia that it was essentially gone before it could be fully recorded. As a result, instead of a holistic picture of how Polynesians charted their island world and navigated within it, we have only bits and pieces, such as the tantalizing ones Tupaia provided.

EARLY EUROPEAN CHARTS OF THE CAROLINE ISLANDS

The first European charts of Micronesia's Caroline Islands, like the one derived from Tupaia's chart, were based on indigenous geographical knowledge. Following Magellan's traverse of the Pacific in 1520, Spain colonized the Philippines and later established an outpost in Micronesia's Mariana Islands to provide a stop for the galleons sailing between Mexico and the Philippines. Not until well into the nineteenth century, however, did Spain begin to pay attention to the Caroline Islands, the long chain to the south of the Marianas.

Even before this period, the arrival along the eastern shores of the Philippines of Carolinian canoes driven there by storms or long spells of strong trade winds ex-

26. *Hōkūle'a* (Hawaiian for the star Arcturus) is a reconstruction of a twin-hulled Polynesian voyaging canoe that measures sixty-two feet in length and is powered by two Polynesian sprit sails. Since 1975 we have sailed her over seventy-five thousand miles throughout Polynesia, navigating most of that distance by traditional, noninstrument methods (Finney, *Voyage of Rediscovery,* and idem, "Colonizing an Island World" [both note 5]).

27. Although we have not sailed *Hōkūle'a* from the Societies to West Polynesia, our experiments have shown that a double canoe such as the Tahitian *pahi* Cook mentioned can easily make forty leagues or 127 nautical miles a day sailing before the trade winds (using a conversion of 3.18 nautical miles for one marine league; see Peter Kemp, ed., *The Oxford Companion to Ships and the Sea* [Oxford: Oxford University Press, 1976], 472). Sailing ten to twelve days westward before the trades at this rate would take a canoe 1,275 to 1,525 miles to the west, putting it in the midst of West Polynesia.

28. As documented through our extensive sea trials with *Hōkūle'a,* double canoes can certainly sail to windward, but lacking deep keels or centerboards, they do so at a much more modest angle than today's racing yachts. Canoes making long, oblique tacks at seventy-five degrees to the wind must sail almost four miles to make one mile directly to windward. This slow tacking process, along with fighting against the currents that typically accompany steady trade winds, would greatly lengthen time spent at sea on crossings made directly to windward. Particularly when we also consider the battering the canoes and those on board them would receive while constantly bashing through the drenching head seas raised by steady trades, it is difficult to imagine canoe voyagers tacking from West Polynesia all the way back to the Societies.

29. Cook, *Journals,* vol. 1, *The Voyage of the Endeavour, 1768–1771,* 154 n. 2 (note 7).

30. As was the case when sailing *Hōkūle'a* eastward from Samoa to Tahiti in 1986; Finney, *Voyage of Rediscovery,* 125–62 (note 5).

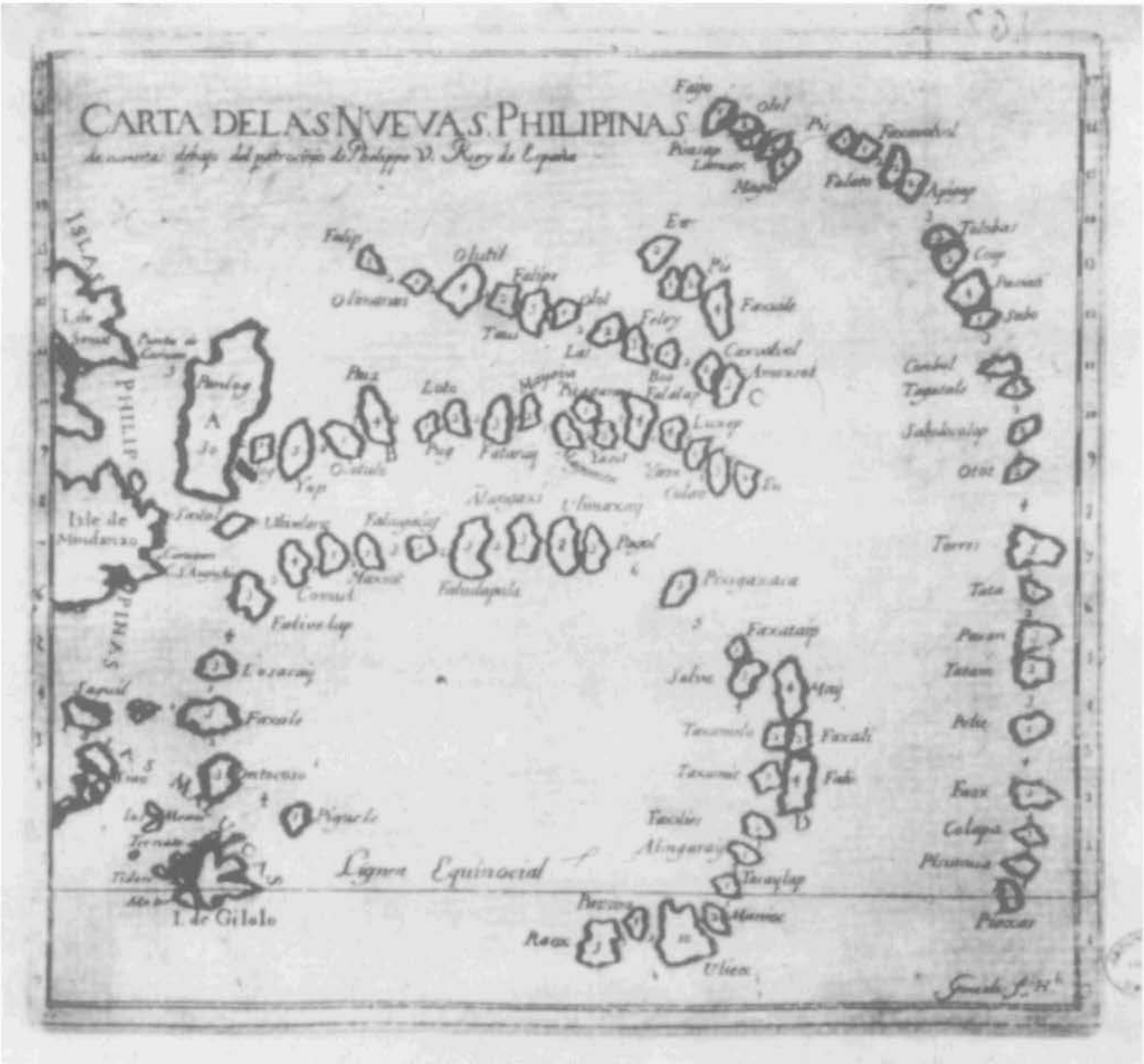


FIG. 13.5. FATHER PAUL KLEIN'S 1696 MAP OF CAROLINE ISLANDS. "Carta de las Nuevas Philipinas [Palaos], descubiertas debajo del patrocinio de Phelippe V, Rey de España." This map, showing the Caroline Islands and other islands east and southeast of the Philippines, was derived from information provided by castaways from Fais Atoll in the Carolines who had landed on Samar Island in the Philippines. The result is not very realistic. Panlog is apparently Belau (Palau) but is drawn as one large island instead of a group of closely spaced islands and is placed far too close to the Philippines. Although the line of islands immediately to the east of Panlog might be said to depict the linear character of the Carolines, the island arcs farther to the east and to the southeast may reflect the way Caroline Islanders charted islands around a central referent.
Size of the original: 18.7 × 20.4 cm. Photograph courtesy of the Ministero de Cultura, Archivo General de Indias, Seville (Mapas y Planos, Filipinas 15).

cited the missionary ambitions of Jesuits stationed there. In December 1696 two strange-looking canoes landed on Samar, an island in the eastern Philippines. To communicate with the castaways the villagers summoned two women who had themselves drifted to Samar some time earlier. By a stroke of fortune, several of the castaways recognized one of the women as their relative, and communication between the Filipinos and the castaways was established. In the resultant conversations, it was learned that the strangers had been blown off course in sailing from Lamotrek to Fais, two small atolls in the Carolines, and had drifted for seventy days before making landfall on Samar. They also named the thirty-two islands that made up their "nation" and later spread out pebbles on the beach to signify the locations of eighty-seven islands they claimed to have visited.[31]

Father Paul Klein, who visited Samar after the arrival of the canoes, took a lively interest in the story and had a chart of the islands drawn from a sketch of the pebble map. Klein then sent the chart and accompanying report about the castaways' homeland to the superior general of the Jesuits in Rome, after which these documents were published in a number of works (fig. 13.5).[32] The long arc of islands aligned north and south and flanked to the southeast by a partial circle of islands may have reflected the way Carolinian navigators visualize the bearings of islands arrayed around a central reference point (to be discussed below), but it probably mystified Western navigators on subsequent missionary expeditions.

Another chart of the Carolines was drawn in 1721 by Jesuit missionary Juan Antonio Cantova when he was stationed on Guam (fig. 13.6). Cantova was aware of the unsuccessful missionary attempts in islands lying due east of the Philippines, which had been stimulated by the reports by Klein and others of castaways from there. He also realized that for missionary success in Las Islas Carolinas, as the islands had recently become known, a better chart of the islands and more accurate descriptions of the customs of the people were needed. Accordingly, when two Carolinian canoes landed on Guam, Cantova made a concerted effort to befriend the people, learn their language and customs, and chart their islands from the testimony given him by the canoes' navigators. The resultant brief ethnography has been called "the best account of Carolinian people until well into the nineteenth century," and the chart, in its own idiom of showing some of the islands in exaggerated size, is a fair representation of the way the Caroline Islands are spread out from west to east for more than a thousand miles (fig. 13.7).[33]

KOTZEBUE'S CHART OF THE MARSHALL ISLANDS

As a great admirer of Cook, the Russian explorer Otto von Kotzebue had no doubt been stimulated by the British navigator's work with Tupaia to attempt to gather similar geographical information from indigenous experts elsewhere in the Pacific. Kotzebue had his chance while visiting Ratak, the eastern chain of the Marshall Islands, for two and a half months in 1817. There he worked at learning the language and took every opportunity to quiz the people about what they knew of other islands in the region. In his journal, Kotzebue enthusiastically describes how, at his request, the Marshallese readily converted their knowledge of the size, shape, and distribution of the islands in this group into ephemeral charts of some accuracy. For example, after a month on Wotje Atoll, the Russian captain managed to get Lagediack, an experienced navigator, to outline in the sand the entire Ratak chain. First Lagediack drew a circle and placed small lumps of coral around it to represent the atoll outline of Wotje and its constituent islets. Then he outlined in the sand all the atolls of the Ratak chain extending to the north and south of Wotje, using still more coral fragments to represent the islets around the perimeter of each atoll.[34]

The excited Kotzebue then set sail to find these islands. After easily locating several of them, the Russian astonished a chief on Maloelap Atoll by sketching the entire chain in the sand and reciting the names of each island as given to him by his Wotje informant. The chief found the alignment to be not quite right, however, and outlined in the sand his own mental map, which according to Kotzebue later proved, in the light of his own survey, to be "very correct."[35]

At another atoll, Kotzebue met Langemui, an elderly man with numerous scars on his body, which he said were from wounds inflicted by the inhabitants of Ralik. When the Russian finally realized that Ralik was another chain of islands lying immediately to the west of and parallel to the Ratak chain, he prevailed on the old man to give more information. This Langemui did by outlining with coral fragments placed on a mat first the Ratak chain and then the Ralik chain. To show the distances between islands, he took another small piece of coral and used it to figuratively "sail" across the Ratak chain, then from the Ratak to the Ralik chain, and finally between the islands of the latter, noting the distances involved in sailing days or portions thereof. Given the problems Kotzebue must have had translating such rough outlines of islands and measures of sailing time to a chart on a Mercator projec-

31. Francis X. Hezel, *The First Taint of Civilization: A History of the Caroline and Marshall Islands in Pre-colonial Days, 1521–1885* (Honolulu: University of Hawai'i Press, 1983), 36–37.

32. "Lettre écrite de Manille le 10. de juin 1697 par le Père Paul Clain de la Compagnie de Jésus au Révérend Père Thyrse Gonzalez, Général de la même Compagnie," in *Lettres édifiantes et curieuses, écrites des missions étrangères, par quelques missionnaires de la Compagnie de Jésus,* 34 vols. (Paris, 1702–76), 1:112–36; Glynn Barratt, *Carolinean Contacts with the Islands of the Marianas: The European Record* (Saipan: Micronesian Archaeological Survey, 1988), 17–20; and Hezel, *First Taint,* 36–40.

33. Hezel, *First Taint,* 48–55, quotation on 50, and Barratt, *Carolinean Contacts,* 20–23. For Cantova's account, see "Lettre du P. Jean Antoine Cantova, missionnaire . . . au R. P. Guillaume Daubenton . . . 20 de mars 1722," in *Lettres édifiantes et curieuses, écrites des missions étrangères, par quelques missionnaires de la Compagnie de Jésus,* 34 vols. (Paris, 1702–76), 18:188–247.

34. Otto von Kotzebue, *A Voyage of Discovery into the South Sea and Beering's Straits . . . in the Years 1815–1818,* 3 vols., trans. H. E. Lloyd (London: Longman, Hurst, Rees, Orme, and Brown, 1821), 2:83–84.

35. Kotzebue, *Voyage of Discovery,* 2:108–9.

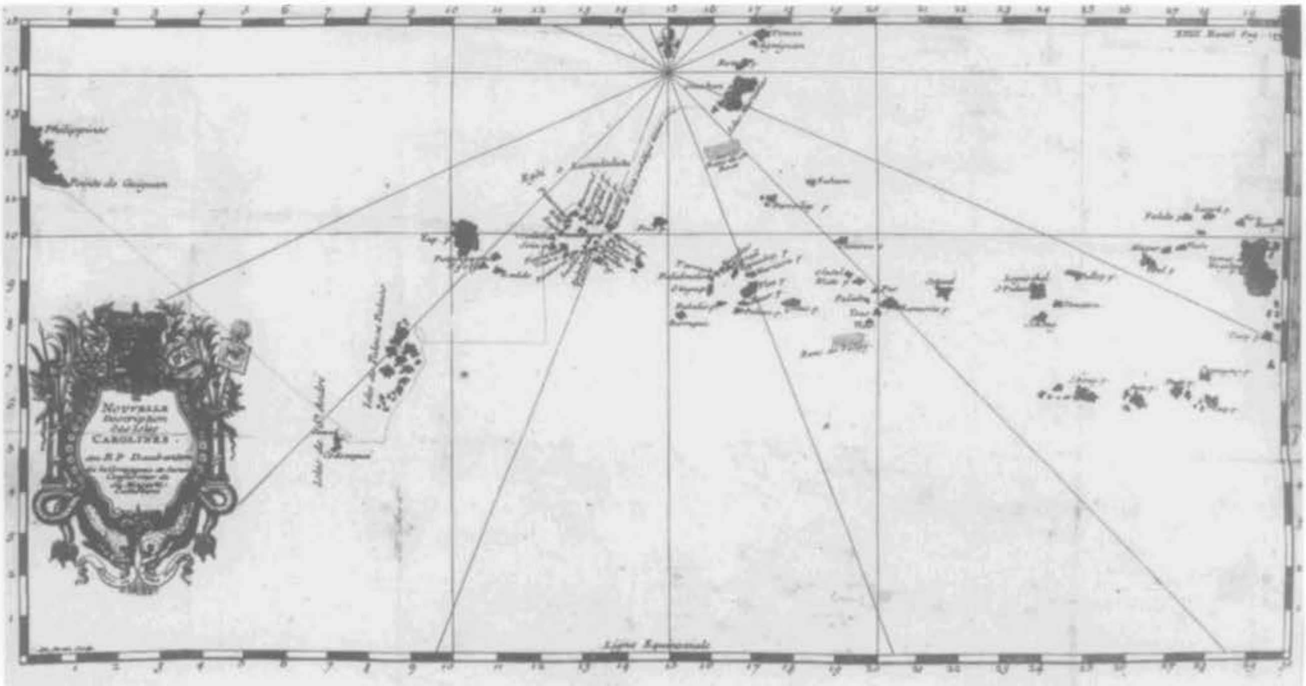


FIG. 13.6. CANTOVA'S CHART OF THE CAROLINE ISLANDS OF MICRONESIA. In 1722 Juan Antonio Cantova, a Jesuit missionary stationed in the Mariana Islands of Micronesia, drafted the original of this published chart from information given him by castaways from the Caroline Islands, a long chain of atolls and a few high islands that lie several hundreds of miles to the south of the Marianas. The chart shows that portion of the Carolines known to the castaways from sailing experience: from Belau (labeled "Islas de Palau ou Palaos") and Uap (Yap) in the west to Chuuk (Truk), the large island on the eastern border, which is unnamed except for its western point (labeled "Torres ou Hogolen P").

From "Lettre du P. Jean Antoine Cantova, missionnaire . . . au R. P. Guillaume Daubenton . . . 20 de mars 1722," in *Lettres édifiantes et curieuses, écrites des missions étrangères, par quelques missionnaires de la Compagnie de Jésus,* 34 vols. (Paris, 1702–76), vol. 18, facing 189.

tion, the general correspondence is striking between Kotzebue's chart (fig. 13.8) and one drawn from the corresponding section of a modern hydrographic chart (fig. 13.9). Note, however, that although the placement of the islands of the Ralik chain depended solely on Langemui's testimony, that of the islands in the Ratak chain was based on both indigenous testimony and Kotzebue's own survey of several of the chain's islands and his astronomical determination of their latitude and longitude.[36]

An Outline of Oceanic Navigation and Cartography

What lay behind the geographical knowledge derived from Tupaia and his Carolinian and Marshallese counterparts and used to construct the charts considered in the previous section was not seriously investigated by their interlocutors, not even by Cook. Nor did any of the other early Western explorers and missionaries inquire closely into how island navigators charted the islands and archipelagoes of their world and navigated between them. (Alternatively, if some did make thorough inquiries, they never published the results.) Not until the late 1800s and early 1900s did foreign scholars begin to investigate this field of indigenous knowledge. Although by then it was too late to get much firsthand information from Polynesia, the situation was very different in the less affected islands of Micronesia. There, notably among the atolls of the Marshall and Caroline Islands, the canoe makers kept building sailing canoes and navigators continued sailing them from island to island well into the twentieth century, and those from a few atolls in the central Carolines are still doing so. Consequently we now have much fuller accounts of traditional navigation and associated cartographic practices from these two archipelagoes than from anywhere else in Oceania.

36. Kotzebue, *Voyage of Discovery,* 2:143–46 (note 34). While in the Marshalls Kotzebue befriended a pair of castaways from the Caroline Islands, Edock and Kadu, who told him and Chamisso, the naturalist on the Russian expedition, much about their home island of Woleai and the islands surrounding it. Based on verbal directions primarily from Edock, Kotzebue drew another reasonably accurate chart (except for the exaggerated size of the islands), in this case of the Caroline Islands from Belau in the east to Truk in the west. Since Kotzebue had at his disposal the chart made earlier by Cantova, however, his effort may not have been totally based on Edock's testimony (2:132–33, with the chart inserted at the back of volume 2).

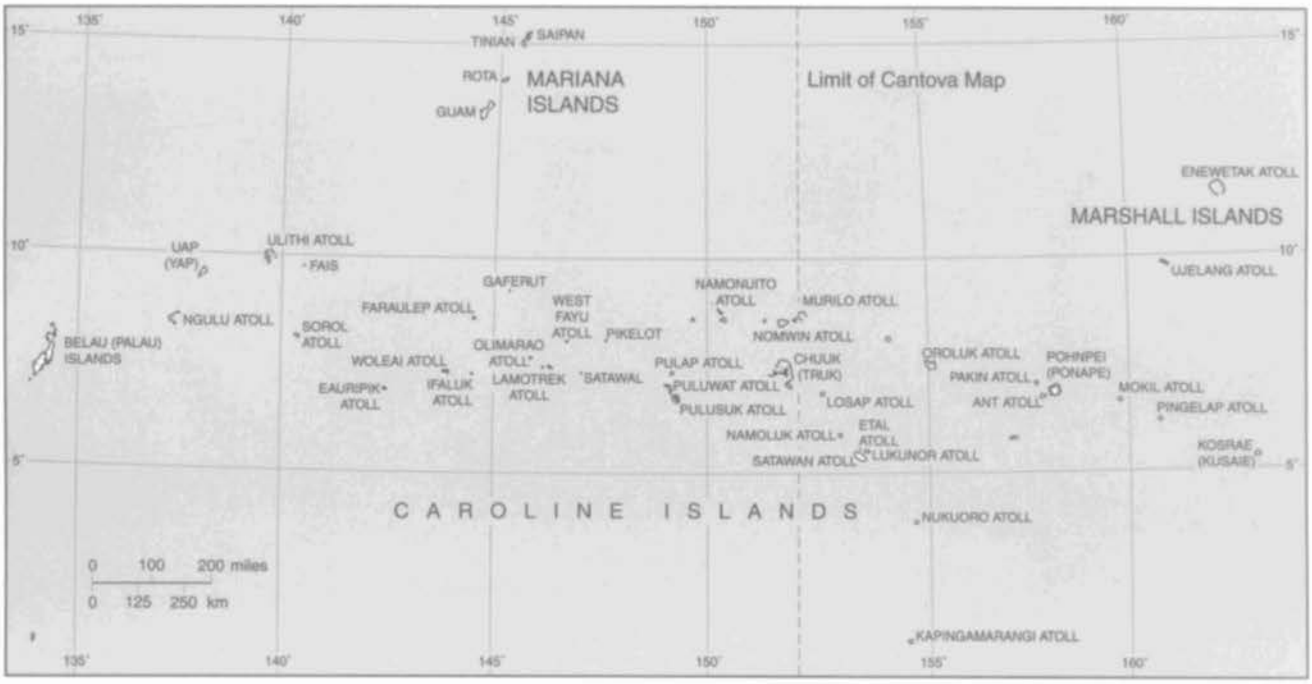


FIG. 13.7. THE CAROLINE ISLANDS. This modern map shows the Caroline Islands stretching west to east from Belau (Palau) and its outliers to Kosrae (Kusaie). A comparison of this chart with Cantova's chart indicates that although the castaways had a good idea of the general configuration of the islands lying between Belau and Chuuk (Truk), some islands–notably Belau, Uap (Yap), and Chuuk–are greatly exaggerated in size, and the distance between the Marianas and the Carolines is underestimated.

Until the publication in 1972 of David Lewis's now classic *We, the Navigators,* there was little appreciation of the common basis of navigational methods practiced throughout the islands and archipelagoes of Oceania.[37] By combining a thorough search of the literature with extensive voyages to contact and sail with surviving traditional navigators, Lewis was able to show that all the individual traditions shared a common basis and therefore could be thought of as parts of a single Pacific Island navigational system. This system can be outlined in terms of three main tasks that all navigators must carry out: orientation and course setting; dead reckoning and keeping on course; making landfall.[38]

A few words on gender and navigation are in order before we consider how Oceanic navigators accomplished these tasks. Traditional navigation is typically discussed as a preeminently male activity, yet there are a few references here and there to the participation of women in navigation. For example, in their discussion of the master navigators of the Marshall Islands during the first decades of the twentieth century, Krämer and Nevermann noted that some were women, including one woman who also taught navigation.[39] Although they did not elaborate on their remark, perhaps relevant is an observation shared with me by anthropologist Mimi George about navigators in the Santa Cruz Islands of Melanesia. In one family a navigator had trained his daughters to help him at sea, and perhaps also to ensure that the family navigational tradition was transmitted to future generations.[40] It is also interesting that in the Caroline Islands a young woman is mythically credited with passing navigational knowledge derived from a spirit to her two sons, who in turn founded the two "schools" of Carolinian navigation.[41] The masculine pronouns used in this chapter to refer to navigators are thus not intended to deny a possible female role in this art.

ORIENTATION AND COURSE SETTING

Because of the rotation of the earth, stars appear to rise in the east and set in the west, intersecting the horizon at points and following paths across the sky that do not change perceptibly during a navigator's lifetime. Pacific Islanders have long used these regularities to orient themselves and to guide their canoes toward destinations far beyond sight range. Since their methods are still being

37. David Lewis, *We, the Navigators: The Ancient Art of Landfinding in the Pacific* (Honolulu: University of Hawai'i Press, 1972).

38. This section is adapted from Finney, *Voyage of Rediscovery,* 51–65 (note 5).

39. Augustin Krämer and Hans Nevermann, *Ralik-Ratak (Marshall Inseln)* (Hamburg: Friederichsen, De Gruyter, 1938), 215, 220.

40. Mimi George, personal communication, September 1995.

41. See p. 470 and note 74.

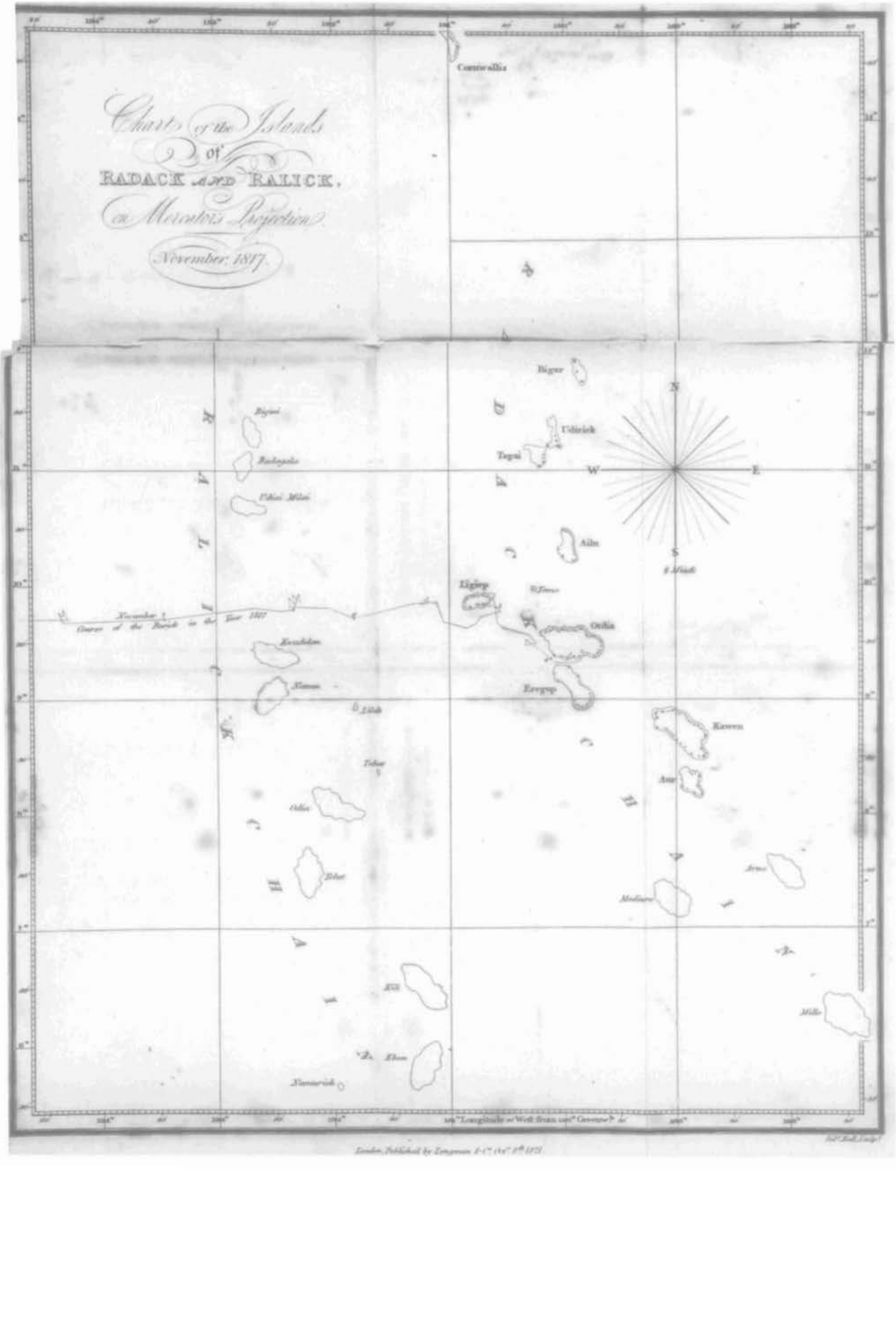


Chart of the Islands of
RADACK AND RALICK,
on Mercator's Projection
November, 1817.
Cornwallis
Bigar
Udirick
Tagai
N
W
E
S
Ailu
Eligup
Otdia
Eregup
Kawen
Aur
Mediuro
Arno
Mille
Ebon
Kili
Odia
Course of the Rurick in the Year 1817

employed in some parts of the Pacific, I will describe them here in the present tense.

At night the navigator points the prow of his canoe toward the rising or setting point of the star that has the same bearing as his destination (fig. 13.10). When sailing across wind and current, the navigator picks a star course slightly to one side or the other of the direct course to compensate for the estimated leeway (sideways slipping of a vessel under pressure of the wind) and the direction and strength of the current (fig. 13.11). When the star marking the desired course is too high in the sky to give a good directional reading or is out of sight below the horizon, the navigator keeps himself oriented on other stars that rise and set at the same or nearly the same points on the horizon as the key star and therefore follow the same path across the sky. The navigator must therefore memorize all the prominent stars of such a "star path" to keep oriented and on course throughout the night at all times of the year. In fact, he must know the pattern of the stars throughout the sky so that when clouds obscure the stars being followed, he can look to stars and constellations elsewhere in the sky.

Although it is more convenient to steer a canoe on stars rising or setting in the direction of travel, steersmen are perfectly capable of keeping their canoe on course by facing the stern and keeping it aligned on the stars rising or setting in that direction. Even when clouds blanket all the bow and stern stars, it is still possible to keep a canoe on course by reference to stars off to one side or the other of the course line.[42]

(Facing page)
FIG. 13.8. KOTZEBUE'S CHART OF THE RATAK AND RALIK CHAINS OF THE MARSHALL ISLANDS. In early 1817 the Russian explorer Otto von Kotzebue spent two and a half months in the Marshall Islands of Micronesia. Kotzebue stayed in the central region of the Ratak (eastern) chain, where he questioned Marshallese navigators about the location of the islands they knew. The navigators responded by outlining in the sand all the islands they had sailed to, using coral fragments to stand for individual islets, and indicating by gesture and word the bearing and sailing distances from one island to another. The information given by the navigators, plus Kotzebue's own survey of several islands, resulted in a fairly accurate chart of the Ratak chain. One navigator also provided information on the islands of the Ralik (western) chain that he knew from raids conducted there, which Kotzebue also incorporated in his chart. Although Kotzebue returned to the Ratak chain in November 1817 and sailed from there through the Ralik chain on his way to Kamchatka (see track on the chart), the expedition sighted none of the Ralik islands and so did not have a chance to verify information from the Ratak navigator or to expand on it by interviewing Ralik navigators.
From Otto von Kotzebue, *A Voyage of Discovery into the South Sea and Beering's Straits . . . in the Years 1815–1818*, 3 vols., trans. H. E. Lloyd (London: Longman, Hurst, Rees, Orme, and Brown, 1821), at the back of volume 2. Photograph courtesy of the State Historical Society of Wisconsin, Madison (neg. no. WHi [3X]50544).

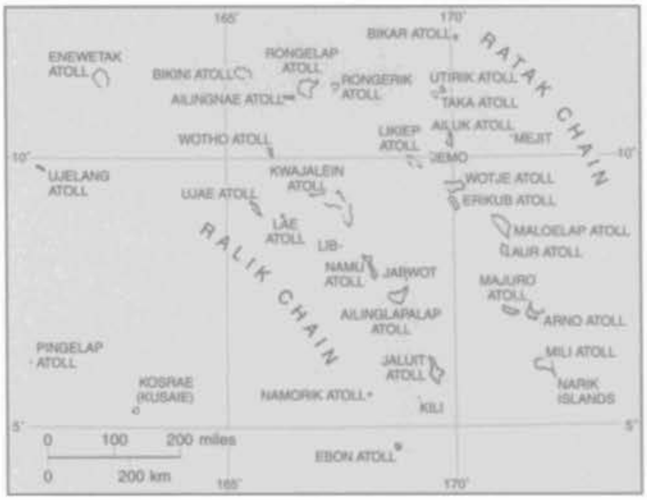


FIG. 13.9. THE MARSHALL ISLANDS. This modern map shows the thirty-four atolls and separate coralline islands of the two chains of Ralik and Ratak. The fit between Kotzebue's chart and this one is best for the Ratak chain, as is to be expected in light of Kotzebue's surveys there and the fact that his navigator-informants were all from that chain. Nonetheless, his lone informant for the Ralik chain seems to have had a fair idea of the location of the central islands of that chain, although he left out the atolls at the extreme northwest end of the chain and his placement of the southern islands is somewhat askew.

During the day, the navigator orients himself on the sun and the pattern of ocean swells. The sun can best be used in the early morning and late afternoon when it is low on the horizon. The navigator must, however, be aware that the rising and setting points of the sun shift daily and must periodically recalibrate the bearing of the sun by watching each morning where it rises with respect to the fading star field of the dawn sky. When the sun rises too

42. I was forced to do this one cloudy night in early December 1985 while steering the *Hōkūle'a* toward New Zealand. We had left the Cook Islands and tropical seas behind us and were sailing southwest with a strong breeze from the east. During the short nights of the late austral spring, there were no prominent stars to be seen to the southwest, our direction of travel. Accordingly, we found ourselves steering mostly by facing astern and using the rising Pleiades or Orion's belt (adjusting for differences in declination from the exact star path we were using) to keep the canoe on course.

That particular night, however, thick clouds blocked all the stars astern from view, and most of the rest of the sky was also obscured. Only toward the south could any stars be seen, and my job was to keep the canoe heading southwest by maintaining a fixed angle between the Southern Cross and the longitudinal axis of the canoe and then adjusting this for the constellation's rotation around the celestial south pole. But after about an hour the spreading clouds covered the Cross, leaving only the two bright stars pointing directly toward the Cross for steering. When the clouds began to block these pointers as well, I spotted two fuzzy light spots that are known as the Magellanic Clouds but are actually separate galaxies outside our own.

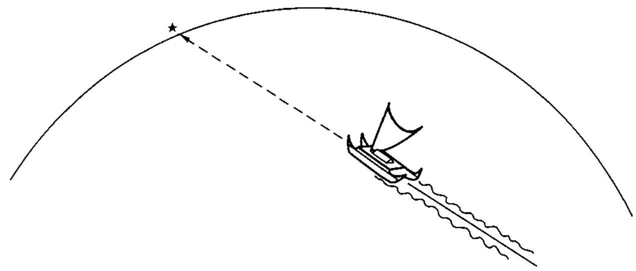


FIG. 13.10. SAILING TOWARD A STAR LOW ON THE HORIZON. This maneuver is basic to oceanic course setting and steering. This diagram ignores current and leeway.
By permission of Ben Finney.

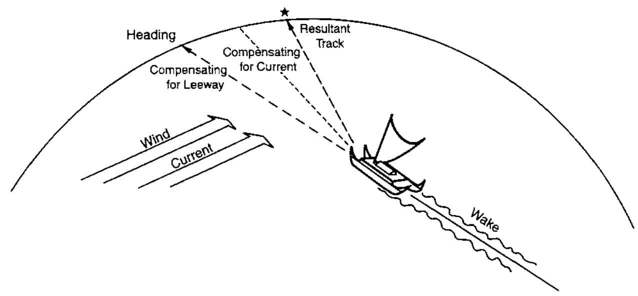


FIG. 13.11. COMPENSATING FOR CURRENT AND LEEWAY WHEN COURSE SETTING AND STEERING BY HORIZON STARS.
By permission of Ben Finney.

high in the sky to serve as a precise directional guide, the navigator can use the pattern of ocean swells to keep the canoe on course–as he must do anytime it is so solidly overcast that he cannot discern the position of the sun. Similarly, when it is too overcast at night to see any stars, any planets, or the moon, the navigator falls back on the ocean swells to keep himself oriented.

The ocean swells most useful to the navigator are not those raised by local winds, but long, regular swells generated by steady winds blowing over long stretches of ocean or by distant storm centers. Amid the often confusing pattern of swells coming from several directions at once, the navigator picks out the most prominent and regular ones and keeps track of their alignment in reference to horizon stars (or the rising or setting sun) so that he can use them for orientation anytime the sky becomes overcast or the sun is too high in the sky to yield an accurate bearing.

The navigators from the Caroline Islands of Micronesia are particularly noted for visualizing a series of bearings along the horizon by the rising and setting points of the key stars and constellations. That writers commonly call this conception a "star compass" is perhaps unfortunate, because it is not a physical instrument like a magnetic compass. It might better be called a "star compass rose" in that it is a directional framework, not an instrument that mechanically indicates direction. Furthermore, it is primarily a mental construct, a conceptual system by which the navigator mentally divides the horizon surrounding him according to celestial referents. Although he may demonstrate this construct to his pupils ashore by placing a circle of pebbles on a mat to mark the rising and setting points of the key stars and constellations, the navigator sets sail with only a conceptual vision engraved in the mind through years of study and practice. This compass and associated navigational and cartographic practices are discussed in detail in the section on Carolinian navigation below.

Although we do not know nearly as much about the now largely forgotten Polynesian navigational methods as we do about the still-practiced Carolinian ones, there can be no question that the Polynesians set their courses by the stars and other celestial bodies, and that they did so skillfully. Both Cook and Banks wrote about Tahitian stellar navigation methods, as did the Spanish navigator José Andía y Varela, who visited Tahiti in 1774, four years after Cook first touched there, and wrote the following succinct entry in his journal about how the Tahitians navigated:

> When the night is a clear one they steer by the stars; and this is the easiest navigation for them because, these being many [in number], not only do they note by them the bearings on which the several islands with which they are in touch lie, but also the harbours in them, so that they make straight for the entrance by following the rhumb of the particular star that rises or sets over it; and they hit it off with as much precision as the most expert navigator of civilised nations could achieve.[43]

These and other accounts make it clear that Polynesian voyagers used star bearings for navigation, but we have no detailed descriptions of any Polynesian star compass similar to that employed by Carolinian navigators. This lack may be because Polynesians did not conceptualize one or simply because no one bothered to record their ideas before they were lost.

Although evidence for Polynesian stellar directional systems may be unclear, information recorded in the nineteenth century from several archipelagoes indicates that the navigators there conceptualized a wind rose in which the horizon was divided into twelve, twenty-four, or thirty-two points named according to the winds that characteristically blow from each point. Figure 13.12 shows a diagram of a thirty-two-point wind rose from the

43. "The Journal of Don José de Andía y Varela," in *The Quest and Occupation of Tahiti by Emissaries of Spain during the Years 1772–1776*, 3 vols., comp. and trans. Bolton Glanvill Corney, Hakluyt Society Publications, ser. 2, nos. 32, 36, 43 (London: Hakluyt Society, 1913–19), 2:221–317, esp. 286; brackets in original.

Cook Islands as drawn by the nineteenth-century missionary William Wyatt Gill, who wrote that the islanders used a large gourd to symbolize the distribution of winds. Small holes were drilled in the lower part of the gourd to correspond to the "wind pits" from which the various winds blow and then plugged with pieces of tapa cloth that supposedly could be manipulated to control the wind.

> Should the wind be unfavourable for a grand expedition, the chief priest began his incantation by withdrawing the plug from the aperture through which the unpropitious wind was supposed to blow. Rebuking this wind, he stopped up the hole, and advanced through all the intermediate apertures, moving plug by plug, until the desired wind-hole was reached. This was left open, as a gentle hint to the children of Raka [the god of winds] that the priest wished the wind to blow steadily from that quarter.

Gill wryly added, however, that because the priest would have had "a good knowledge of the ordinary course of the winds, and the various indications of change, the peril of the experiment was not great."[44]

Polynesian wind roses are reminiscent of the wind rose of eight points formerly used by Mediterranean seafarers, in which each point is named for the prevailing wind. Given the shifting nature of the winds in the Mediterranean, it has been said that early mariners there must have been "able to recognize these winds either by their characteristics of temperature, moisture content, etc., or else by association with sun, moon, or stars, otherwise it would be hardly possible to use a wind-rose for purposes of navigation with any degree of certitude."[45] Similarly, it seems likely that Polynesian navigators used their wind roses primarily for conceptualizing directions but ultimately relied on celestial referents to set their course and steer it.

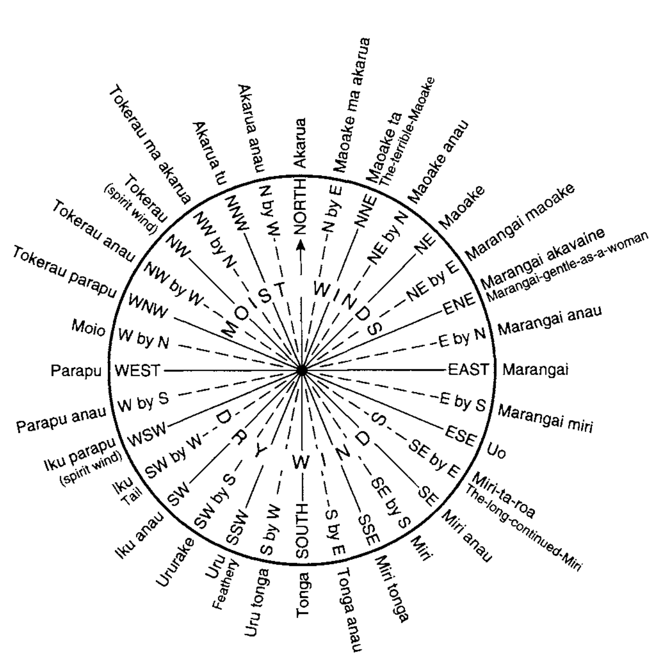


FIG. 13.12. THIRTY-TWO-POINT COOK ISLANDS WIND ROSE. The Cook Islanders of Polynesia conceptualized a wind rose in which each of the thirty-two points represented the direction from which a named wind blew. The missionary William Wyatt Gill, who published this engraving of the wind rose, stated that it was also inscribed around the edge of a large gourd by means of drilled holes. The gourd served as a device for predicting or magically controlling the wind by manipulating tapa cloth plugs for the holes.
After William Wyatt Gill, *Myths and Songs from the South Pacific* (London: King, 1876), 320.

DEAD RECKONING AND KEEPING ON COURSE

As in the Western procedure called "dead reckoning," the island navigator effectively keeps track of his vessel by integrating his estimates of course and distance covered to arrive at a mental picture of where he is at any one time. But he employs a conceptual system utterly different from the Western one based on compass bearings, miles covered, and lines of latitude and longitude.

The Carolinian navigator, for example, conceptualizes his canoe's progress through the water by picturing how a "reference island" lying off to one side of the course moves under successive star points along the horizon. This is an abstract construct for picturing a canoe's progress, not a precise measure, since the reference island is too far off the course line to be seen from the canoe.

In addition, for voyages made to the north or south, the navigator can also judge progress by the changing angular elevation of stars above the horizon, such as Polaris. Hawaiian astronomers named Polaris Hōkū-paʻa, literally the "immovable star," and further recognized that its angular elevation above the horizon decreased as one sailed south and would disappear below the horizon if one sailed far enough south. For example, a Hawaiian text states that "you will lose sight of the Hoku-paa" when you reach the equator and, referring to the portions of the southern sky not visible from Hawaiʻi, that then "you will discover new constellations and strange stars."[46]

Based on fragmentary accounts, including one by the nineteenth-century Hawaiian writer Kepelino Keauokalani, Lewis has proposed that Polynesian navigators once

44. William Wyatt Gill, *Myths and Songs from the South Pacific* (London: King, 1876), 319–22, quotation on 321.

45. Kemp, *Oxford Companion to Ships and the Sea*, 942 (note 27).

46. Rubellite Kawena Johnson and John Kaipo Mahelona, *Nā Inoa Hōkū: A Catalogue of Hawaiian and Pacific Star Names* (Honolulu: Topgallant, 1975), 73. (This text is given in full below, pp. 486–87.) Sirius, the brightest star in the sky, now passes almost directly over Tahiti (i.e., its declination is virtually the same as Tahiti's latitude).

used this principle of changing stellar elevations on voyages headed north or south in a particularly precise manner by carefully observing stars that passed directly above specific islands.[47] A star's declination is its celestial latitude–its angular distance north or south of the celestial equator. As it progresses from east to west across the sky, a star passes directly above all places on the globe whose terrestrial latitude equals its declination. If, therefore, a navigator knew what star passed directly above his target island, he would be able to judge when he was approaching the latitude of that island by observing when the star whose declination marked the island (had the same declination as the island's latitude) passed almost directly above him as it crossed the meridian.

The star Arcturus (Hōkūle'a in Hawaiian), provides a case in point, for it now passes directly over the sanctuary at Honaunau, a complex of ancient stone structures found on the southwestern coast of the island of Hawai'i, the largest island in the Hawaiian chain. Arcturus's declination and the latitude of Honaunau are the same: 19°27′ north. A navigator sailing north from Tahiti for Hawai'i could take advantage of this in the following way. He would set a course slightly to the east of Hawai'i and then judge his northward progress by watching Arcturus rise higher and higher in the sky until, at its highest point during its passage across the sky, it was directly over the navigator's zenith, that is, the point in the heavens directly above him. If his observation was accurate he would then be at the latitude of the island of Hawai'i, and if his dead reckoning was also correct, he would be off the eastern, windward side of the island. He could then turn his canoe to the west and sail downwind until the island came into sight.[48]

Such zenith observations cannot, however, be used to set and maintain a course because a star at its zenith does not yield a fixed bearing with reference to the globe. For example, Arcturus passes directly above all places on earth located along 19°27′ north and therefore looks the same at the zenith no matter what the longitude of the observer. The Hawai'i-bound navigator sailing north from Tahiti who wished to use Arcturus to judge when he had reached the latitude of Hawai'i would still have to gain his bearings by reference to the rising and setting points of the stars, then use his observational and dead reckoning skills to keep the canoe heading on the proper course to reach Hawai'i–ideally off its eastern, windward flank.

MAKING LANDFALL

To make landfall on small island targets, particularly on low atolls that cannot be seen until they are ten to twelve miles away, navigators expand their ability to detect land beyond direct sight range by sensing when their canoes approach an island. The most widely used method is to watch for those birds–particularly the terns, noddies, and boobies–that sleep each night on land but fly out to sea at dawn to fish. Adults of these species with chicks to feed seldom fly beyond forty miles from their home island in any sizable numbers.

Navigators also look for signs of islands in the clouds: for example, a characteristic piling up of clouds along the horizon indicating that a high island is disrupting the flow of the trade winds and accompanying clouds or a greenish hue on the underside of clouds made by the reflection from the shallow lagoon of an atoll below it, as with the atoll of Ana'a in the Tuamotus. Phosphorescent streaks of light occurring deep below the surface and pointing to or from islands are yet another way of detecting land still below the horizon, although the physical basis is not yet clear. Ocean swells bouncing back from an island ahead, bending around it, or intersecting with one another after being deflected by an island provide clues for another technique that greatly expands the detection range of islands beyond their visual range, one that will be discussed in the section on the Marshall Islands.

THE ISSUE OF NAVIGATIONAL ACCURACY

Doubts about the accuracy of traditional Oceanic navigation have been expressed intermittently over the past four centuries by ethnocentric writers who have questioned whether it was possible to intentionally navigate to distant islands without the magnetic compass and other aids. The most recent outbreak of such skepticism occurred in the late 1950s and early 1960s when critics charged that the probability for error in reading star compass points, in keeping on course in cloudy weather, and in estimating the current were so great that the image of the Polynesians and other Pacific Islanders as great navigators was nothing but a romantic myth. The Aotearoa

47. Kepelino Keauokalani, *Kepelino's Traditions of Hawaii,* ed. Martha Warren Beckwith, Bishop Museum Bulletin, no. 95 (Honolulu: Bernice P. Bishop Museum Press, 1932), 82–83, and Lewis, *We, the Navigators,* 278–90 (note 4).

48. As star declinations slowly shift with the precession of the equinoxes, a star's path over the earth's surface also slowly shifts. For example, in A.D. 1000 Arcturus had a declination of 24°39′ north and thus passed over the Hawaiian chain north of the island of Kaua'i (Lewis, *We, the Navigators,* 283). Lewis tested the feasibility of this "zenith star" method on his 1964 voyage from Tahiti to New Zealand aboard a modern catamaran. By adjusting the stays of the mast of his catamaran to make it vertical to the surface of the sea, then sighting up the mast, Lewis was able to ascertain what stars were passing directly overhead and thereby keep track of his changing latitude as he sailed southwest for New Zealand. While sailing *Hōkūle'a* to Tahiti in 1976, Lewis and I experimented with this method and found that we could judge our latitude to within half a degree or so (David Lewis, "Stars of the Sea Road," *Journal of the Polynesian Society* 75 [1966]: 85–94, and Ben R. Finney, *Hokule'a: The Way to Tahiti* [New York: Dodd, Mead, 1979], 212–16).

(New Zealand) historian Andrew Sharp went so far as to claim that such errors would necessarily accumulate so fast that it was impossible to traditionally navigate between islands separated by more than three hundred miles of open ocean. The far-flung islands of Oceania could have been settled, he concluded, only by a long series of maritime accidents. He posited that canoes making short crossings wandered (or were blown) off course and were then pushed by wind and current to uninhabited islands, or that canoes carrying refugees who had fled their homes because of war or famine, leaving their fate to the mercy of the winds and currents, fortuitously fetched up on such islands.[49]

Sharp's claim about the impossibility of navigating between islands more than three hundred miles apart has since been amply refuted by the Caroline Islanders who in the 1970s revived the old practice of sailing between the Carolines and Marianas, archipelagoes separated by over four hundred miles of open ocean.[50] Furthermore, since 1976 the *Hōkūle'a* has repeatedly been sailed over the legendary sea routes of Polynesia on voyages between islands separated by many hundreds of miles of blue water, and in some cases more than two thousand miles, without instruments or physical charts.

Two main factors aid such long-distance navigation. First, the inevitable errors in estimating star bearings with the naked eye, in steering on the swells when the sky is totally overcast, in judging the effects of unseen currents, and in estimating distance traveled do not necessarily accumulate in one direction to throw a canoe progressively off course the longer it sails.[51] Second, most of the islands of Oceania occur within archipelagoes, meaning that navigators typically can sail between groups of islands rather than making their way from one lone island to another, lost in the vastness of the sea.

Although the significance of being able to sail between groups of islands rather than between lone, isolated ones cannot be overestimated, the challenge to navigation presented by the few solitary and truly isolated islands found in Remote Oceania should not be underestimated. Rapa Nui (Easter Island), the most remote and solitary island of the Pacific to be permanently settled, provides a prime example. There are no other islands immediately around Rapa Nui, and the nearest permanently inhabited high island is Mangareva, 1,450 miles to the west. (Tiny Pitcairn Island and the even smaller raised coral island of Oeno are several hundred miles closer, but these were only temporarily occupied by Polynesians.) Initially finding this lone island might not have been that difficult for the first Polynesian explorers who ventured beyond the frontiers of settlement along the eastern margins of the Marquesas, Tuamotus, and Australs. Migratory land birds flying to Rapa Nui from the west would have given them a bearing to follow, and the abundance of birds nesting on the island (before humans arrived and, with them, the predatory rat) would have strongly advertised the island's presence to any voyagers who came near. But once the first settlers became established, bird populations were greatly affected by hunting as well as by the rats they introduced. Then clearing land for agriculture and harvesting trees turned the once-forested flanks of the island into desiccated, windswept grasslands. The resulting crash in the populations of birds migrating through and nesting on Rapa Nui, combined with its lack of an archipelagic screen to aid navigation, must have discouraged further visits from the archipelagoes to the west. With no trees left for the islanders themselves to build voyaging canoes, Rapa Nui was cut off from the rest of Polynesia.[52]

Caroline Island Navigation and Cartography

Traditional Oceanic navigation is best documented in Micronesia's Caroline Islands. These extend over thirty-two degrees of longitude but are mostly concentrated in a narrow band between six and ten degrees of latitude north of the equator. We are primarily concerned with the central Carolines, the atolls that lie between the large and mostly high islands of Belau (Palau) and Yap (Uap) in the west and the high island (though surrounded by a huge barrier reef) of Truk (Chuuk) in the east.

Detailed descriptions of Carolinian navigation were not gathered until the late nineteenth century. The lengthy

49. Sharp, *Ancient Voyagers* (note 4), and Andrew Sharp, "Polynesian Navigation to Distant Islands," *Journal of the Polynesian Society* 70 (1961): 219–26.

50. Michael McCoy, "A Renaissance in Carolinian-Marianas Voyaging," in *Pacific Navigation and Voyaging*, comp. Ben R. Finney (Wellington: Polynesian Society, 1976), 129–38, and Finney, "Voyaging Canoes" (note 5).

51. The random effects of errors in dead reckoning during the 1980 voyage of *Hōkūle'a* from Hawai'i to Tahiti were documented (after the crossing had been completed) by comparing where the navigator reckoned the canoe had sailed with precise data on the actual track and on the currents flowing across it, gathered by passing satellites from automatic transmitters installed on the canoe and on buoys dropped parallel to the course line. During that voyage the navigator, who was making his first long crossing employing traditional navigational techniques, failed to perceive that the canoe was pushed ninety miles to the west while crossing one of the swift, narrow current jets that occur close to the equator where the Coriolis effect is relaxed. Then, sailing slowly in light airs south of the equator, he overestimated the strength of the westward-flowing south equatorial current, which, as was later learned, was then very weak. But these two errors, if they may be called such, did not compound. Instead, the second one canceled out the first, and by the time the canoe was approaching Tahiti the navigator's mental picture of where they were sailing turned out to more or less coincide with the actual track of the canoe. Ben R. Finney et al., "Re-learning a Vanishing Art," *Journal of the Polynesian Society* 95 (1986): 41–90.

52. Ben R. Finney, "Voyaging and Isolation in Rapa Nui Prehistory," *Rapa Nui Journal* 7 (1993): 1–6.

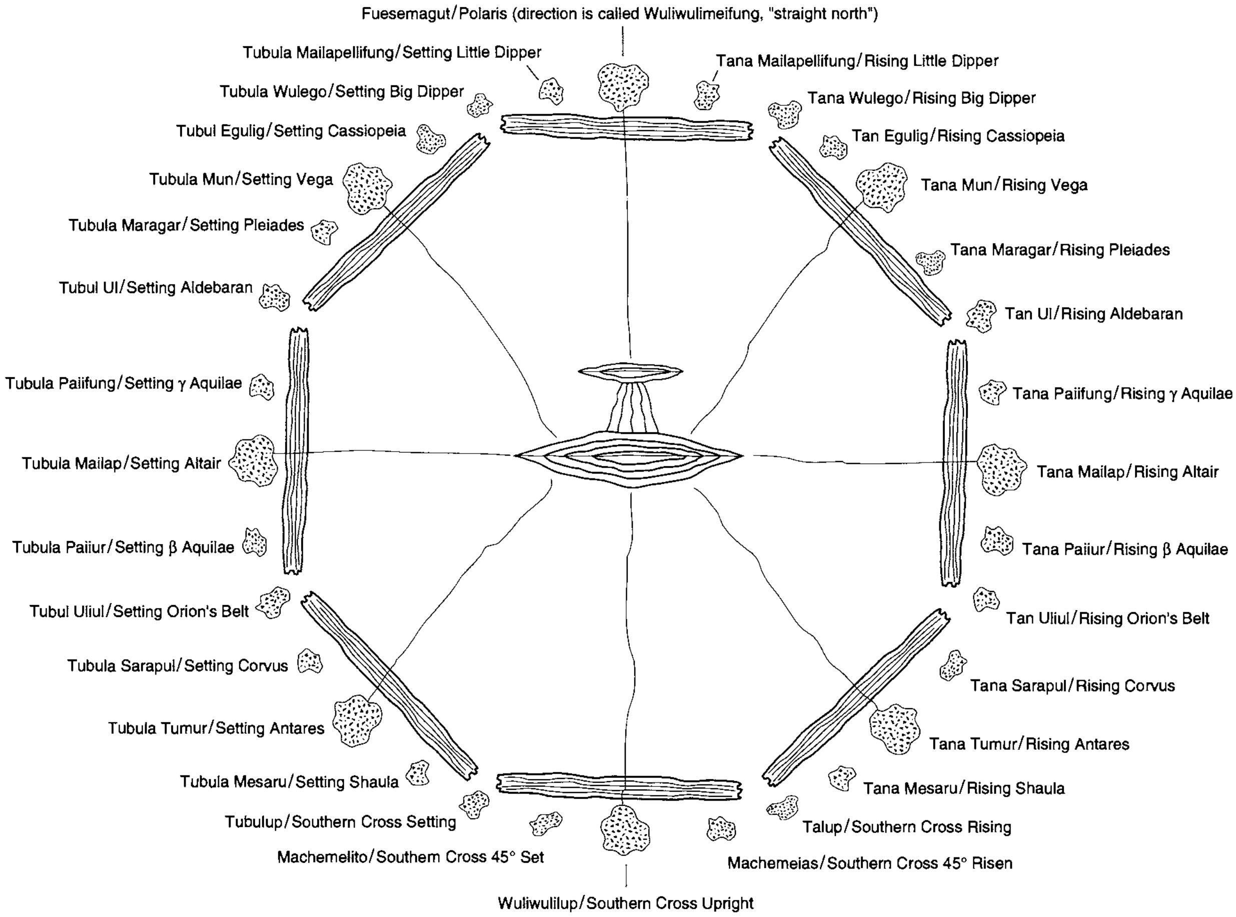


FIG. 13.13. CAROLINIAN STAR COMPASS. Carolinian navigators arrange lumps of coral, coconut leaves, and banana fibers on a mat to teach students the sidereal compass. In this compass from Satawal Atoll lumps of coral are laid out in a circle to represent the thirty-two compass points, but they are spaced unevenly since each one stands for the actual rising or setting point of the particular star or constellation. (Rising points are indicated by the prefix *tan,* setting by the prefix *tubul;* both with an *a* suffixed to bridge consonants.) Banana fibers strung across the principal axes demonstrate reciprocal star courses. A small canoe of coconut leaves in the center helps the student visualize himself at the center of various star paths. Bundles of coconut leaves placed just inside the ring of coral lumps represent the eight swell directions used in steering.
After S. D. Thomas, *The Last Navigator* (New York: Henry Holt, 1987), 81.

but limited Spanish interest in these islands did not result in any sustained inquiries into the navigational skills of their inhabitants. The first such research was conducted by German scholars who worked in the Carolines from the late 1800s, just before Germany purchased colonial rights to them from Spain, until Japan took them over at the start of World War I. Their pioneering inquiries, along with the more intensive work carried out after World War II by American and Japanese researchers, provide a fair idea of how the Carolinians navigate. This knowledge includes how they envision the islands around them and employ their mental constructs to teach novices, how they guide their canoes, and how knowledge is passed on to their pupils.[53] It would be hubris to claim, however, that we fully understand the way Carolinian navigators think and work. As will be ap-

53. German sources include A. Schück, "Die astronomischen, geographischen und nautischen Kentnisse der Bewohner der Karolinen- und Marshallinseln im westlichen Grossen Ozean," *Aus Allen Welttheilen* 13 (1882): 51–57 and 242–43; E. Sarfert, "Zur Kenntnis der Schiffahrtskunde der Karoliner," *Korrespondenz-Blatt der Deutschen Gesellschaft für Anthropologie, Ethnologie und Urgeschichte* 42 (1911): 131–36; and Paul Hambruch, "Die Schiffahrt auf den Karolinen- und Marshallinseln," *Meereskunde* 6 (1912): 1–40. More recent sources include Tomoya Akimichi, "Triggerfish and the Southern Cross: Cultural Associations of Fish with Stars in Micronesian Navigational Knowledge," *Man and Culture in Oceania* 3, special issue (1987): 279–98; idem, "Image and Reality at Sea: Fish and Cognitive Mapping in Carolinean Navigational Knowledge," in *Redefining Nature: Ecology, Culture and Domestication,* ed. Roy Ellen and Katsuyoshi Fukui (Oxford: Berg, 1996), 493–514; William H. Alkire, "Systems of Measurement on Woleai Atoll, Caroline Islands," *Anthropos* 65 (1970): 1–73; Gladwin, *East Is a Big Bird* (note 1); Goodenough, *Native Astronomy* (note 4); Lewis, *We, the Navigators* (note 4); and S. D. Thomas, *The Last Navigator* (New York: Henry Holt, 1987). Frédéric Lutké, *Voyage autour du monde* (Paris, 1835), 2:68–69, reports that the Caroline Islanders tattoo their bodies with long straight lines and images of small fish associated with the names of islands.

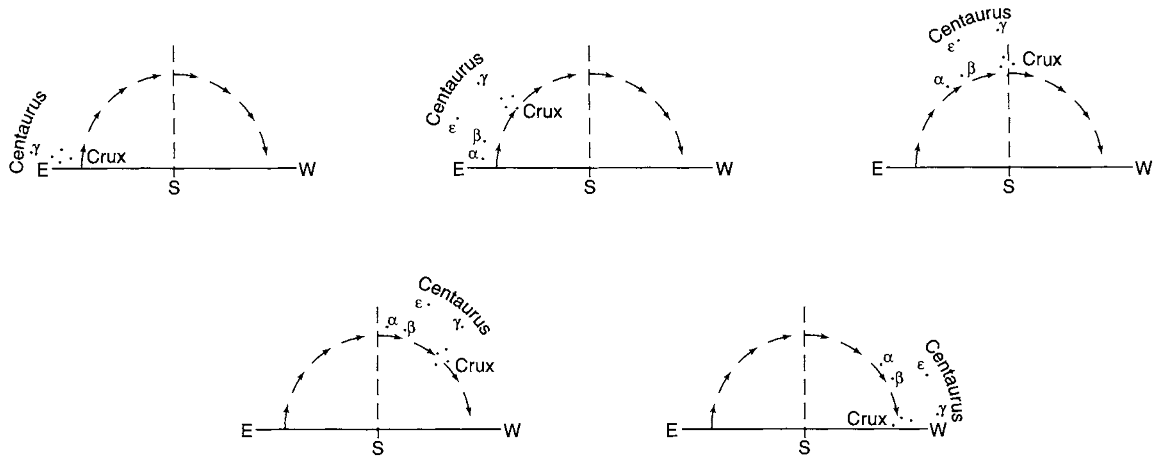


FIG. 13.14. SOUTHERN CROSS STAR POSITIONS AS SEEN LOOKING SOUTH FROM THE CAROLINE ISLANDS. Carolinians employ these five positions (rising on horizon, rising at forty-five degrees, upright, setting at forty-five degrees, setting on horizon) for five points of their thirty-two-point star compass.

After Ward Hunt Goodenough, *Native Astronomy in the Central Carolines* (Philadelphia: University Museum, University of Pennsylvania, 1953), 17.

parent in the summary that follows, there are differences in the way various researchers have presented the material, and some major points require further research.

Carolinian navigators employ a conceptual construct that in the language of Satawal Atoll is called a *nááng*, literally, "heaven" or "sky."[54] This is generally known in English as a "star compass," "sidereal compass," or "star path compass." Although they do not take any physical representations of this compass to sea with them, they do outline it on the ground to teach aspiring navigators basic principles. Figure 13.13 reproduces a sketch, made in the early 1980s by yachtsman Stephen D. Thomas, of such a teaching device as it was demonstrated to him on Satawal Atoll when he was doing research on navigation there.[55] Thirty-two lumps of coral are shown arrayed at more or less equal intervals in a rough circle to stand for the compass points named for the azimuths, or bearings, of the rising and setting points of such prominent stars as Vega and Antares and such constellations as the Pleiades and Corvus, as well as in the north the azimuth of Polaris and in the south that of the five positions of the Southern Cross (Crux) as it rotates around the celestial south pole (fig. 13.14).[56] Banana fibers extending from the perimeter to the center of the circle indicate the principal axes of the compass, and coconut fronds placed along the inner edge of the circle indicate the main swell directions. A model canoe made from coconut leaves is placed at the center and manipulated by the instructor to help his pupils visualize sailing to or from various compass points and anticipate how their vessel will be pitched or rolled by the main swells.

According to Thomas's diagram, as well as those published by anthropologist Tomoya Akimichi, who has also recently worked on Satawal, the navigators there typically arrange the coral lumps of their star compass in a circle.[57] However, the first German reports of Carolinian compass representations indicated that the navigators arranged the rocks on a quadrangular plan rather than a circular one.[58] Navigators from Woleai Atoll interviewed by anthropologist William Alkire in the 1960s stressed that they always outlined the star compass in this quadrangular way (fig. 13.15) and also explained to him that this format did not affect the function of the compass. In fact, they claimed that having four corners made it easier to memorize the order of the star and constellation points arrayed along the perimeter of the compass.[59] Although the preference for the circular or the quadrangular form may reflect regional differences, most scholars assume that the quadrangular form was original and that the influence of the magnetic compass, with its thirty-two points marked out on a circular compass card, has led contemporary navigators to portray the thirty-two points of their star compass as a circle. Note, however, that although two of the navigators Alkire interviewed were thoroughly familiar with the magnetic compass from their service on trading ships, they still conceived of the star compass as a traditional quadrangle.

Today virtually all Carolinian navigators employ a magnetic compass during the day to avoid the difficult

54. Akimichi, "Image and Reality," 495.
55. Thomas, *Last Navigator*, 81 (note 53).
56. Goodenough, *Native Astronomy*, 15–17 (note 4).
57. Akimichi, "Image and Reality," 497, and idem, "Triggerfish," 282 (both in note 53).
58. Sarfert, "Zur Kenntnis der Schiffahrtskunde" (note 53).
59. Alkire, "Systems of Measurement," 41–43 (note 53).

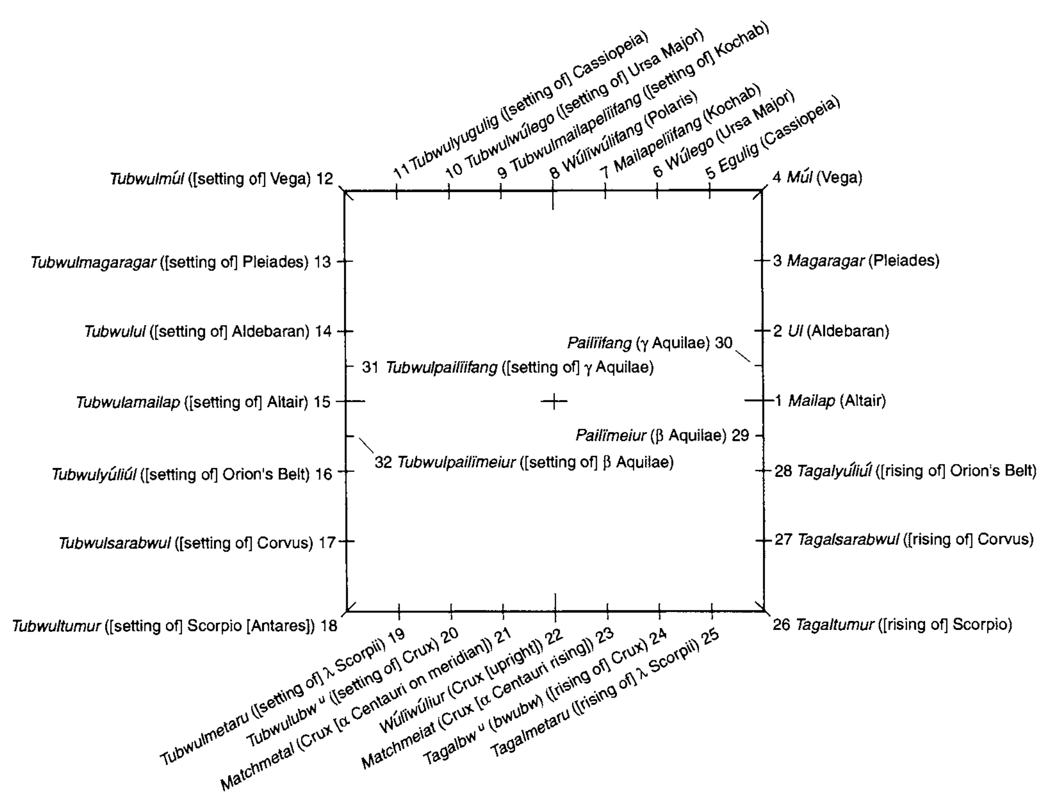


FIG. 13.15. "STAR PATH" COMPASS FROM WOLEAI ATOLL, CAROLINE ISLANDS. Each star path, or compass point, is known by its key star or constellation.

After William H. Alkire, "Systems of Measurement on Woleai Atoll, Caroline Islands," *Anthropos* 65 (1970): 1–73; esp. 42–43.

task of steering by the sun during the early morning and late afternoon and by the swells in the middle of the day. At night, however, they typically prefer to steer by the stars because–as most modern sailors will agree–it is easier to follow a steady star than the ever-swinging needle of a compass. Furthermore, even when using a magnetic compass, they still verbalize its bearings in terms of traditional celestial referents rather than using directional terms such as north or north by west.

As portrayed by Thomas and Akimichi, the points of the Satawal compass are evenly spaced around its perimeter. Even though the compass points on Alkire's outline of the Woleai compass are unequally spaced along its four sides, the angles between them are equal except for the rising and setting points of β and γ Aquilae. According to Alkire, these points (nos. 29–32 in fig. 13.15), which closely flank the rising and setting points of Altair (nos. 1 and 15 in fig. 13.15), are auxiliary to the other twenty-eight points of the compass.[60] In contrast to the even spacing of points on the Satawal compass and, with the exception above, the Woleai compass as well, the points are irregularly spaced in the way the Carolinian compass is most frequently represented in the literature. These representations stem from Goodenough's portrayal of the compass in his 1953 monograph on Carolinian astronomy (fig. 13.16) in which, drawing from early German reports, he plotted the compass points according to the actual rising and setting points of the named stars and constellations.[61] His diagram looks even more irregular because the east-west axis is drawn north of the celestial equator, reflecting the star path of Altair, the star of primary orientation that passes directly over the long axis of the Caroline chain.

This discrepancy could be explained by assuming that originally the star compass points were spaced irregularly according to star azimuths, and that the equal spacing of compass points came with the introduction of the magnetic compass. As suggested by Charles O. Frake, however, it seems more likely that these two presentations of the compass simply reflect the differing approaches of the researchers. Whereas Thomas, Akimichi, and Alkire were ethnographically reporting how the Carolinians conceive of the star compass in their minds and ephemerally represent it on the ground, in his study of Carolinian astronomy Goodenough chose to represent it analytically in terms of the actual azimuths of its defining stars and constellations. Accordingly, Frake's solution to the confusion

60. Alkire, "Systems of Measurement," 44.

61. Goodenough, *Native Astronomy*, 5–6 (note 4).

seems sensible: "The stars provide the names, not the positions, for abstract conceptual segmentations of the horizon circle into 32 equally spaced points." [62]

Of course the Carolinian navigators do not just name their compass points after stellar bodies. They also use the stars and constellations to set courses and to steer their canoes. Although such dual use might seem confusing, it does not trouble them. Just as they are able to adjust the heading of their vessels to the right and left of the bearing of the island they are heading toward to compensate for the effects of current and leeway, these consummate navigators can adjust for the differences between the actual rising and setting azimuths of their navigational stars and the evenly spaced compass points named after them.

That Carolinians divide the horizon into thirty-two points just as is done on the card of the modern magnetic compass does not necessarily mean the two constructs are historically connected. Both compasses (as well as the wind rose from Polynesia's Cook Islands) were probably constructed by halving the horizon and resultant sections until it had been divided into thirty-two divisions. These turn out to be 11.25 degrees wide, about as fine as possible for practical use by a steersman and also approximately equivalent to the width of one's fist held at arm's length.[63] But whereas the points of the Western compass were named, initially at least, for wind directions, as seems to have been true in Polynesia as well, the Carolinians looked to the starry heavens to label their compass points.

In his article on measurement systems on Woleai Atoll, which includes the rectangular representation of the compass, Alkire describes how novice navigators learn the compass and then learn the various compass courses to and from the islands in their sailing range though a series of formal steps.[64] The first step focuses on the mnemonic recitation of "star paths" (*pafü*), which Alkire likens to the Western exercise of "boxing the compass" (reciting the points in the correct order). The master navigator instructs his student by representing the points of the star compass (which Alkire prefers to call the "star path compass") with small coral pieces placed on the ground or on a mat in the rectangular form outlined in figure 13.15. The novice then memorizes and recites the compass points in terms of four groups of eight star names. Starting with Altair (1), which Alkire calls the "star of primary orientation" for the compass, the novice moves counterclockwise to Aldebaran (2), Pleiades (3), Vega (4), Cassiopeia (5), Ursa Major (6), Kochab (7), and Polaris (8). Then, starting with Polaris he continues with Kochab setting (9) and on through to Altair setting (15), again eight stars. Following the same process of starting the next set with the last star of the preceding set, the novice continues counterclockwise around the compass for two more

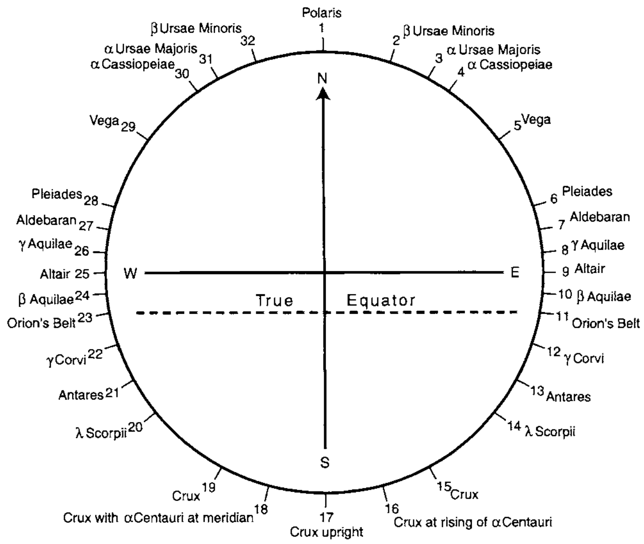


FIG. 13.16. CAROLINIAN STAR COMPASS SHOWN WITH UNEQUALLY SPACED POINTS. The points are placed according to the actual azimuths of the key stars and constellations by which the points are known.
After Ward Hunt Goodenough, *Native Astronomy in the Central Carolines* (Philadelphia: University Museum, University of Pennsylvania, 1953), 6.

sets of eight stars until Altair (1) is reached again. Because of the way the sets overlap, however, only twenty-eight star positions have so far been covered. To complete the series, the novice must then add in the four star positions that closely flank Altair rising and setting: β Aquilae rising (29) and setting (32); and γ Aquilae rising (30) and setting (31).

The second step involves learning and then reciting two sets of eight pairs of rising and setting stars. The novice begins with Altair rising (1)/Altair setting (15), Aldebaran rising (2)/Aldebaran setting (14), and so on until Polaris (8)/Southern Cross upright (22) is reached. Then he begins again with Altair rising (1)/Altair setting (5) and works south through Orion's Belt rising (28)/Orion's Belt setting (16), and so on, until the set is completed.

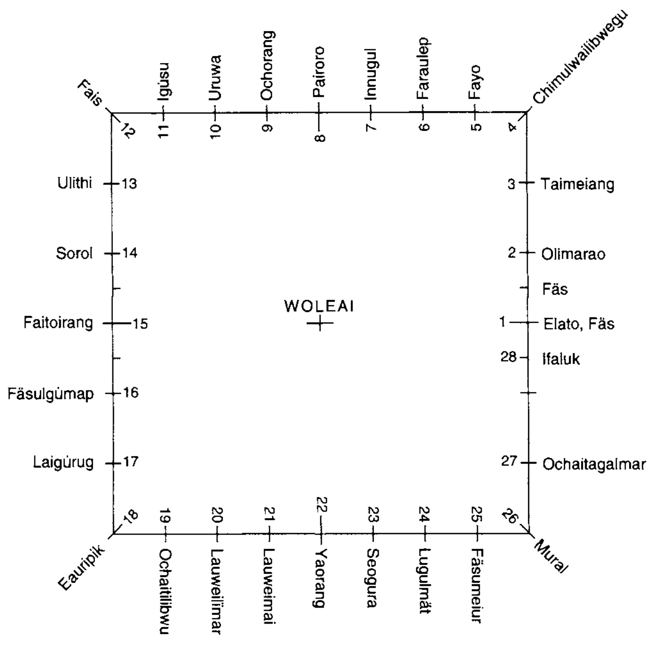
The third step is to learn and recite reciprocal star courses that will enable the navigator to recall immediately the return course for any course he has taken. He begins with Altair rising (1)/Altair setting (15) and proceeds through Aldebaran rising (2)/Orion's Belt setting (14), Pleiades rising (3)/Corvus setting (17), and so on, until all positions are completed.

The fourth step requires the most detailed memorization, for it involves locating all the islands, reefs, and

62. Charles O. Frake, "A Reinterpretation of the Micronesian 'Star Compass,'" *Journal of the Polynesian Society* 104 (1995): 147–58, esp. 155.

63. Frake, "Reinterpretation," 156.

64. Alkire, "Systems of Measurement," 41–47 (note 53).



1. *Fäsaliïfaluk*, i.e., "reef of Ifaluk." Fäs is north of Ifaluk (Gamen Reef).
2. Olimarao Island.
3. Special *wofälu* name for a type of small porpoise found along this course line.
4. Woleaian name for Tarang Bank.
5. Gaferut Island.
6. Faraulep Island.
7. *Wofälu* designation for a type of mutton fish said to be some 1.5 feet long.
8. Special name for an unidentified species of bird.
9. A "yellow" reef.
10. Navigational term of reference for a large tropical bird with red feet.
11. Term identifying a barracuda that is seen swimming close to the surface of the water.
12. Fais Island.
13. Ulithi Island.
14. Sorol Island.
15. A reef that lies far below the surface but that is recognized by the large number of birds that feed above it.
16. The reef of "*gümap*."
17. A whale seen along this course line.
18. Eauripik Island.
19. The reef of the *tilibwu*, which is a small sardinelike fish.
20. An area of many sharks.
21. Also an area of sharks but of a variety somewhat smaller than those of number 20.
22. Refers to a tropical bird with yellow feet.
23. One egret, a type of bird frequenting this area.
24. Identifies a slow-swimming shark that is said to have only half of a dorsal fin.
25. Means reef to the south. It lies close to the surface of the ocean.
26. A local name for Ulloa Reef.
27. A reef named after the man Tagalmar, who is said to have discovered it (probably Ianthe Shoal).
28. Ifaluk Island. This southern course to Ifaluk is used under particular wind conditions.

FIG. 13.17. STAR COURSES (*WOFÄLU*) FROM WOLEAI ATOLL. Carolinian navigators similarly diagrammed for their students the star courses (*wofälu*) radiating outward from each island within their sailing range. This diagram represents such a teaching device for Woleai Atoll, with the courses to islands, reefs and shoals, and places noted for particular kinds of sea life projected onto a rectangular representation of the Carolinian star compass.
After William H. Alkire, "Systems of Measurement on Woleai Atoll, Caroline Islands," *Anthropos* 65 (1970): 1–73, esp. 45–46.

shoals as well as living "seamarks" that are to be found around a particular island starting point. Each island in the Caroline chain therefore has its own conceptual chart indicating the star courses (*wofälu*) to the surrounding islands and other features. But these "charts," whether outlined on the ground or envisioned in the mind, are really just representations of the star compass. It is up to the navigator and his pupils to breathe life into these outlines by mentally or verbally reciting–for each island point of reference–all the islands and other features to be found by sailing along each star course defined by the compass. Figure 13.17 reproduces Alkire's diagram of the rectangular chart centered on Woleai, on which the navigators and then their students point out the islands and other features that lie along each compass bearing.

The living seamarks are forms of birds or sea life, such as a particular whale, a lazily swimming tan shark, a single noisy bird, each said to be associated with a particular place along a star course from a specific island. According to Goodenough and Thomas, "One does not sail to find them, rather one encounters them only when lost and not always then. They serve as a last recourse for the navigator who has missed his landfall or lost his bearings, enabling him to 'align' himself once more in the island world."[65] However, Riesenberg and other writers have stressed the mnemonic utility of these seamarks in filling out the otherwise blank star bearings that do not lead to other islands or physical features.[66]

In addition to memorizing the chart for his own island, the Woleai navigator must know the separate charts for all the islands surrounding Woleai so that once he sails to one of these islands he can visualize from there the bearings to all its surrounding islands and other features and therefore be able to plot his course back to Woleai. Alkire gives the following example: "If the navigator sets sail for Faraulep . . . he bases his course on Ursa major with possible alterations depending on wind and sea conditions at the time of the voyage. On his return voyage from Faraulep he must conceptualize the Island Chart for this island in order to take advantage of all significant reference points he may encounter during his return voyage. These might become crucially important if he should happen to be blown off course during the voyage." Alkire added that two of his navigator informants who shared the same teacher collectively knew from memory the charts centered on eighteen islands extending across the Carolines, meaning that for each successive one they could recite the star course bearings to surrounding islands and other features, thus effectively organizing hundreds of bits of navigational information in a form they could remember and employ at sea.[67]

After learning all the individual island charts, the

65. Ward Hunt Goodenough and S. D. Thomas, "Traditional Navigation in the Western Pacific," *Expedition* 29, no. 3 (1987): 3–14, esp. 7–8.

66. Saul H. Riesenberg, "The Organisation of Navigational Knowledge on Puluwat," in *Pacific Navigation and Voyaging*, comp. Ben R. Finney (Wellington: Polynesian Society, 1976), 91–128.

67. Alkire, "Systems of Measurement," 46 (note 53).

novice memorizes the seasonal order of the rising and setting of a long list of stars, knowledge vital for orientation when the stars defining compass bearings are not visible. After that, he takes lessons on the main swells used for orientation when the stars are not visible. Then instruction moves on to learning what Alkire calls "pole charts." These are lists of islands, reefs, living seamarks, and other navigational features that lie in a straight line along the bearing of a star compass point. The sequence of islands and features lying along a particular bearing is outlined by coral lumps arranged in long lines or "poles" to simplify its memorization.[68]

Another important way for navigationally ordering islands is called *pwuupwunapanap,* or "great triggerfish."[69] The root of this term, *pwuupw,* is polysemic with two main meanings, triggerfish (*Rhinecanthus aculeatus*) and the constellation Southern Cross (Crux), which are cognitively linked by their common diamond shape (fig. 13.18). The four stars of the Southern Cross correspond, respectively, to the mouth (head) of the fish and its dorsal (back), ventral (abdominal), and caudal (tail) fins. With this triggerfish metaphor, navigators can schematically map the relation between islands in terms of one or a series of diamond-shaped mental diagrams of islands and reefs, seamarks, distinctive swells, and where nothing else is available, even imaginary islands.

In these diagrams, the mouth of the fish always faces east and the tail west. The dorsal and ventral fins can serve as either the northern or southern points, depending on which way the fish is flipped. The backbone of the fish serves as a fifth feature of reference. Virtually any suitable arrangement of islands, real and imaginary, reefs, shoals, or living seamarks can be cognitively organized in terms of a single triggerfish or a linked series of them. Figure 13.19 represents two linked triggerfish.

The linkage of the triggerfish metaphor of the second referent of *pwuupw* as Crux becomes apparent when visualizing the islands lying to the south of Saipan in terms of the compass positions defined by the rotation of this constellation. *Pwuupw* as the Southern Cross rises almost directly above Magur at the head of the fish and sets close to the bearing of Fais at the tail. The southbound navigator therefore knows that if he heads his canoe between the rising and setting points of the Cross he will end up in the center of the Carolines, where he will sight islands, reefs, or other familiar features that will enable him to check his position and change his course if necessary (fig. 13.20).

To include more navigational information, navigators can also overlap a number of their diamond-shaped diagrams, using the backbone of one fish to serve as the dorsal or ventral fin of the next, and so on. Figure 13.21 shows such a linked series of overlapping triggerfish diagrams in which the last three diagrams have been offset to take into account that although Guam, Gaferut, and

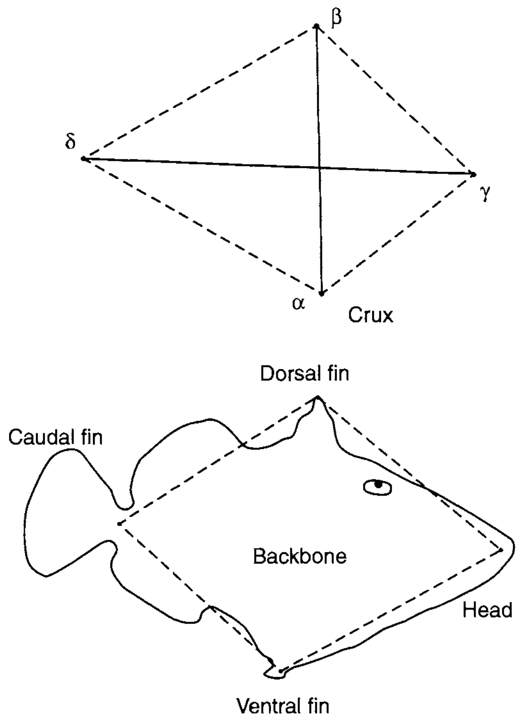


FIG. 13.18. SOUTHERN CROSS AND TRIGGERFISH. Carolinians consider these to have a common shape and call them by the same name. Their shape provides a schematic metaphor called the "great triggerfish" for organizing islands and other information needed by navigators.
After Tomoya Akimichi, "Triggerfish and the Southern Cross: Cultural Associations of Fish with Stars in Micronesian Navigational Knowledge," *Man and Culture in Oceania* 3, special issue (1987): 279–98, esp. 282 (fig. 2).

Olimarao are roughly aligned north and south, the islands below Olimarao are skewed to the east. Note that several names represent swells, living seamarks, or mythical or unknown islands and reefs. These conceptual features are evidently needed to fill out the diagram where no islands and reefs are found.

Although these mental diagrams are not meant to provide exact bearings, they nonetheless can be lifesaving aids when a navigator becomes lost or disoriented. Once he locates one known point in the diagram, from memory he can visualize the rest of the diagram or linked diagrams to get an idea of his position. Then, working directly or indirectly from the bearings chart for the nearest island, he can recalculate his course and get under way.

Various other mnemonic exercises–recitations, songs,

68. Alkire, "Systems of Measurement," 49–50 (note 53).

69. This is in the language of Satawal; in the closely related languages of Woleai and other central Carolinian atolls, cognate terms are used. Since Alkire only briefly describes the great triggerfish ("Systems of Measurement," 51), this summary depends on the studies from Satawal made by Akimichi ("Triggerfish" [note 53]) and Goodenough and Thomas ("Traditional Navigation," 8–10 [note 65]).

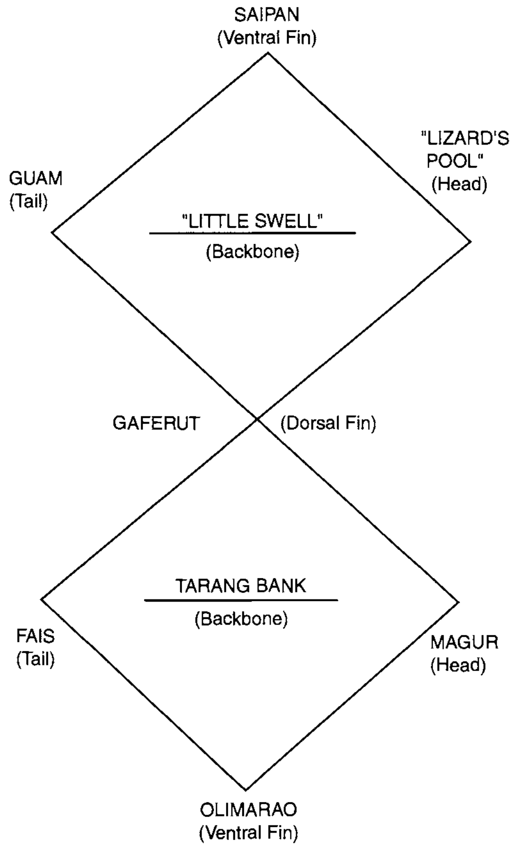


FIG. 13.19. TWO LINKED TRIGGERFISH. This shows the two linked triggerfish by which Carolinian navigators mentally diagram the distribution of islands for sailing from Saipan in the Mariana Islands to Olimarao in the Caroline Islands. The navigator sailing from Saipan conceptually starts at the top of the upper diamond, which in this case is represented by the ventral fin of the fish. Sailing south between the island of Guam to the west at the tail of the fish and "lizard's pool" (a mythical place used to fill in where no islands or reefs exist) to the east at the mouth of the fish, he passes over the backbone noted for its characteristic "little swell" and then proceeds to the island of Gaferut at the dorsal fin. By mentally flipping the fish around its east-west axis, its dorsal fin remains at Gaferut in the lower diamond. The navigator continues southward, passing between the head and tail of the fish, which represent the islands of Magur and Fais, respectively, over the backbone marking the Tarang Bank, and then on to Olimarao Island, the ventral fin, to complete the voyage.
After Ward Hunt Goodenough and S. D. Thomas, "Traditional Navigation in the Western Pacific," *Expedition* 29, no. 3 (1987): 3–14, esp. fig. 9.

chants, oral drills, and even dances–help students memorize all this information and also refresh the memories of practiced navigators by giving form to what would otherwise be stale lists of islands and star courses. For example, a verbal exercise from Puluwat Atoll called "Reef Hole Probing" focuses on the image of a parrot fish that lives in a deep hole in the reef of Puluwat. The participant recites how he is poking a stick into the hole, causing the fish to flee to a reef hole of another island. Then, mentally transferring himself to that island, he again threatens the fish, forcing it to swim to the reef hole of yet another island, and so on, until all the islands of a circular chain around Puluwat are visited and the fish returns to the home island, where it is finally caught. In the recital, each time it flees, the star bearing of its flight to the next island must be given. But to confound the uninitiated, instead of reciting the common names of the islands involved, the navigator calls each one by the secret name of its reef hole.[70]

In another Puluwat exercise, "The Torch of the Lagoon at Anúúfa," the navigator imagines that he carries a torch and seeks fish of various kinds from a series of twenty-two islands. First he recites how to get in position for the exercise by going from Puluwat to the atoll of Magur, where the exercise was invented, and from there to the lagoon of Anúúfa (a spirit) at the mythical island of Fanuankuwel. Then he starts the exercise by verbally carrying the torch in successive voyages to twenty-two places, taking a different star course from Anúúfa to each one. On each trip he captures his prey by the light of his torch and then returns to the lagoon on the reciprocal star course.[71]

The importance of being able to picture navigational information with the mind's eye was stressed by Mau Piailug, the master navigator from the Carolines' Satawal Atoll who guided the reconstructed Polynesian voyaging canoe, *Hōkūle'a*, on her first voyage from Hawai'i to Tahiti in 1976. One evening three years later, as he was coaching the young Hawaiian Nainoa Thompson in how to navigate the canoe to Tahiti, Mau startled Nainoa by asking him, "Can you see Tahiti?" The puzzled Hawaiian wondered what in the world Mau was driving at. From their vantage point on the south shore of O'ahu Island in the Hawaiian chain, Nainoa could point out the star compass bearing to Tahiti, but he knew that since the island lies over 2,250 miles south-southeast of Hawai'i, there was no way he could actually see it. Then Nainoa remembered Mau's urging him to learn to visualize the island he was sailing toward, and he replied that indeed he could "see" Tahiti in that sense. Never lose sight of Tahiti as you sail, the master navigator then told him, for if you do you will be lost. In his aptly titled book *An Ocean in Mind,* Will Kyselka describes how Nainoa went on to apply this and other principles of mental cartography and navigation in taking *Hōkūle'a* from Hawai'i to Tahiti and back in 1980, becoming the first Polynesian navigator in centuries to guide a canoe over this long route.[72]

The traditional Carolinian navigator visualizes the progress of his vessel through the sea in an entirely dif-

70. Riesenberg, "Navigational Knowledge," 94–95 (note 66).
71. Riesenberg, "Navigational Knowledge," 107–10.
72. Kyselka, *Ocean in Mind* (note 5).

ferent way than does his modern counterpart. The latter spreads out a nautical chart showing the location of islands, reefs, and continental shores systematically transformed by Mercator's projection and crisscrossed with lines of latitude and longitude. A compass rose printed on the chart lets him use his parallel rulers to find the compass bearings between points and provide, after compensating for magnetic variation, a heading for the steersmen to follow using a magnetic compass. After setting sail, the modern navigator dead reckons by periodically estimating the course and distance made good from compass readings and measurements of distance run, adjusted for estimated current and leeway and expressed in degrees, nautical miles, and periods of time, then plots this information on his chart. In these days of GPS (global positioning systems), satellite fixes, and computerized steering, dead reckoning may be employed only by particularly conscientious navigators, but it has long been a feature of Western navigation. Before the introduction of the chronometer allowed longitude to be determined precisely, dead reckoning was the primary Western means of tracking position.

The Carolinian navigator has none of his modern counterpart's paraphernalia, yet he manages to keep track of his canoe's progress and to make any course corrections necessary to reach his island destination. On setting sail, he points his canoe toward the memorized star bearing of his target island, adjusting the heading to take into account estimated current and leeway. (Just after sailing he can get an initial idea of these by backsighting on the departure island to compare the actual course made good to the canoe's heading.) As he sails along, the navigator thinks of his progress in a way totally unlike our notion of what happens on a voyage. To him the canoe is stationary and it is the islands that move. Of course he knows that he is sailing the canoe to an island destination and that the latter is not really moving toward him. But just as modern navigators talk about the rising and setting of stars when they know it is the earth that turns, so do Carolinian navigators find it natural to think of their canoes as stationary in relation to moving islands. Their view may be more comprehensible after reading this passage from Gladwin's monograph on Puluwat navigation:

> Picture yourself on a Puluwat canoe at night. The weather is clear, the stars are out, but no land is in sight. The canoe is a familiar little world. Men sit about, talk, perhaps move around a little within their microcosm. On either side of the canoe water streams past, a line of turbulence and bubbles merging into a wake and disappearing in the darkness. Overhead there are stars, immovable, immutable. They swing in their paths across and out of the sky but invariably come up again in the same places. You may travel for days on the canoe but the stars will not go away or change their positions aside from their nightly trajectories from horizon to horizon. Hours go by, miles of water have flowed past. Yet the canoe is still underneath and the stars are still above. Back along the wake, however, the island you left falls farther and farther behind, while the one toward which you are heading is hopefully drawing closer. You can see neither of them, but you know this is happening. You know too that there are islands on either side of you, some near, some far, some ahead, some behind. The ones that are ahead will in due course fall behind. Everything passes by the little canoe–everything except the stars by night and the sun in the day.[73]

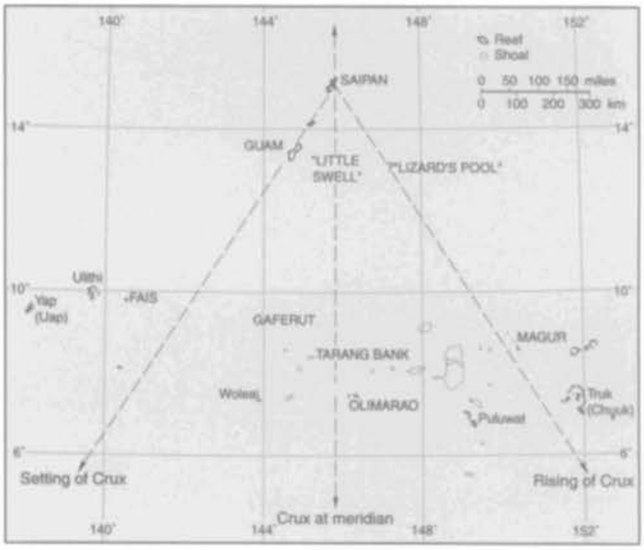


FIG. 13.20. THE "GREAT TRIGGERFISH." This diagram illustrates how the Southern Cross/triggerfish metaphor can incorporate information on star bearings as well as the placement of islands. A navigator looking south from Saipan in the Mariana Islands knows that the atoll of Magur in the Caroline Islands (the head of the triggerfish) bears in the direction of the compass point marked by the rising Southern Cross, and that the atoll of Fais (the tail of the triggerfish) bears almost in the direction of the compass point marked by the setting Southern Cross. By keeping the canoe headed south, toward the upright Southern Cross, he knows that he will end up in the middle of the Caroline archipelago.
After Ward Hunt Goodenough and S. D. Thomas, "Traditional Navigation in the Western Pacific," *Expedition* 29, no. 3 (1987): 3–14, esp. fig. 11.

This canoe-centered perspective parallels the common practice of Western sailors of saying that a channel marker is "drawing abeam," or that an island is "falling astern," when it is obvious that it is the vessel that is moving, not the channel marker or island. The Western sailor typically applies this vessel-centered perspective only to objects he is looking at, however. When he considers ob-

73. Gladwin, *East Is a Big Bird,* 182 (note 1).

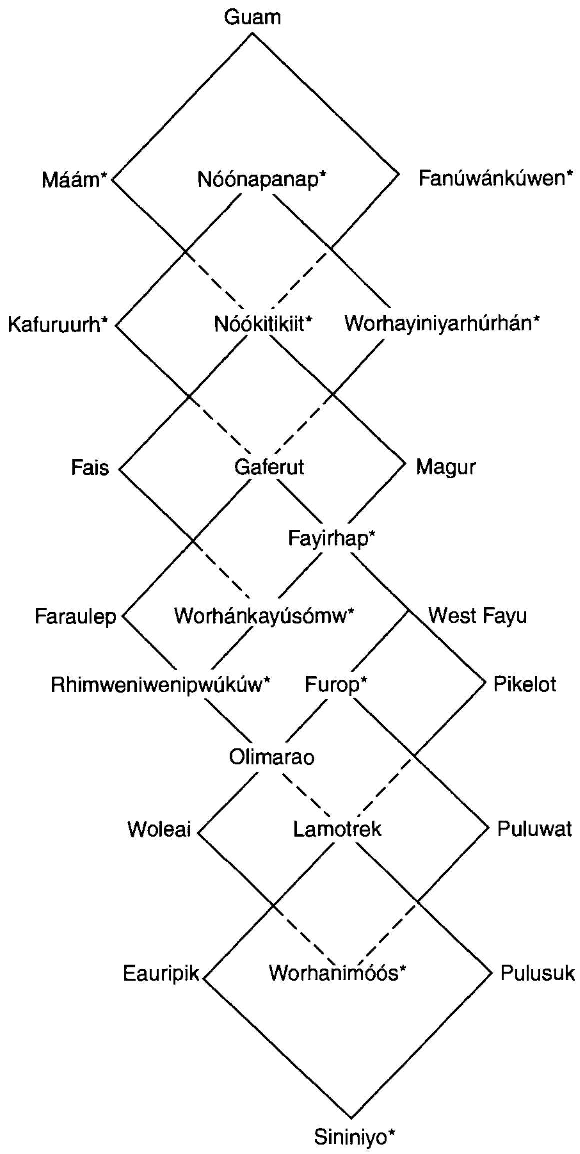


FIG. 13.21. OVERLAPPING TRIGGERFISH DIAGRAM. This overlapping series of seven triggerfish is offset laterally to take into account that Carolinian Lamotrek Atoll is to the east of the course from Guam in the Mariana Islands to the Carolinian atolls of Gaferut and Olimarao. Where no islands are at or near the four points of the fish, navigators have used reefs, shoals, living seamarks, and even imaginary islands to fill out the diagrams. These are indicated by an asterisk after the name and are as follows.
Triggerfish 1: Máám (unidentified object); Nóónapanap (big swells); and Fanúwánkúwen (mythical island).
Triggerfish 2: Kafuruurh (mythical island); Nóókitikiit (small swells); Worhayiniyarhúrhán (unidentified reef with particular living seamarks).
Triggerfish 3: Fayirhap (upside-down reef).
Triggerfish 4: Worhánkayúsómw (unidentified reef).
Triggerfish 5: Rhimweniwenipwúkúw (reef with head curving); Furop (Rainbow runner [*Elagatis bipinnulatus*])
Triggerfish 7: Worhanimóós (unidentified reef); Sininiyo (seed of *Barringtonia* sp.)
After Tomoya Akimichi, "Triggerfish and the Southern Cross: Cultural Associations of Fish with Stars in Micronesian Navigational Knowledge," *Man and Culture in Oceania* 3, special issue (1987): 279–98, esp. 287 (fig. 6).

jects over the horizon or thinks about a voyage in the abstract, he normally switches to a plan view–looking at his chart as though gazing down on the ocean from a great height, visualizing the fixed islands and continents and his vessel's progress over the surface of the sea.

In contrast, the Carolinian navigator employs a horizontal perspective even for objects he cannot see. Looking outward from his craft with his mind's eye, he visualizes the destination island approaching the canoe and pictures other islands moving past his vessel. This is not because he is incapable of assuming the top-down perspective of modern navigation and cartography. As reviewed at the beginning of this chapter, navigators from the Carolines and other parts of the Pacific were able, when asked by European explorers, to outline the arrangement of islands and archipelagoes within their own sailing ranges. Furthermore, this perspective is embedded in a Carolinian myth about how a spirit revealed navigational knowledge to Inosagur, the daughter of a chief of Pulap Atoll, to thank her for feeding him. The grateful spirit put Inosagur in a small coconut tree and by magic made it grow until it reached above the clouds. She then could see all the islands, all the reefs, banks, and shoals, and all the forms of "sea life" spread out below her. After Inosagur had memorized the rising and setting star points under which all these places lay, the spirit shrank the tree so that she could return to earth. Later, following the spirit's directions, she taught her firstborn son how to navigate, and he in turn taught the art to her second son, thus founding the two "schools," or traditions, of navigation extant in the Carolines, which are named Fanur and Wareyang after Inosagur's sons.[74] Yet it remains that Carolinian navigators do not employ this view from above when dead reckoning but prefer the horizontal perspective of looking outward from the canoe.

To envision the progress of a voyage, before leaving the navigator picks a "reference island" on one side or the other of the course line that will, in his conception, move past the canoe as he sails it toward the destination island. (When no single island happens to be placed in the right position, he may employ two reference islands in succession.) In Satawalese this reference island is called *lu pongank,* which translates as "in the middle and athwart."

74. Thomas, *Last Navigator,* 85 (note 53). On these two schools, Alkire comments: "These two 'schools' of knowledge are referred to as Masts (*gaich*). In answer to a question of 'which Mast do you know?,' the navigator will reply either *faluch* or *wuriang,* terms which refer to the legendary founders of each. There seems to be little difference in the essential navigational techniques learned in the two schools, but there are different restrictions associated with navigators of each" ("Systems of Measurement," 41 [note 53]).

Typically a reference island is a low atoll that even in daylight gives no direct visual clue of its presence until the tops of the highest coconut palms begin to poke above the horizon when the island is ten to twelve miles away. Since it usually lies several times that distance off to one side or the other of the course line, during a crossing the navigator never sees the reference island. Nonetheless, he mentally tracks its changing bearings, although exactly how he accomplishes this feat is most difficult to grasp.

Let us begin with a brief verbal description of the process. Once the voyage begins and, in the navigator's way of thinking, the reference island starts moving past the canoe, the navigator conceptualizes the progress of the voyage in terms of the reference island's bearing moving under the horizon from one compass point to another. At any time during the voyage he can therefore picture his position in terms of how far the reference island has moved through the compass points. When he reckons that the reference island has moved to where it is almost under the final compass bearing of the memorized series for the voyage, he knows that the destination island should be visible or should soon come into sight.[75]

To further explain this dead reckoning system to readers who find the concept of moving islands utterly alien, Gladwin and other analysts have diagrammed it, but not from the Carolinian perspective of a navigator looking outward from his canoe toward an unseen and moving reference island. Instead, they have taken a plan view, mapping the canoe, islands, and compass bearings as though seen from above. Gladwin diagrammed how bearings drawn from the successive star compass points through the reference island to the course line divide that line into cognitively manageable segments, or *etak* as they are known on Puluwat and Satawal (fig. 13.22). In such a diagram, the reference island is shown as fixed in one place, and the viewer is required to imagine the canoe moving along the course line from which, at successive intervals, the reference island bears in the direction of one after another of a series of star compass points.

In Thomas's more recent study of navigation on Satawal, he similarly illustrated this process of segmenting the course line with a diagram of an actual sailing route, the fifty-five-mile crossing between Satawal and West Fayu, a small uninhabited atoll north of Satawal that the Satawalese often visit to fish and hunt turtles (fig. 13.23). For this crossing Lamotrek, an atoll thirty-five miles west of the course line, serves as the reference island the navigator employs to keep track of his canoe's progress by mentally segmenting the voyage into six *etak*. At the start off Satawal, Lamotrek lies in the direction of the compass point of setting γ Aquilae. As the canoe heads northward toward West Fayu, the bearing of Lamotrek shifts counterclockwise through the compass points. When the navigator estimates that the reference island bears in the

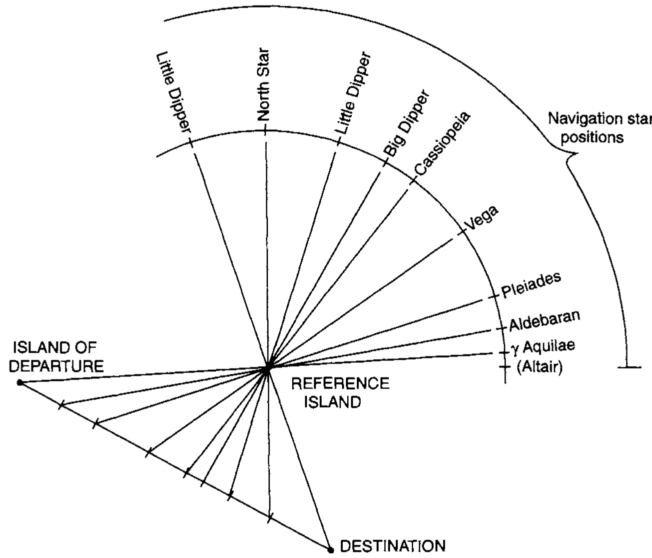


FIG. 13.22. GLADWIN'S MODEL OF *ETAK* DEAD RECKONING. Carolinian navigators dead reckon by mentally sighting over a reference island to one side of the course line between two islands, then visualizing their progress along that course line by estimating how the bearing from the canoe to the reference island shifts from one star compass position to another, thereby cutting the course line into conceptually manageable segments called *etak*. Even though the reference island is too far away to be seen, or otherwise sensed, at any time during the voyage, the navigators envision how its bearing shifts as the voyage progresses and thus are able to keep track of their progress.

After Thomas Gladwin, *East Is a Big Bird: Navigation and Logic on Puluwat Atoll* (Cambridge: Harvard University Press, 1970), 185.

direction of the next compass point, setting Altair, the first *etak* has been completed. As the voyage proceeds, the bearing of the reference island moves successively to the setting points of β Aquilae, Orion's Belt, Corvus, Antares, and Shaula to segment the voyage into five more *etak* until the canoe is within range of West Fayu.

On this particular crossing, the first and last segments created by the reference island bearings happen to coincide with what Satawalese call the "*etak* of sighting" in that the departure and target islands can be seen once the canoe is within these segments, and the second and second to last segments similarly coincide with the "*etak* of birds" in that they mark the normal flight limit of land-nesting birds.[76] However, bird and land sighting ranges do not always correspond with the successive bearings of reference islands. When, for example, the reference island is more distant from the course line, the limits of the *etak*

75. Thomas, *Last Navigator,* 77–84; cf. Gladwin, *East Is a Big Bird,* 181–89 (note 1); Lewis, *We, the Navigators,* 173–79 (note 4).

76. Thomas, *Last Navigator,* 80, and Gladwin, *East Is a Big Bird,* 188.

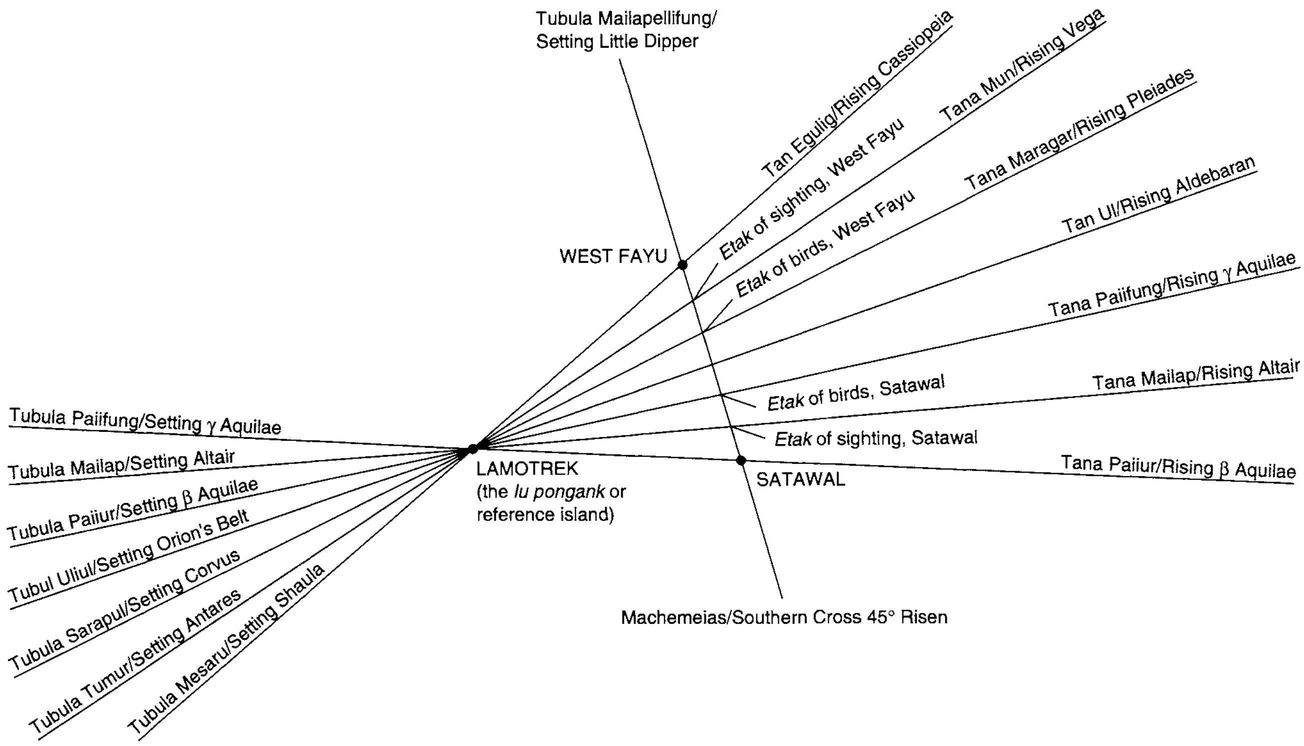


FIG. 13.23. *ETAK* RECKONING BETWEEN SATAWAL AND WEST FAYU. In the voyage pictured here from Satawal to West Fayu, islands about fifty-five miles apart, Lamotrek serves as the reference island, the changing bearings of which cut the voyage into six *etak*. On this particular route the first and last segments are equivalent to the *etak* of sighting (the farthest distance at which a low island in question can be seen), and the second and second to last segments are equivalent to the *etak* of birds (the usual limit at which land-nesting birds can be seen fishing out to sea). On routes with longer or shorter *etak* this would not be so.
After S. D. Thomas, *The Last Navigator* (New York: Henry Holt, 1987), 79.

formed by the changing bearing of the reference island surpass the limits for sighting land and land birds fishing out to sea.

Although this method of diagramming the *etak* system from above may fit Western cartographic conventions, it still leaves unanswered the fundamental question raised by the verbal description of dead reckoning as conceived by the navigator: If the navigator cannot see the reference island at any time during the voyage, how does he know when it moves from one compass point to another? From a Western navigational perspective, it is tempting to think that the resultant *etak* segments must be units of measurement like nautical miles or marine leagues, albeit longer. But such reasoning founders on the unequal length of these segments, which (depending on the distance of the reference island from the course line and its position between the departure and destination islands) can vary enormously from crossing to crossing or even within a single crossing. Contrary to the impression given by the equal or near-equal spacing shown in Thomas's diagram, figure 13.23, even when the reference island is at right angles to the midpoint of the course line, *etak* segments vary in length during a voyage, starting long at the beginning, becoming shorter toward the middle, and then lengthening toward the end. Variance between the length of the inner and outer segments increases the closer the reference island is to the course line and becomes progressively more skewed to one side or the other the farther the reference island lies off the midpoint of the course line. (The unequal spacing of *etak* segments shown in figure 13.22 is also a function of Gladwin's use, following Goodenough's precedent of actual, and therefore unequal, star bearings to denote the compass points.)

Cognitive anthropologist Edwin Hutchins has proposed that to understand how the navigator tracks the unseen reference island we need to go back to a point that Sarfert stressed in his 1911 study but that has subsequently been ignored: the navigator conceives of the horizon under which the reference island moves as a straight line, not a segment of a circle.[77] Therefore, as Hutchins points out, the horizon:

> becomes a line, parallel to the course steered, on

77. Sarfert, "Zur Kenntnis der Schiffahrtskunde," 135 (note 53).

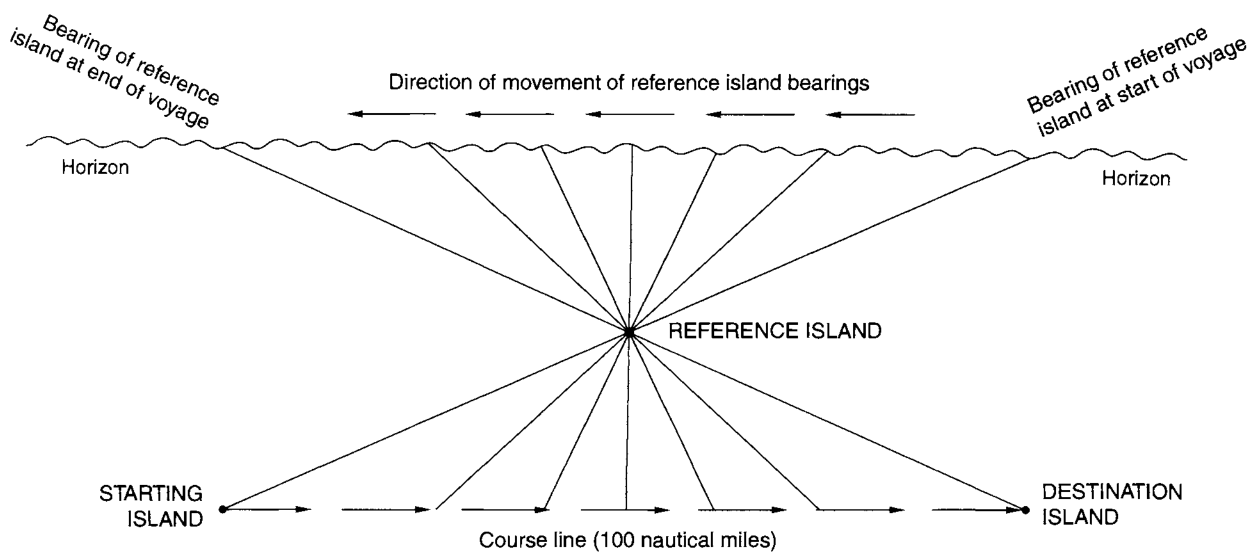


FIG. 13.24. *ETAK* DIAGRAM OF A VOYAGE ASSUMING A STRAIGHT HORIZON. By envisioning the horizon as straight, as it appears to the navigator looking outward from his canoe, rather than curved as it appears when seen from a great height, it becomes apparent that the navigator's visualization of the reference island's movement from one compass point to another models the actual movement along the course line, albeit reciprocally in terms of compass bearing.

> which the progress of the reference island from initial bearing through a set of intermediate bearings to the final bearing is exactly proportional to the progress of the canoe from the island of departure across the sea to the goal island. . . . the imagined movement of the *etak* reference island just under the horizon is a complete model of the voyage which is visualizable (but not visible) from the natural point of view of the navigator in the canoe.[78]

Figure 13.24 views from above a crossing between two islands separated by one hundred miles in which the reference island lies directly off the midpoint of the course line. A view of the horizon as seen from the canoe is added to illustrate how the navigator's visualization of the reference island's movement from one compass point to another models the actual movement of the canoe along the course line, albeit reciprocally in terms of compass bearings. With this in mind, and again with Hutchins as our guide, we are now in a position to propose an answer to the riddle of how the navigator judges the reference star's movement from under one compass point to another. Like experienced yachtsmen, canoe navigators can judge how fast they are moving by watching the water flowing past or just listening to its rush along the hull. But instead of converting these sense perceptions into so many knots (nautical miles per hour) and then multiplying that figure by the number of hours sailed to estimate how many nautical miles they have traveled in a particular period, they envision the movement of their vessels in a way that is consonant with their view of the starry horizon from the canoe. Judging from what Tupaia and several other navigators told Cook and other early explorers, Tahitian navigators estimated their progress in terms of a "sailing day" or portions thereof. Perhaps because of the relatively dense distribution of islands in the Carolines and the fact that most are atolls that cannot be seen until you are almost upon them, the navigators there developed their elegant way of visualizing the advance of their canoes toward a destination. By translating their perceptions of speed and time–honed through long experience in sailing through the islands–into angular distance traced by an invisible island along the horizon, they can mentally plot the movement of their canoes from one low coral island to another with a precision not attained in Western navigation until the development of accurate distance and time measuring devices and then more sophisticated instrumentation.

A way to portray on paper how a Carolinian navigator visualizes *etak* plotting in terms of time intervals is to forsake our usual view from above and adopt solely the perspective of looking outward from the canoe to the horizon. Figure 13.25 plots in terms of time intervals the star compass points as they would appear to the navigator sailing along the course line illustrated in the preceding figure at a steady speed of just over four knots, a rate that would enable a canoe to make the one-hundred-mile passage in twenty-four hours. Although the bearings are de-

78. Edwin Hutchins, *Cognition in the Wild* (Cambridge: MIT Press, 1995), 65–93, quotation on 84. See also Hutchins's "Understanding Micronesian Navigation," in *Mental Models,* ed. Dedre Gentner and Albert L. Stevens (Hillsdale, N.J.: Lawrence Erlbaum, 1983), 191–225.

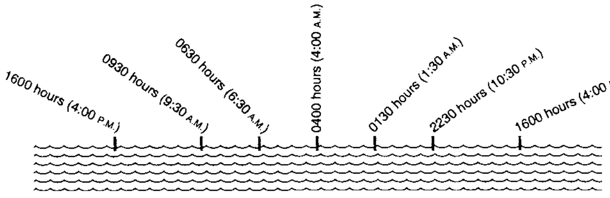


FIG. 13.25. JUDGING DISTANCE BY SAILING TIME IN THE *ETAK* SYSTEM. This diagram looks at the same situation illustrated in figure 13.24, but solely from the perspective of the navigator looking outward toward the horizon and judging the passage of the reference island from one point to another in terms of his canoe's speed converted to time intervals. This diagram assumes that the departure and destination islands are separated by one hundred nautical miles and that the canoe sails at a steady four knots. Thus, at regular intervals, denominated by time periods similar to those given here in English, the navigator judges that the *etak* passes from one star compass point to another, completing successive *etak* segments envisioned as of equal length along the course line and along the straight horizon. The navigator would, of course, adjust his time estimates according to his perceptions of the canoe's speed and also the effect of current.

nominated in terms of hours, the traditional navigator would employ such categories as late afternoon for 4:00 P.M., just after sunrise for 6:30 A.M., and so on. And he would, of course, have to adjust his estimate of when each succeeding compass point is reached according to his judgment of the sailing speed at that time.

Since the reference islands remain invisible to the navigator throughout a voyage, it is not surprising that imaginary places are used as points of reference on routes for which there is no island appropriately placed along one side or other of the course. For example, since there are no conveniently placed islands to serve as references for the entire length of the four- to five-hundred-mile voyages between the Carolines and the Marianas, navigators employ conventionally located "ghost islands" to plot their progress. The crossings between these archipelagoes illustrate how, even though this dead reckoning system may have been developed, or at least perfected, among the relatively closely spaced islands of the Caroline group, it can be adapted for longer voyages–even those over two thousand miles.

When in 1976 the Satawalese master navigator Mau Piailug guided *Hōkūle'a* from Hawai'i to Tahiti, we realized that the geography of the eastern Pacific was totally beyond his experience and that we therefore would have to brief him on the location of the islands and expected wind and current patterns. This did not violate our experimental protocol, since we were not attempting to replicate a discovery voyage. Instead, we wanted to recreate a voyage between an already settled Tahiti and Hawai'i, such as one navigated by a Hawaiian or Tahitian voyager who had already made the crossing and was therefore familiar with the distribution of islands along the route and the environmental conditions likely to be encountered. We therefore showed Mau large-scale charts of the eastern Pacific to acquaint him with relative locations of Hawai'i, Tahiti, and the other islands and discussed with him the pattern of winds and currents along the course line.

Once we were under way, Mau used the Marquesas Islands, 750 miles northeast of Tahiti and about 400 miles east of the course line, as his *etak* reference island. Even though this voyage took Mau into seas where he had never before sailed and was five times longer than any previous crossing he had made, he was able to adapt his system with impressive accuracy. After thirty days at sea he told us we would soon see the Tuamotu Atolls just to the north-northeast of Tahiti, and that if we kept sailing we would see Tahiti the next day. That night we made landfall on Mataiva, the westernmost atoll of the Tuamotu chain. After a short stay there, we set sail for Tahiti, sighting the island after a little less than a day's sailing.[79]

So far this discussion of Carolinian dead reckoning has focused only on situations when a canoe sails freely with a fair wind blowing across the course line. When the wind blows from the direction of the destination island, forcing a canoe to tack back and forth across the wind, navigators can use a variation of *etak* reckoning in which the destination island becomes the reference island as well. To explain how this is done, Gladwin has offered a simple diagram in which the departure island (A) lies due west of the destination island (B) and the wind is blowing directly from the east against the direction of travel (fig. 13.26). In this situation, island B, which lies under the rising point of Altair, serves as the navigator's reference island during tacking as well as being his destination. The diagram shows the first tack being made toward the north-northeast. As the canoe sails in that direction, the navigator visualizes its progress on that tack in terms of the bearing to island B moving from under Altair to β Aquilae, then to Orion's Belt, and finally to Corvus. At this point he puts his canoe on the other tack, sailing south-southeast until he judges that island B is under the Pleiades. Then he again tacks north-northeast and so on until, after successively shorter tacks between the bearings of Corvus and the Pleiades, the canoe reaches its destination. Thomas, who in his book presents a series of dead reckoning diagrams of actual courses that require tacking, reports that navigators consider upwind voyages to be navigationally easier than downwind ones. This is because in tacking back and forth across a rhumb line course to the target island, there is little chance they can

79. David Lewis, "Mau Piailug's Navigation of Hokule'a from Hawaii to Tahiti," *Topics in Cultural Learning* 5 (1977): 1–23, and Finney, *Hokule'a* (note 48).

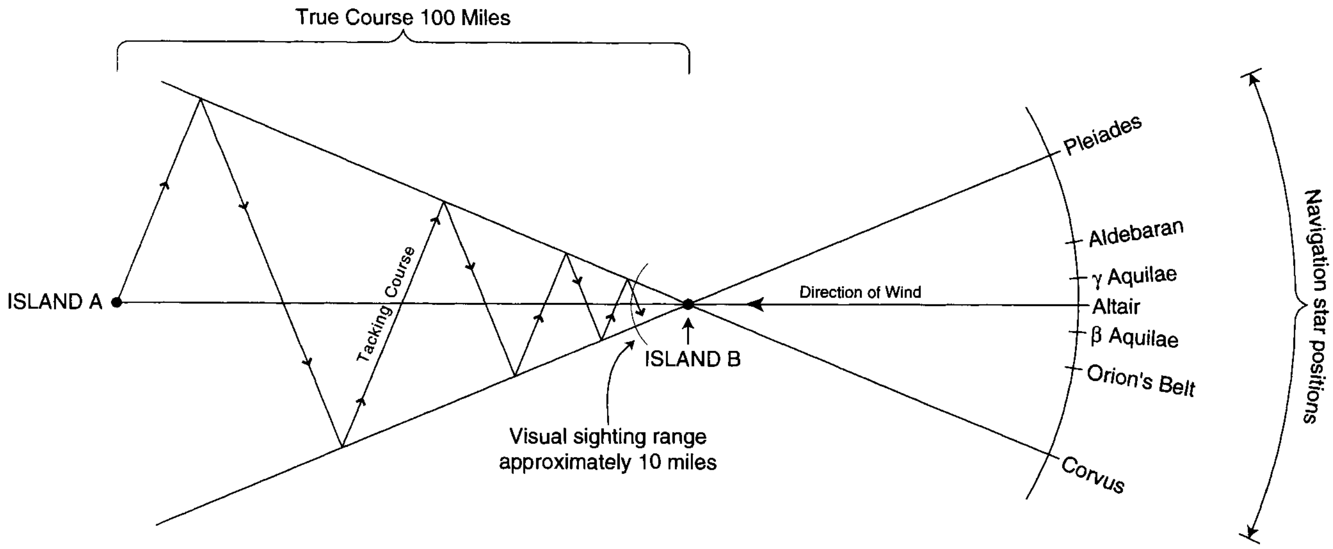


FIG. 13.26. DEAD RECKONING WHEN TACKING DIRECTLY UPWIND. In the Carolinian system, when tacking directly upwind toward an island, the latter becomes the reference island for dead reckoning as well as the destination. In this hypothetical case, the navigator is sailing directly upwind from island A to island B, which lies under the star compass point marked by rising Altair. He first tacks north-northeast until he estimates that island B lies under Corvus. Then he tacks south-southeast, sailing until he estimates that island B is under the Pleiades. At this point he tacks back north-northeast, and then again south-southeast, and so on, making shorter and shorter tacks until the canoe reaches its destination.
After Thomas Gladwin, *East Is a Big Bird: Navigation and Logic on Puluwat Atoll* (Cambridge: Harvard University Press, 1970), 191.

sail past without spotting it directly or indirectly through sighting land birds fishing around it.[80]

Piloting by Swell Pattern Disruptions in the Marshall Islands

Marshall Island navigators took the common Oceanic practice of judging when an island is near by the changes it causes in the ocean swells around it and developed this skill into a highly sophisticated sensing system. Although like other Oceanic navigators they employed the stars for orientation and initial course setting, for actually finding their way among the many islands of their twin-chain archipelago the Marshallese focused on detecting islands still below the horizon by the way they reflected, refracted, or diffracted the deep ocean swells. As distinct from deep sea navigation, the act of guiding a vessel in harbors, through channels, and along a coast by reference to landmarks, soundings of the bottom, and more recently by radar images of the land is known as pilotage. Similarly, the Marshallese technique of finding their way by using disruptions in the swells to sense the islands around them can also be called pilotage. With the demise of interisland canoe travel in the Marshalls after World War II, this art of piloting by the swells is apparently seldom practiced, and I will use the past tense in describing it.[81]

To represent the major swell patterns, and the ways the islands disrupted these patterns, Marshallese navigators made the stick charts that have so intrigued scholars of the development of cartography.[82] Although these charts have fallen out of use, copies are still being made as decorative items or for sale to tourists. Fortunately, a number of stick charts collected a century or so ago can be found in museums around the world (appendix 13.1), and there are also several descriptions of how these were employed in the Marshallese navigational system. Before drawing

80. Gladwin, *East Is a Big Bird,* 189–95 (note 1); Thomas, *Last Navigator,* 276–82 (note 53); and Hutchins, "Understanding Micronesian Navigation," 220–23 (note 78).

81. If the attempt now under way to revive canoe voyaging in the Marshalls succeeds, it is possible that swell pilotage could also be reactivated, particularly since there are many older Marshallese who still know the principles and could teach them to young sailors. In 1992, canoe makers from the Marshallese atoll of Enewetak (Eniwetok) built the first interisland sailing canoe to be constructed in more than three decades and shipped her to the island of Aitutaki in the Southern Cooks. At the same time, we sailed *Hōkūle'a* to Aitutaki to join the Marshallese canoe and a small double canoe built on Aitutaki for the sail 140 miles south to the island of Rarotonga. This sail was planned as part of a gathering of reconstructed canoes at the Pacific Arts Festival then being celebrated there. After several weeks at Aitutaki, the three canoes set sail together for Rarotonga, but they became separated after several hours as each took a slightly different course. Upon reaching Rarotonga, we learned to our delight that the navigator of the Marshallese canoe, a man in his early seventies, had been able to keep his vessel on course during the cloudy, squally night and the overcast morning that followed by orienting himself on the disruptions to the swell pattern caused first by Aitutaki, then by Rarotonga as they neared that island.

82. See note 3 above.

on these sources to describe this system of pilotage, however, we first need to consider the oceanic environment of the Marshall Islands where this system was developed, the nature of the ocean swells it was based on, and how Marshallese navigators interpreted the disruptive effects of islands standing in the paths of these swells.

The Marshall Islands are composed of some thirty-four atolls arranged in a double row, each row stretching roughly from southeast to northwest for over five hundred miles. The two chains extend from just under 5° north to over 12° north latitude, meaning that most of them lie in the "doldrums," the region between the northeast and southeast trade winds zones, characterized by seasonal calms and light winds. The northeast trade winds often extend southward and blow across the two chains from November to the end of June, but the Marshallese apparently avoided interisland sailing then because of the difficulty of reading the underlying swell patterns beneath the wind-whipped surface of the sea. Instead they preferred to sail from July through October, when the surface of the sea typically is only slightly ruffled by light southerly and variable winds, so they could easily discern undulations of swells generated from far away and could pilot their canoes by the patterned ways the islands disrupted these.[83]

According to Marshallese sailors, the islands up to about 9° north are exposed to the strong eastward flow of the equatorial countercurrent, while those to the north of that are usually bathed by the somewhat weaker westward flowing north equatorial current.[84] Neither of these flows is a steady, monolithic current, however. The Marshallese consider the countercurrent to be composed of separate narrow streams, each with an independent flow that may at times approach three knots and at other times may hardly be perceptible. This variability, increased by changes in velocity and direction as the current streams squeeze through the gaps between atolls, made it difficult for navigators moving up or down the chain across the various current streams to estimate how these displaced their canoes to one side or the other of the course line. For example, on an overnight voyage from one atoll to another, misjudging a current flowing at two knots could take a canoe so far off course that the next day it would pass the target island out of sight range. This circumstance, plus the clarity with which the ocean swells may be seen and felt during the light weather sailing months, probably goes far toward explaining why the Marshallese navigators focused so much on sensing land masses through disruptions in the swell patterns.

The deep ocean swells the Marshallese used to navigate are ultimately generated by the wind, but not the local wind blowing over the ocean where these swells are being observed. That portion of the wind's energy that is transmitted to the surface of the ocean produces, to use common nautical terminology, first small ripples and then larger and larger waves, which are cumulatively called a sea. As this wind-driven sea travels from its generating area, it eventually produces the regular, deep ocean swells. To the physicist, the ripples, waves, sea, and swells are all examples of wave transmission of energy. In this discussion of Marshallese pilotage, however, I will avoid the term "wave," lest readers think I am referring specifically to local wind waves or to waves breaking on a beach, and use the term "swell" to emphasize the distantly generated, regular character of the undulating surface of the sea that navigators monitored in piloting their canoes.

The first published notice about this unique piloting system appeared in the 1862 report of a resident missionary,[85] and not until the late 1890s was it comprehensively described. That is when a naval officer, who signed his essay "Captain Winkler of the German Navy," became so intrigued by the stick charts and the navigational principles behind them that he made a major effort to convince the secretive navigators to share their knowledge. The following summary on Marshallese pilotage is drawn primarily from Winkler's essay, from a monograph on Marshallese culture by the anthropologists Augustin Krämer and Hans Nevermann based on their fieldwork in the islands before World War I, and from more recent analyses by anthropologist William Davenport and other interpreters.[86]

According to Winkler, the Marshallese recognized four main swells: *rilib, kaelib, bungdockerik,* and *bungdockeing*. The *rilib*, or "backbone," the strongest of the four, is generated by the northeast trade winds and is present year round, even when the trades do not penetrate as far south as the Marshalls. They considered the *rilib* to come

83. Captain [Otto?] Winkler, "On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islanders in General," *Annual Report of the Board of Regents of the Smithsonian Institution, 1899,* 2 vols. (Washington, D.C.: United States Government Printing Office, 1901), 1:487–508, esp. 504. "Sea Charts" is a translation of Winkler's "Ueber die in früheren Zeiten in den Marschall-Inseln gebrauchten Seekarten, mit einigen Notizen über die Seefahrt der Marschall-Insulaner im Allgemeinen," *Marine-Rundschau* 10 (1898): 1418–39.

84. M. W. de Laubenfels, "Ocean Currents in the Marshall Islands," *Geographical Review* 40 (1950): 254–59, esp. 257.

85. L. H. Gulick, "Micronesia–of the Pacific Ocean," *Nautical Magazine and Naval Chronicle* 31 (1862): 169–82, 237–45, 298–308, 358–63, 408–17, esp. 303–4. A Hawaiian missionary, who like Gulick was stationed in the Marshalls, also mentioned navigating by the swells in a Hawaiian-language manuscript written in 1862–63, but it was not translated and published until 1947: Hezekiah Aea, "The History of Ebon," in *Fifty-sixth Annual Report of the Hawaiian Historical Society* (Honolulu: Hawaiian Historical Society, 1947), 9–19, esp. 16–17.

86. Winkler, "Sea Charts" (note 83); Krämer and Nevermann, *Ralik-Ratak,* 221–32 (note 39); and William Davenport, "Marshall Islands Navigational Charts," *Imago Mundi* 15 (1960): 19–26.

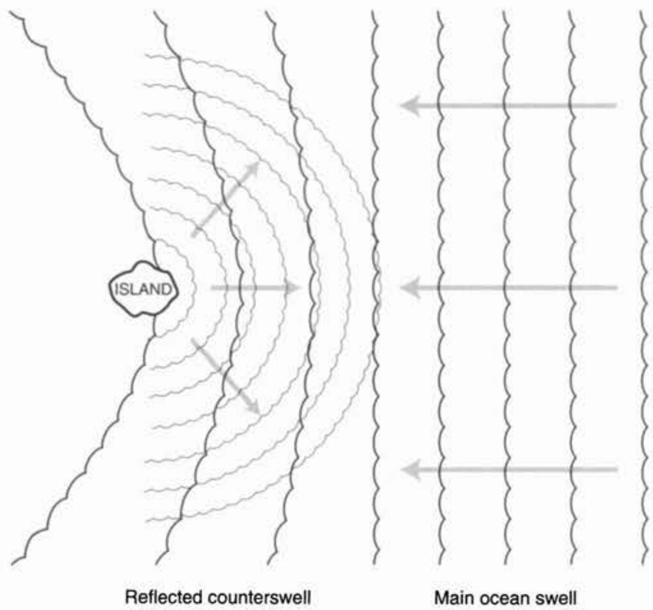


FIG. 13.27. SENSING AN ISLAND BY REFLECTED COUNTERSWELLS. Part of the energy of swells striking an island is reflected in swells that radiate back from the island, signaling to the navigator that an island barrier lies ahead.
After David Lewis, *We, the Navigators: The Ancient Art of Landfinding in the Pacific,* 2d ed., ed. Derek Oulton (Honolulu: University of Hawai'i Press, 1994), 234.

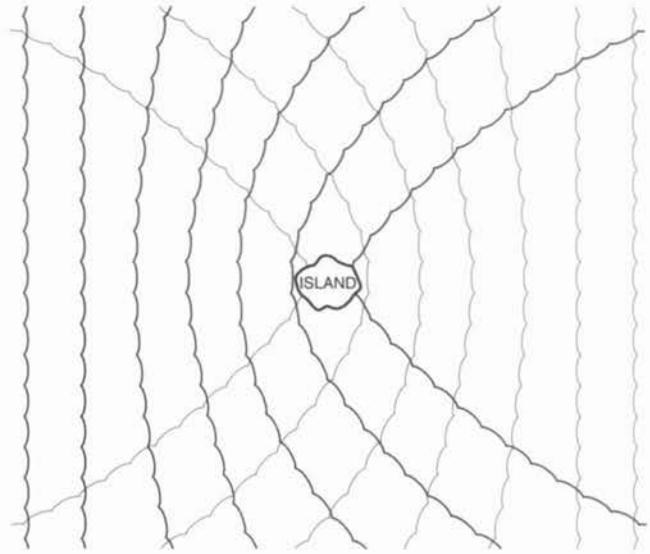


FIG. 13.28. SWELLS REFRACTING AROUND AN ISLAND. Swells also refract around an island, creating characteristic patterns of interference as they meet. This figure models only swells coming from the east and west refracting around an island and intersecting one another. The categories of refracted swells and their intersections that the Marshallese navigators abstracted from these patterns to sense the presence of an island when it cannot be seen are shown in figure 13.29.
Partially after David Lewis, *We, the Navigators: The Ancient Art of Landfinding in the Pacific,* 2d ed., ed. Derek Oulton (Honolulu: University of Hawai'i Press, 1994), 238.

from the east (*rear*), although its exact direction varies according to the angle of the generating trade winds as well as the impact of the ocean currents. The western swell, called the *kaelib,* can also be seen throughout the year, but it is weaker than the *rilib,* and unpracticed persons can detect it only with the greatest difficulty. The *bungdockerik* arises in the southwest. It can also be observed throughout the year and, especially in the southern islands, can be as strong as the *rilib.* The *bungdockeing* comes from the north and is the weakest of the four swells, felt mainly in the northern islands.[87]

Although the Marshallese navigators did not ignore the effect islands had of blocking swells and generating reflected counterswells (fig. 13.27), they seem to have concentrated primarily on the complex disruption patterns that arise out of the refraction of swells as they come in contact with the undersea slope of an island, then bend around that island and interact with swells coming from the opposite direction (fig. 13.28). A swell is refracted, or bent, when the section nearest inshore of an island slows markedly as it enters shallow water, while the section of the swell passing immediately offshore of the island is only partially slowed and that farther out in deeper water retains still more of its original speed, until the water is so deep that the speed and hence the direction of the swell are apparently unaffected.

Figure 13.29 reproduces the diagrams Winkler made to show how *rilib* (east) and *kaelib* (west) swells bend around an island and interfere with one another to provide precise information for the navigator. Where the crests of the bending swells from the east and west meet to the north and south of an island, they heap up to form a series of noticeable *bōt* (spelled alternatively *boot* or *buoj*), which translates as "knot" or "node." Encountering such a node alerted the navigator to the presence of an island nearby, and he could even roughly gauge whether it was close (when the angle between the two refracted swells is wide) or farther away (when the angle is narrow). A continuous series of such interference nodes extending out from an island forms an *okar,* or "root." "As the root, if you follow it, leads to the palm tree, so does this lead to the island," is how one of Winkler's navigator informants described the utility of the *okar.*[88] A navigator who ran into an *okar* could sail down that "root" to the island. Winkler's informants advised caution, however, telling him that *okar* were often curved to one side or the other by bands of strong currents flowing around an island. Swells coming from the north and south and bending around the eastern and western shores of an is-

87. Winkler, "Sea Charts," 493.
88. Winkler, "Sea Charts," 493.

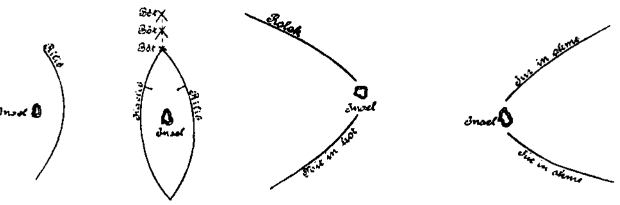


FIG. 13.29. MARSHALLESE CATEGORIES OF SWELL REFRACTION AND INTERSECTION AROUND AN ISLAND. In his study of Marshallese navigation, Captain Winkler of the Imperial German Navy drew these diagrams of how the Marshallese categorize the way swells refract and intersect around islands. The diagram on the left shows a *rilib* (swell from the east) refracting as it approaches an island. The middle diagram of a single island shows how as a *rilib* and a *kaelib* (swell from the west) refract around an island they meet to the north (and south, though not shown) and heap up to make a linear series of *bōt* ("knot" or "node"), alerting the navigator to the island before it actually can be seen. The line of such nodes extending north (or south) from an island (or east or west when refracted north and south swells meet) provides the navigator with an *okar* ("root"), which leads him directly to the island. The diagram on the right shows the refracted swells after they have passed an island, at which point they still provide the navigator with a means of sensing it. The two arms of the *kaelib* (western) swell are both called *jur in okme,* meaning "post" or "stake," in the sense that they provide obstacles that warn the navigator approaching from the east of the presence of an island. The northern and southern arms of a refracted *rilib* (eastern swell) are called, respectively, *rolok* ("something lost") and *nit in kot* ("trap" or "bird cage"), giving the sense that the navigator has overshot his target and must turn back. After Captain [Otto?] Winkler, "On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islanders in General," *Annual Report of the Board of Regents of the Smithsonian Institution, 1899,* 2 vols. (Washington, D.C.: United States Government Printing Office, 1901), 1:487–508, esp. 493–94.

land yield the same type of information as the eastern and western swells and were most often used for navigation at the southern and northern ends of the chains.

Before a navigator reached the *okar* line, or if he had sailed through it without noticing the nodes, the way the swells were being refracted could still alert him that land was near and provide a bearing toward it. According to Winkler, refracted *kaelib* (western) swells bending around an island to the northeast and to the southeast were called *jur in okme,* which he translates as "stakes" or "posts," meaning that for the canoe approaching from the east an "obstruction" is in the way. The navigator encountering the *jur in okme* could then point his canoe in the direction of the bent swells and home in on the island at the focus of the bend. The *rilib* swells bending around an island to the northeast and southeast seem also to have been named in reference to the voyager sailing from east to west, but one who had overshot his target island and had a last chance to pick up its signature in the swells refracting past it. Those swells bending to the northwest past the island were called *rolok,* meaning "something lost," while those bending to the southwest past the islands were called *nit in kot,* "a hole," signifying a bird cage or trap that the navigator must turn out of to go back to the island.[89]

In addition to piloting by the ways swells are reflected and refracted around islands and the interference patterns set up when diffracted swells coming from opposite directions meet, Marshallese navigators were also able to use information derived from diffracted swells. Diffraction occurs when swells are interrupted or restricted by an obstacle that provides a point of departure for a new series of swells. Swells striking a breakwater with a gap in it provide a classic example of diffraction. The swells entering the opening act as a point source in generating new swells that then radiate from the gap into the harbor.[90] Similarly, when swells strike a pair of closely spaced islands, the gap between the islands can serve as a new point source for swells, which, according to Davenport, Marshallese navigators recognized from their relatively short wavelength.[91]

It is also tempting to speculate that these navigators may have learned to use a special form of wave interference that was not understood in Western science until the early 1800s, when Thomas Young performed the first diffusion grate experiments by projecting a light against an opaque barrier with two slits cut in it. The slits of such a diffusion grate act as new point sources of light that cast a pattern of light and dark bands, depending on whether the light waves emanating from the slits meet in or out of phase, an interpretation that has been crucial in confirming the wave nature of light.[92] A similar pattern of wave reinforcement and cancellation would result when a series of new swells coming from two or more narrow interisland gaps impinge on one another, causing a heaping-up effect where they meet in phase and a lull where they meet out of phase. When Marshallese navigators questioned by Krämer, Hambruch, and other Western investigators referred to particularly confused seas occurring in the vicinity of groups of closely spaced islands, they may have been referring to such interference patterns.[93]

89. Winkler, "Sea Charts," 493–94. However, Hambruch, "Die Schiffahrt," 35–36 (note 53), describes the *nit in kot* as a square area of unrefracted swells between four islands. Lewis, *We, the Navigators,* 240–41 (note 4), describes the *rolok, nit in kot,* and *jur in okme* as forming definite swell lines that extend out at about forty-five degrees from each corner of an island, where they are reinforced by swells reflecting off the island.

90. Tom Garrison, *Oceanography: An Invitation to Marine Science* (Belmont, Calif.: Wadsworth, 1993), 225–26.

91. Davenport, "Navigational Charts," 24 (note 86).

92. J. P. G. Richards and R. P. Williams, *Waves* (Harmondsworth: Penguin, 1972), 159–63.

93. Krämer and Nevermann, *Ralik-Ratak,* 226 (note 39); Hambruch,

The characteristic ways swells are disrupted by islands can be felt as well as seen. In addition to mounting a visual watch over the surface of the sea, navigators relied on their sense of balance to feel the swells by the way their canoes pitched or rolled. Raymond de Brum, a Marshallese trading boat captain who had learned to read the swells from his father, made this dual reliance clear when, in 1962, he told a reporter: "We older Marshallese people navigate our boats both by feel and by sight, but I think it is knowing the feel of the vessel that is the most important. The skipper who understands the motion or feel of the boat can sail in the dark as well as in the daytime."[94] De Brum's account is particularly valuable, if difficult to follow. Instead of taking a plan view, as did Winkler and the other Western authors we have followed here, he discussed swell navigation from the perspective of a navigator who, from a position just above sea level, watches the sea around him and feels with his body the direction, period, and strength of the swells passing beneath his canoe. Furthermore, his account ventured beyond other sources by estimating distances at which swell disruptions can be perceived: for example, he estimated that the first indications of an island can be felt from the pitching of the affected swells as far as fifty or sixty miles out and describes how the motion of a vessel changes as one gets closer to land and the swells disrupted by it.[95]

The stick charts that embody and illustrate this knowledge of swell patterns and islands were typically made from the midribs of coconut fronds lashed together to form an open framework. The locations of islands were marked by small shells tied to the framework or simply by the lashed junction of two or more sticks. Individual charts might vary so much in form and interpretation, however, that only the navigator who made a particular chart could fully interpret it. Nevertheless, Winkler and other writers agree that the charts fell into three main categories: *mattang, meddo* (or *medo*), and *rebbelib* (or *rebbelith*). Whereas the *mattang* is an abstract instructional chart for teaching the principles of reading how islands disrupt swells, the *meddo* and the *rebbelib* show actual islands and their relative if not exact positions, along with such information as the direction of the main deep ocean swells, the way these curve around specific islands and intersect with one another, and the distance from a canoe at which an island can be detected. The difference between the *meddo* and *rebbelib* is one of inclusiveness: whereas the *meddo* portrays only a section of one of the two chains of islands, the *rebbelib* includes all or most of the islands of one chain or both. Winkler's drawings of examples of these three types, along with stick chart examples, are reproduced and briefly explained below.

Figure 13.30 shows a *mattang*. Inasmuch as Winkler's description of its use is rather spare, this explanation also draws on Davenport's fuller description of the use of a similar *mattang*.[96] The points A, B, E, D, and M, where the long structural sticks of the chart intersect at the four points and at the center of the chart, can be used to represent islands. The long, straight sticks (A–D, D–B, B–E, and E–A) forming the perimeter and the straight cross sticks (v–u, t–w, r–y, and z–x) are structural, although they can do double duty to indicate swells coming from those quarters. The chart is normally aligned on *rilib,* the eastern swell; the short, vertical stick R–R_1 just to the right of M indicates this easterly direction (*rear*). The curved stick b–l represents the *rilib* refracting around M, with its *rolok* segment in the north and its *nit in kot* segment in the south. Similarly, the opposite curved stick a–g represents the *kaelib* or western swell refracting around M, with its two northern and southern sections both called *jur in okme.* The two other sticks curving around M (s–n and q–m) represent the refracted *bungdockeing* (north) swell and the *bungdockerik* (south) swell. Compare figure 13.31, a photograph of a *mattang.*

The intersections c and f, where the curved sticks symbolizing the eastern and western swells refracting around island M meet, represent the resultant *bōt,* or nodes of peaking, sometimes breaking water where the swells meet. The dashed line A–M–B (which is not present on the actual stick chart) indicates the *okar,* or continual line of such nodes, extending to the north and south of the island but ignoring any deviations that might be caused by crosscurrents displacing the nodes to one side or the other. In addition to alerting a navigator sailing to M from the east or the west that he is to the south or north of his target, the *okar* can be directly followed (allowing for current) by navigators moving between islands A and M, and M and B. For example, a navigator sailing from A to M would sail south along the *okar* marked by the

"Die Schiffahrt," 35–37 (note 53). However, further field research is needed to investigate whether swells moving through closely spaced islands actually generate such interference patterns anywhere in the Marshalls and, if so, whether the Marshallese navigators recognized and exploited them in their navigation. Garrison, *Oceanography,* 226, fig. 10.19 (note 90), provides an illustration of the reinforcement and cancellation of swells emanating from just such an island diffusion grate, but the legend confuses the issue both by prematurely indicating that such patterns definitely were used in navigation and by attributing the putative ability to read such diffusion grate patterns to Polynesians rather than to the Marshallese.

94. Raymond de Brum (as told to Cynthia R. Olson), "Marshallese Navigation," *Micronesian Reporter* 10, no. 3 (May–June 1962): 18–23 and 27, quotation on 18. Raymond de Brum's father, Joachim de Brum, was a Marshallese-Portuguese sea captain who was one of Winkler's primary informants.

95. De Brum, "Marshallese Navigation," 21–22.

96. Winkler, "Sea Charts," 496–97 (chart I) (note 83), and Davenport, "Navigational Charts," 22–23 (note 86). For an elegant analysis of the mathematical ideas of modeling and mapping contained in the *mattang,* see Marcia Ascher, "Models and Maps from the Marshall Islands: A Case in Ethnomathematics," *Historia Mathematica* 22 (1995): 347–70.

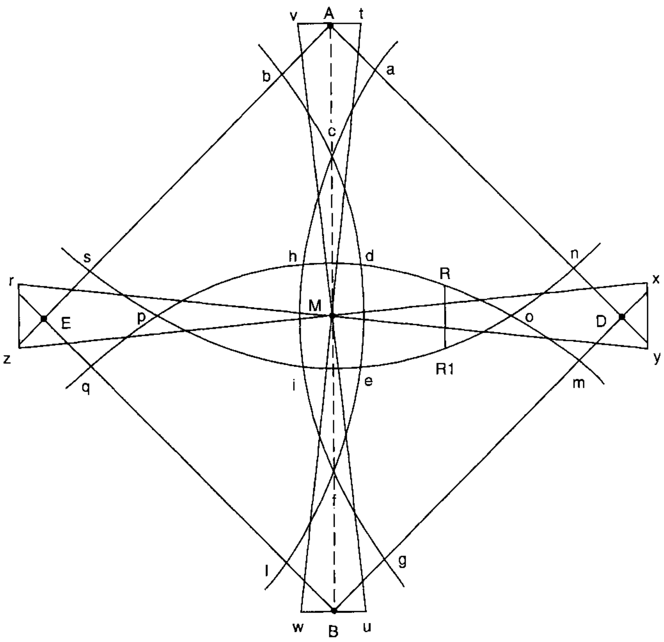


FIG. 13.30. *MATTANG:* A MARSHALLESE STICK CHART FOR TEACHING PRINCIPLES OF SWELL REFRACTION AND INTERSECTION. The *mattang* is an abstract presentation of how swells refract around an island and meet in a series of nodes. The one pictured here and the charts pictured in figures 13.32 and 13.34 were drawn by Captain Winkler from actual stick charts he studied during his 1896 investigation of Marshallese navigation. The "sticks" (actually the midribs of coconut leaves) curving around the central point M model how swells from opposite directions refract around an island and intersect (at points c, f, p, and o) to form *bōt* or nodes. The dotted line (not actually part of the chart) running between A and B indicates the *okar* or line along which nodes produced by intersecting refracted swells form.
After Captain [Otto?] Winkler, "On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islanders in General," *Annual Report of the Board of Regents of the Smithsonian Institution, 1899,* 2 vols. (Washington, D.C.: United States Government Printing Office, 1901), 1:487–508, esp. 496.

succession of peaking nodes. When these are no longer detectable he would continue sailing south by keeping parallel to the unrefracted *rilib* or *kaelib* swells (or by keeping at the appropriate angle to them) until he picked up the line of nodes extending north from M, which he would then use to home in on the island.

Figure 13.32 illustrates a *meddo.*[97] It shows the general position of the islands in the southern part of the Ralik chain, plus a series of lines for instructional purposes. Each large dot represents an island, which is a shell lashed to the framework on the actual chart. The dot at E at the bottom of the chart stands for the island of Ebon, and the dot at A at the top stands for Ailinglapalap. The dots along the horizontal line at N, K, J, and M stand, respectively, for the islands of Namorik, Kili, Jaluit, and Mili. The sticks M–G and M–E stand for the *rilib* swell refracting around Mili. Similarly, the sticks O–A and O–E stand for the *kaelib* swell refracting around Namorik. The sticks P–Q, R–S, and T–U mark the *bungdockeing* (bn) or north swell; the sticks V–W, X–Z, and O–M mark the *bungdockerik* (bk) or south swell. Stick H–L is intended to show a south swell specifically for Mili but is placed above because there is no room to tie it below the island.

Stick K–d is intended to show a north swell for Jaluit Island, and at the same time the *jur in okme* or "post" end of the west swell refracted around Kili Island. Stick B–X represents the *rolok* or "lost course" end of the east swell refracted around the north side of an island, and stick B–Y the *nit in kot* or "bird cage/trap" end of the east swell refracted around the south side of an island at point B. The stick a–a passing through B indicates the direction of the swell from the east. The stick l–l going through C is an *ai* or distance marker for Ebon Island. Point C represents the *bōt* or node where the *rilib* (stick C–F) and *kaelib* (stick C–D) refracting around the north side of Ebon meet. Stick E–K represents the *okar* line of nodes running between Ebon and Kili islands. Compare figure 13.33, a photograph of a *meddo.*

Figure 13.34 shows a long, narrow *rebbelib.*[98] It includes all but two of the main islands of the Ralik chain, each marked in the drawing by large dots standing for a shell in the original. The framework for the central core of the chart is made by joining six long, curved sticks, three on the right and three on the left, that also represent the *rilib* (east) and *kaelib* (west) swells as they begin to bend when approaching an island obstacle. Most of the chain's islands are attached within this lenticular core. Namorik (Nk) in the southwest is attached to the core by an extension, as are Ujae (U) and Wotho (W) in the northwest. The maker did not extend the chart past Ujae and Wotho to include Ujelang and Enewetak, the westernmost atolls of the Ralik chain, perhaps because doing so would have made the chart even more unwieldy than it is. Compare figure 13.35, a photograph of the same *rebbelib.*

Winkler considers the *rebbelib* in figure 13.34 especially interesting because it shows several examples of *bōt,* or nodes of intersecting swells refracting around an island, as well as information on how far away an island can be detected. Before considering the way this information is presented, however, a caveat is in order. At the beginning of his description of the chart, Winkler warns the reader that "the position of the islands is insufficiently indicated by the mussels, as may be seen by comparison with the charts." He adds that his interpreter, who must

97. Winkler, "Sea Charts," 498–500 (chart III).
98. Winkler, "Sea Charts," 500–502 (chart IV).

have been another Marshallese navigator, objected to the placement of some of the islands and commented that some of the nodes were also misplaced. Apparently, however, such "misplacements" did not bother the chart's

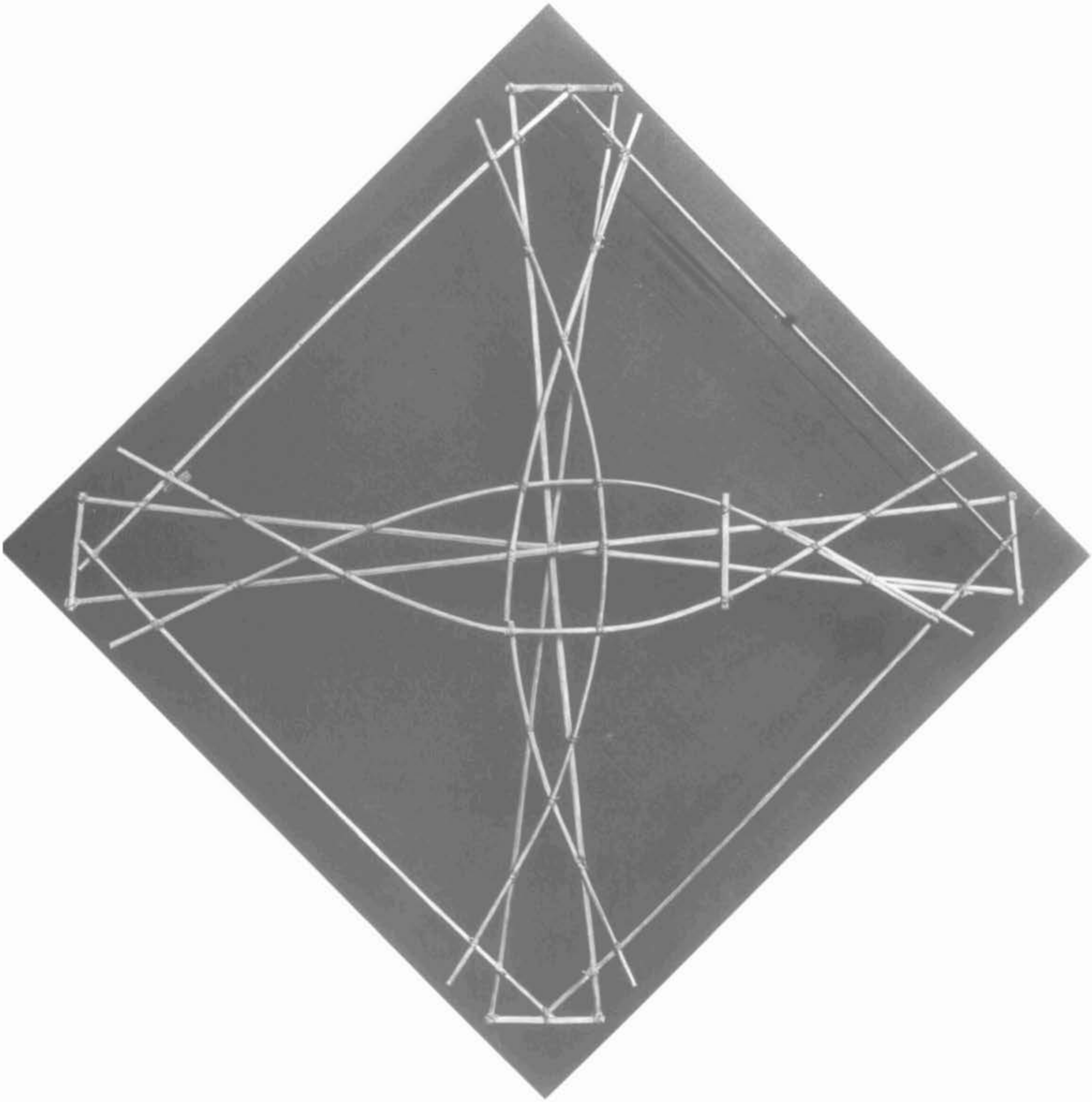


FIG. 13.31. EXAMPLE OF A *MATTANG*.
Length of the original: 78 cm (compare fig. 13.30). Photograph courtesy of the Museum für Völkerkunde, Berlin.

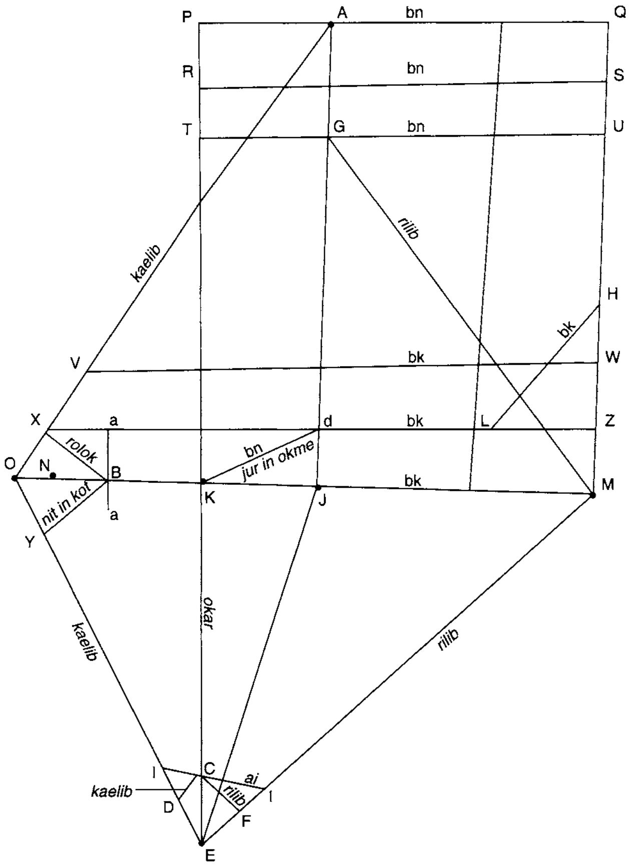


FIG. 13.32. *MEDDO:* A MARSHALLESE STICK CHART SHOWING ISLANDS AND SWELL PATTERNS IN ONE SECTION OF AN ISLAND CHAIN. The *meddo* pictured here shows the general positions of the islands of Ebon (E), Ailinglapalap (A), Namorik (N), Kili (K), Jaluit (J), and Mili (M) at the southern end of the Ralik chain, as well as directions of the main ocean swells and (for some of the islands) the characteristic intersections these swells make as they refract around an island. On an actual chart the islands represented here by the dots at points E, A, N, K, J, and M may be indicated by shells lashed onto the framework. Although the *meddo* are considered to be fairly realistic representations of island relationships, they were only used as mnemonic aids before a voyage and not consulted during it.
After Captain [Otto?] Winkler, "On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islanders in General," *Annual Report of the Board of Regents of the Smithsonian Institution, 1899,* 2 vols. (Washington, D.C.: United States Government Printing Office, 1901), 1:487–508, esp. 499.

navigator-maker, who informed Winkler that he knew what everything stood for and "how to make them clear in their present places."[99]

The nodes along the *okar* leading from Ab (Ailinglapalap) to J (Jaluit) are shown by sticks lashed in a chevron shape indicating the intersections of refracting eastern (*rilib,* labeled r) and western (*kaelib,* labeled k) swells (r_1/k_1 and r_2/k_2) at points c_1 and c_2, respectively. Note how the chart shows the angle of intersection of the refracting swells decreasing as one moves farther from the island at the focus of the refraction. Similarly the points a_1 and a_2, and the refracting swells r_3/k_3 and r_4/k_4, indicate the line of nodes extending north from N (Namu). The four nodes indicated between the *okar* running between J (Jaluit) and Nk (Namorik) in the southwest result from the intersection of north (*bungdockeing,* bn) and south (*bungdockerik,* bk) swells instead of east and west swells. Here, however, is one of the places where the drawing and the explanation given to Winkler seem to clash: although Winkler reports he was told that the nodes are extending out from Jaluit, the direction of the chevrons formed by the intersecting swells makes the nodes appear to be extending from Namorik instead. The nodes C_1 and C_2 are focused on Ujae Island and similarly are formed by the intersection of the south and north swells indicated by the sticks bk_1/bn_1 and bk_2/bn_2.

According to Winkler, the two series of sticks–4, 5, and 6 in the north and 1, 2, and 3 in the south–that extend across the main body of the chart stand for the progressively farther "sighting distances" (*ai*) from Namu and Jaluit, respectively. According to Krämer and Nevermann, however, the terms by which Winkler labels these "sighting distances" actually stand for characteristic "currents": *djeldjelatăe,* which appears about ten miles out from an island where palm trees can be sighted; *rebukăe,* which is about fifteen miles out; and *djugăe,* which occurs still farther out, beyond all sight of land. Yet if Raymond de Brum was talking about the same phenomena when he told his interviewer about the "*jelat ai*" as a type of pitching felt about twenty miles out and the "*jeljelat ai*" as the type of pitching felt about ten to fifteen miles out, it seems likely that these "sighting distances" or "currents" actually refer to the changing nature of the swells felt aboard a canoe as it moves toward or away from an island.[100]

Because the stick charts found today in museum collections did not begin to be collected until the late nineteenth century, by which time the Marshall islanders were being visited with increasing frequency by Western ships, we must consider the possibility that these surviving examples may display Western influence. Particularly suspect are the most "maplike" charts, the *rebbelib,* which show all or most of the islands of one chain or the entire group but give very little information on swells. In his article, Winkler illustrates a *rebbelib* that includes the main islands of both chains and comments that the "tolerable accuracy" with which the navigator-maker had arranged

99. Winkler, "Sea Charts," 500.

100. Winkler, "Sea Charts," 501–2; Krämer and Nevermann, *Ralik-Ratak,* 225 (note 39); and de Brum, "Marshallese Navigation," 23 (note 94).

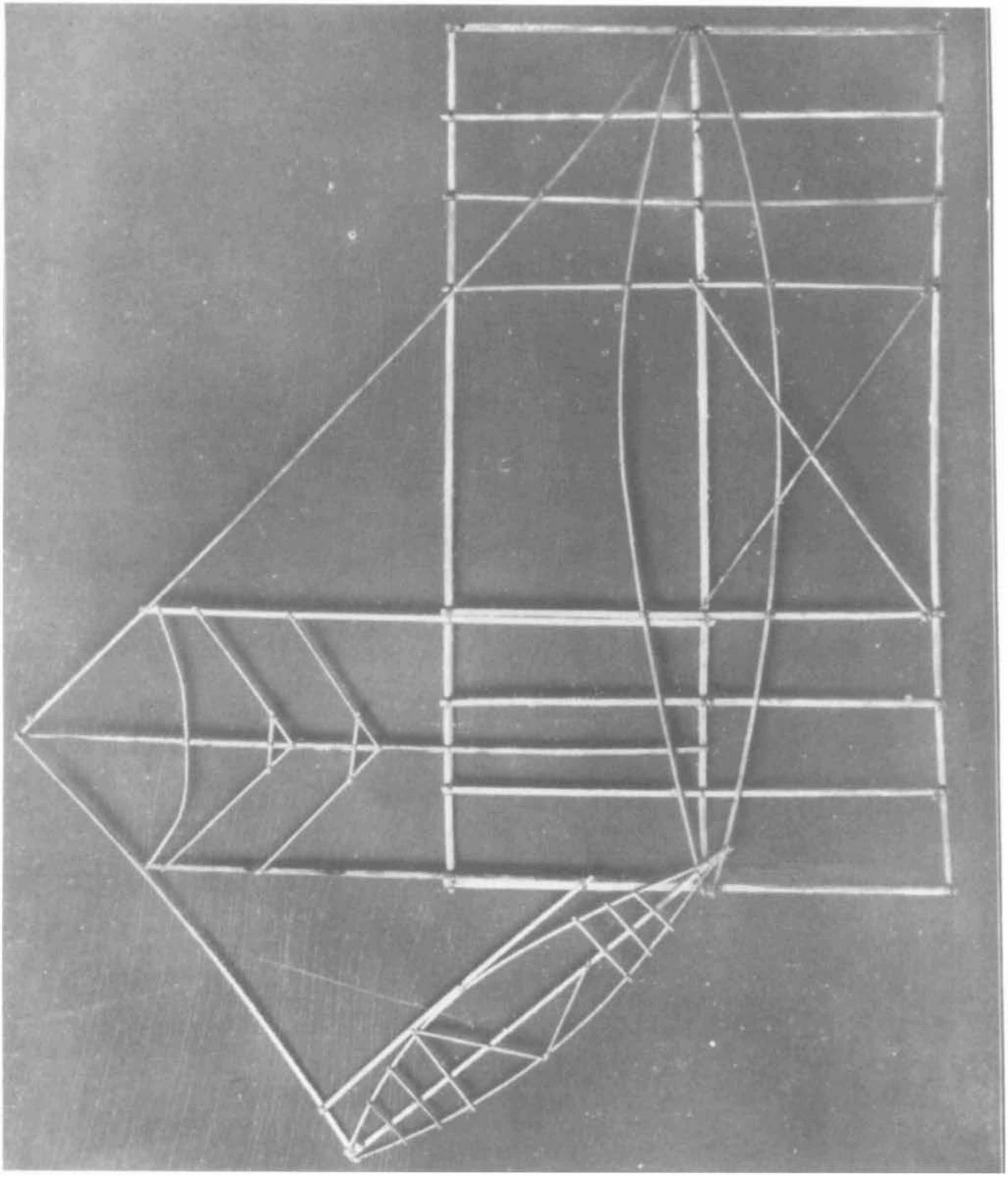


FIG. 13.33. EXAMPLE OF A *MEDDO*.
Length of the original: 160 cm. From Captain [Otto?] Winkler, "On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islanders in General," *Annual Report of the Board of Regents of the Smithsonian Institution, 1899,* 2 vols. (Washington, D.C.: United States Government Printing Office, 1901), 1:487–508, esp. pl. VIII.

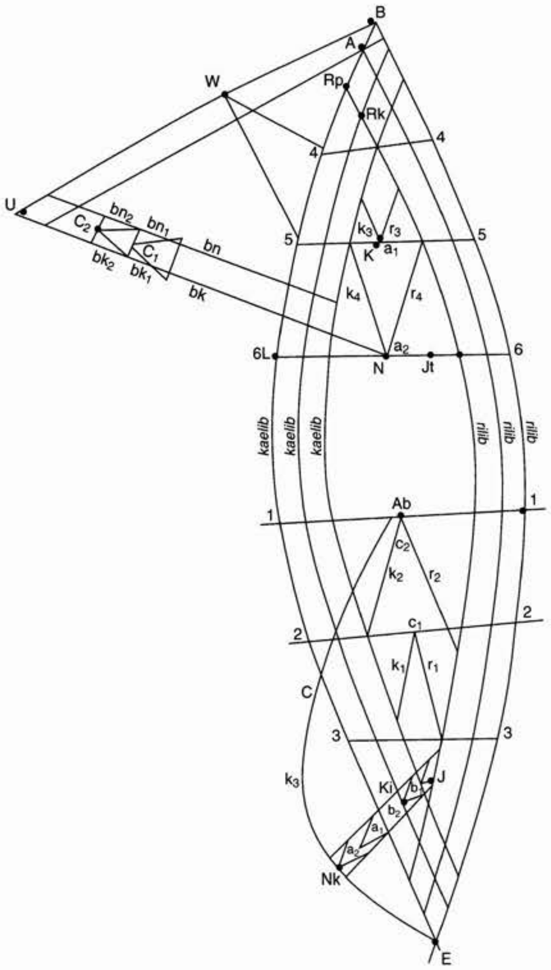


FIG. 13.34. *REBBELIB:* A MARSHALLESE STICK CHART THAT REPRESENTS THE ISLANDS OF ONE OR BOTH CHAINS. The *rebbelib* pictured here includes all but the far northwest islands (Enewetak and Ujelang) of the Ralik chain: Ebon (E); Namorik (Nk); Kili (Ki); Jaluit (J); Ailinglapalap (Ab); Jabwot (Jt); Namu (N); Lib (L); Kwajalein (K); Rongerik (Rk); Rongelap (Rp); Ailingnae (A); Bikini (B); Wotho (W); Ujae (U). The central framework of long, curving sticks also represents the refracting *rilib* (eastern) and *kaelib* (western) swells. The chevrons indicate the intersection of swells refracting around islands, and the horizontal sticks represent the distances at which different indications of an island can be detected. As with the other types of charts, the *rebbelib* were not consulted during voyages.
After Captain [Otto?] Winkler, "On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islanders in General," *Annual Report of the Board of Regents of the Smithsonian Institution, 1899,* 2 vols. (Washington, D.C.: United States Government Printing Office, 1901), 1:487–508, esp. 501.

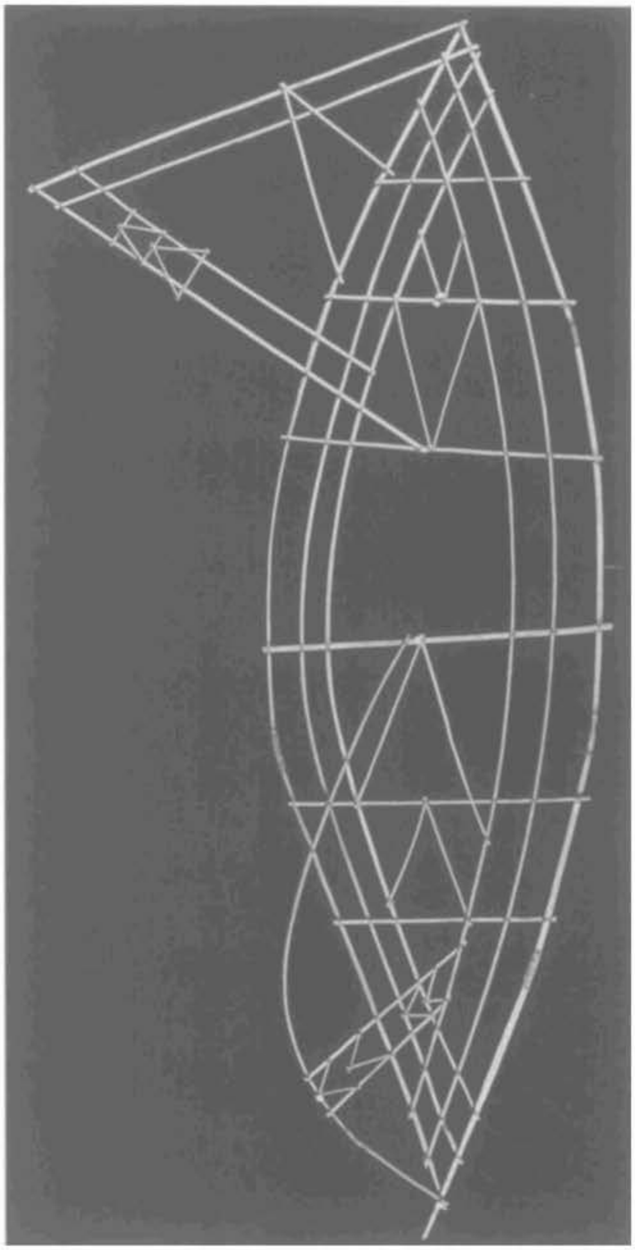


FIG. 13.35. EXAMPLE OF A *REBBELIB.* Compare figure 13.34.
Length of the original: 158 cm. Photograph courtesy of the Museum für Völkerkunde, Berlin.

the islands came about because the chart had "been prepared after an acquaintance with our own charts."[101]

This line of reasoning can be taken too far, however, as in the analysis by George Playdon, a retired U.S. Coast Guard officer who had spent some time in the Marshalls after World War II. His contention that the *meddo* and *rebbelib* were Western-influenced period pieces of only a "brief historical duration, perhaps from 1830 to 1895," and that the *mattang* must be "a simple training device of limited antiquity" because it had not spread throughout Micronesia and the rest of the Pacific, seems misinformed for several reasons.[102] First, before major European

101. Winkler, "Sea Charts," 497–98 (chart II).

102. George W. Playdon, "The Significance of Marshallese Stick

influence had reached the islands, Marshallese navigators were able to map their islands with enough accuracy to appeal to Kotzebue's discerning eye. Second, the depictions of swells, interference patterns, and island detection distances included in the *meddo* and such *rebbelib* as that of the Ralik chain (for example, figures 13.32 and 13.34) could hardly have been borrowed from Western charts, since they are unique to the Marshallese cartographic tradition. Third, the suggestion that the *mattang* must be of "limited antiquity" (ca. A.D. 1500?) because it had not been adopted beyond the Marshalls ignores the secrecy with which the Marshallese navigators guarded their knowledge of this art, as well as the difficulty of transferring to other archipelagoes techniques so closely adapted to the unique ocean swell environment of the Marshalls.

Probably more misinformation has been published about these stick charts than about any other facet of Pacific island navigation. The most frequent error is to attribute the charts and practices to the Polynesians rather than to their distant Marshallese cousins in Micronesia. Second is the notion that the charts portray currents on which the navigator guides his canoe, not the ocean swells. Third would be the assumption that a navigator took his stick charts to sea and used them in navigation as his Western counterpart employed nautical charts.

In his analysis, Davenport states categorically that the stick charts are used only "to teach navigators and possibly to store knowledge against memory loss. They are most assuredly not used to lay out courses, plot positions and bearings, or as aids in recognizing land forms as the European navigator uses his chart. Nor are they mnemonic devices to be taken along on a voyage for consultation. The Marshallese navigator carries his information in his head and does not need to rely upon a reminder."[103] Davenport based his statement on written sources dating from German times, as well as knowledgeable Marshallese living during the 1950s when he did his research. When, for example, Krämer and Nevermann discussed the *meddo,* the stick chart they considered best represents actual sea conditions and islands, they state that the navigator studies this chart only before a journey, "for it is considered scandalous to continue to consult a chart when underway." They further explain how the navigator, after having made sure the season, wind, and weather are right for a voyage, and after having checked which guiding star to use for the course, may consult his stick chart just before leaving, checking the swell patterns and intersections he will use for navigation. Once en route they, like other authors, describe how the navigator focuses intently on sensing the swells and any interference patterns made by their intersection, crouching down in the bow of his canoe to observe the surface of the sea from as low down as possible, or lying prone to feel with his whole body how the canoe is being pitched and rolled by the underlying swells.[104]

Did Oceanic Navigators Use Navigational Instruments?

Just as traditional navigators did not need to take their stick charts, outlines of their star compass, or any other type of physical map to sea with them,[105] it also seems that they did not have to employ any special navigational instruments to help them read the stars, the swells, or any other phenomena crucial to guiding their canoes. Yet various writers have proposed numerous indigenous navigational instruments–for example, sticks and water-filled canes to measure latitude,[106] and the variously drilled or etched bowls and gourds supposedly designed for finding one's way over the long Polynesian sea routes. However, no examples of such instruments can be securely identified today in museums or private collections. Furthermore, none of the texts in which the proposed instruments are mentioned and sometimes sketched seem to have been written by persons who actually witnessed them being used at sea or even examined them on land.

The most famous candidate for an indigenous navigational instrument is the "sacred calabash" of Hawai'i. In 1927 Admiral Hugh Rodman published an article in which he described how Polynesian voyagers sailing north from the South Pacific to Hawai'i sighted through holes drilled near the top of a water-filled "sacred calabash" so that Polaris came in view when it was nineteen degrees above the horizon, thus indicating that their canoe had reached the latitude of Hawai'i. In the following year, ethnologist John F. G. Stokes of Honolulu's Bishop Museum responded to Rodman's article by point-

Charts," *Journal of the Institute of Navigation* 20 (1967): 155–66, quotation on 166.

103. Davenport, "Navigational Charts," 21–22 (note 86).

104. Krämer and Nevermann, *Ralik-Ratak,* 230–31 (note 39).

105. Two other examples of mapping devices used on shore but not at sea come from the Kiribati archipelago (the Gilbert Islands), just south of the Marshalls: an outline of a canoe made of large coral fragments, which was used to teach both star and ocean swell navigational lore (Lewis, *We, the Navigators,* 228–30 [note 4]); and the beams and rafters of meeting houses, which represented the divisions of the night sky (Arthur Grimble, "Gilbertese Astronomy and Astronomical Observances," *Journal of the Polynesian Society* 40 [1931]: 197–224, esp. 220 n. 24).

106. On the sticks, see A. Schück, "Die Entwickelung unseres Bekanntwerdens mit den astronomischen, geographischen und nautischen Kentnissen der Karolineninsulaner, nebst Erklärung der Medo's oder Segelkarten der Marshall-Insulaner, im westlichen grossen Nord-Ocean," *Tijdschrift van het Nederlandsch Aardrijkskundig Genootschap, gevestigd te Amsterdam,* 2d ser., 1 (1884): 226–51. The water-filled canes are mentioned in E. Sanchez y Zayas, "The Marianas Islands," *Nautical Magazine* (London) 34 (1865): 449–60, 641–49, and 35 (1866): 205–13, 253–66, 297–309, 356–63, and 462–72, esp. 256–57 and 263.

ing out that the "calabash" in question was actually a carved wooden "traveling-trunk" of a high chief that, if filled with water to be used in the manner Rodman described, would have weighed an impractical one hundred pounds.[107] In 1947 Rodman's sacred calabash was brought up again by an American resident of Tahiti, who proposed that Tahitians may have employed a similar instrument. His proposal drew an immediate response by the famed Māori anthropologist and then director of the Bishop Museum, Peter H. Buck (Te Rangi Hiroa), who reiterated and amplified Stokes's rebuttal of Rodman.[108] Then in 1975 Hawaiian scholars Ruby Kawena Johnson and John Kaipo Mahelona published a monograph on Polynesian astronomy in which they revisited the issue with some intriguing new information.

In their monograph, Johnson and Mahelona reproduce and discuss an unpublished manuscript, "Navigation Gourd Notes." An amateur scholar, Theodore Kelsey, had compiled these notes, apparently about 1950, from the records of his conversations with an elderly Hawaiian informant, as well as from information he attributed to "foreign observers," which is perhaps a reference to the writings of Rodman, Duryea, and other enthusiasts in the quest for a Polynesian navigational instrument. According to these notes, Hawaiians made "navigation gourds" by drilling and etching gourds and binding them with lines to create holes and lines for sighting on the stars. They then used these instruments to find their way between the main islands of their archipelago and also to sail to the small, rocky islets and atolls that extend far to the northwest beyond the currently inhabited islands of the Hawaiian chain. However, Kelsey's descriptions of these devices, his crude sketches of what he thought they must have looked like, and his attempts to explain how they were used are most difficult to follow–perhaps because he was mixing the recollections of his informant with the conjectures of ill-informed "foreign observers" and did not himself understand navigational principles, modern or indigenous.[109]

Fortunately, Johnson and Mahelona also include in their work a translation of a Hawaiian text on how to mark and then employ a gourd to teach celestial navigation. The original text had been published in 1865. In reading the translation, which follows, it is useful to know that Kane and Kaneloa are major Hawaiian gods, that Wakea is the "sky father" of Hawaiian cosmology, that "the Kahiki groups" refers to the islands such as Tahiti, which lie far to the south of Hawai'i in the Southern Hemisphere, and that many of the stars named in Hawaiian cannot now be identified.

> Take the lower part of a gourd or hula drum (hokeo), rounded as a wheel, on which several lines are to be marked (burned in), as described hereafter. These lines are called "Na alanui o na hoku hookele" (the highways of the Navigation stars), which stars are also called "Na hoku-ai-aina" (the stars which rule the land). Stars lying outside of these three lines are called "Na hoku o ka lewa," i.e., foreign, strange or outside stars.
>
> The first line is drawn from the "Hoku paa" (North Star), to the most southerly of "Newe" (Southern Cross). The portion to the right or east of this line is called "Ke ala'ula a Kane" (the dawning, or the bright road of Kane); and that to the left or west is called "Ke alanui maaweula a Kanaloa" (the much travelled highway of Kanaloa).
>
> Then three lines are drawn east and west (latitudinally), one across the northern section, indicates the northern limit of the sun, about the 15th and 16th days of the month Kaulua, and is called "Ke alanui polohiwa a Kane" (the black shining road of Kane). The line across the southern section indicates the southern limit of the sun, about the 15th and 16th days of the month Hilinama, and is called "Ke alanui polohiwa a Kanaloa" (the black shining road of Kanaloa). The line exactly in the middle of the sphere (the drum, the Lolo), is called "ke alanui a ke Ku'uku'u" (the road of the Spider), and also "Ke alanui i ka Piko o Wakea (the way to the navel of Wakea).
>
> Between these lines are the fixed stars, "Na hoku-paa o ka aina." On the sides are the stars by which one navigates. The teacher will mark the positions of all these stars on the gourd. Thus he will point out to his scholars the situation of Humu (Altair), Keoe (Vega?), Nuuanu, Kapea, Kokoiki, Puwepa, Na Kao (Orion), Na Lalani o Pililua, Mananalo, Poloahilani, Huihui (the Pleiades), Makalii (the twins) /sic/, Ka Hoku Hookekewaa (Sirius), Na Hiku (the Dipper), and the Planets, "hoku hele," Kaawela (Jupiter), Hokuloa (Venus), Hokuula (Mars), Holoholopinaau (Saturn), Ukali (Mercury), etc.
>
> During the nights from Kaloa to Mauli (the dark nights of the moon), are the best times for observation. Spread out a mat, lie down with your face upward, and contemplate the dark-bright sections of Kane and Kanaloa, and the navigating stars contained within them.
>
> If you sail for the Kahiki groups, you will discover new constellations and strange stars over the deep ocean, "hoku i ka lewa a me ka lepo."
>
> When you arrive at the "Piko o Wakea" (Equator), you will lose sight of the Hoku-paa (North Star); and then "Newe" will be the southern guiding star, and

107. Hugh Rodman, "The Sacred Calabash," *United States Naval Institute Proceedings* 53 (1927): 867–72, and the comments of John F. G. Stokes and Rodman in the discussion section of the *United States Naval Institute Proceedings* 54 (1928): 138–40 (both reprinted in *Journal of the Polynesian Society* 37 [1928]: 75–87).

108. "Au sujet de la calebasse sacrée des Iles Hawai," *Bulletin de la Société d'Études Océaniennes* 7 (1947): 289–91 (letter by Chester B. Duryea and response by Peter H. Buck).

109. Johnson and Mahelona, *Nā Inoa Hōkū,* 142–53 (note 46).

> the constellation of "Humu" will stand as the guide above you, "Koa alakai maluna."
>
> You will also study the regulations of the ocean, the movements of the tides, floods, ebbs and eddies, the art of righting upset canoes, "Ke kamaihulipu," and learn to swim from one island to another. All this knowledge contemplate frequently, and remember it by heart, so that it may be useful to you on the rough, the dark and unfriendly ocean."[110]

From the quotation above, it seems clear that the gourd in question was a teaching device used on land, not a navigational instrument to be employed at sea, a conclusion that is consonant with what we know about the Marshallese stick charts as well as the Carolinians' representations of their star compass and "charts" of the islands to be found along each bearing. Although the master navigators of Oceania could have gone to sea carrying engraved astronomical gourds, stick charts, sketches of a star compass, or other devices, they apparently did not. However useful such devices were in learning their craft or in refreshing their memories before a voyage, they did not have to consult them at sea. They set sail "on the rough, the dark and unfriendly ocean" with only the knowledge of the stars, winds, swells, and surrounding islands, and the principles for using these to navigate, for that was all they needed.[111]

Generally overlooked, however, in discussions about whether traditional navigators employed instruments at sea is the fact that parts of the canoe, or even the whole canoe, are used to aid navigation. Judging from my observations at sea of how the Carolinian navigator Mau Piailug and his Hawaiian colleague Nainoa Thompson pursue their skill, such canoe parts as the prow, masts, sections of the rail, the rigging, and fluttering "telltales" attached to the latter can help navigator and steersman sight on stars, track the sun, or keep aligned on the wind. Furthermore, a whole canoe can be turned into a compass rose by marking the compass points on the rails and other features, as I have seen Nainoa Thompson do to help aspiring navigators guide *Hōkūle'a*. As a steersman, I can also attest that in cloudy weather I have more than once kept *Hōkūle'a* on course by feeling the way she reacted to the regular swells passing beneath her twin hulls and keeping her aligned at the appropriate angle to them. This use of an entire canoe as a swell-gauging instrument, was, as we have seen, developed to a high art by the Marshallese navigators, who in the dark of night could feel their way to an island and even into its main pass by sensing the way the information-laden swells pitched and rolled the canoes beneath them.

Colonization, Continuity, and Connections

When some 3,500 years ago Austronesian voyagers first headed their canoes eastward beyond the Bismarck Archipelago and the adjacent islands of the Solomon group, they made a remarkable discovery. Every new island they found in the ocean expanses to the east was unpopulated. Since only they had the technology and skills required to sail so far into the ocean, the prospect of finding and settling one uninhabited land after another must have excited these seafarers, pulling them farther and farther into the ocean until all the permanently habitable islands of the whole of Oceania had been discovered and settled.

To expand over so much of the Pacific, these pioneering seafarers needed more than seaworthy canoes with efficient sail rigs and the ability to exploit seasonal wind patterns to sail where they wanted to go. They also had to be able to navigate in the open ocean and to conceptually map their discoveries. Although the archaeological record by which we trace and date the Austronesian expansion cannot tell us anything directly about their navigational and cartographic methods, that these seafarers were able to spread so far, so fast, and to maintain some communication between home islands and newly discovered ones, as well as among settled outposts, suggests that when they entered Remote Oceania they already had developed basic navigational skills. Judging from what we know of the abilities of the Oceanic descendants of these pioneering Austronesians, these skills must have included some competence in orienting and holding a course by reference to the stars, ocean swells, and winds, in dead reckoning, in sensing islands before they could be seen directly, and in incorporating newly found islands into some kind of cognitive chart.

If, as linguists and prehistorians posit, the seafaring complex that set the stage for the Austronesian expansion into Oceania originated in island Southeast Asia,[112] we

110. Johnson and Mahelona, *Nā Inoa Hōkū*, 72–73, from the following translation: Samuel Manaiakalani Kamakau, "Instructions in Ancient Hawaiian Astronomy as Taught by Kaneakaho'owaha, One of the Counsellors of Kamehameha I., according to S. M. Kamakau," trans. W. D. Alexander, *Hawaiian Annual* (1891): 142–43. Kamakau's article containing the original text was published in the Hawaiian newspaper *Na Nupepa Ku'oko'a* on 5 August 1865 in Honolulu, Hawai'i, by historian Samuel Manaiakalani Kamakau, who had based it on an interview he had conducted some years earlier with Kaneakaho'owaha, a traditional Hawaiian astronomer who had served Kamehameha I, the high chief who united all the Hawaiian islands into a kingdom during the early postcontact period from the late 1700s to the early 1800s.

111. Alternatively, some descriptions of so-called navigating gourds may have referred to devices for predicting or controlling the wind, such as the wind gourd from the Cook Islands described on pp. 458–59 above. There is a legendary account of the use of a wind gourd to control the local winds around the islands of Hawai'i, but it does not include an exact description of the device. Moses K. Nakuina, *The Wind Gourd of La'amaomao,* trans. Esther T. Mookini and Sarah Nākoa (Honolulu: Kalamakū Press, 1990).

112. Robert Blust, "Austronesian Culture History: The Window of Language," in *Prehistoric Settlement of the Pacific,* ed. Ward Hunt

might expect to find at least some vestiges of these skills among conservative sailors of the Philippines and Indonesia. Surprisingly, however, although students of Oceanic navigation have long thought that its roots must lie in this region, only recently have they turned their attention to searching for vestiges of traditional navigation in Southeast Asian waters, and so far just in the Indonesian Archipelago. Inquiries made by several researchers during the 1970s indicated that indeed some traditional Indonesian sailors used the stars, winds, and swells in ways similar to those employed in Oceania.[113] During the late 1980s and early 1990s, Gene Ammarell conducted intensive research on the navigation practices of the Bugis, a seafaring people from southern region of Sulawesi (Celebes) Island. His inquiries give us our first systematic look at surviving traditional navigation in that part of the world.[114]

A significant proportion of Indonesia's interisland shipping is still carried by wooden sailing ships that combine design and construction features of both European and local origin. The Bugis, who are particularly noted for their sturdy, ketch-rigged *pinisi*, the largest of the Indonesian sailing vessels, are major participants in this trade. Although during the past twenty years or so the *pinisi* have been motorized, these vessels still depend on their sails when the wind is fair. Furthermore, as Ammarell has pointed out, even though they carry magnetic compasses, most Bugis navigators can still guide their vessels in reference to the stars, winds, and swells. Particularly during the night, they orient themselves and steer by horizon stars, and like their Oceanic cousins they memorize these and specific interisland courses in terms of "star paths." When necessary, they can switch to the swells and winds for orientation and steering, although now a magnetic compass (if working properly) offers an easier alternative.[115] The Bugis navigators conceive of directions in terms of both wind or star compasses, of which Ammarell recorded two examples, one with twelve points, the other with sixteen. As in the Carolines today, even when using a magnetic compass the Bugis refer to directions by the traditional terms for the points of their own compasses. Ammarell's study, along with the previously collected material, therefore seems to confirm some continuity between traditional Indonesian and Oceanic navigation.[116]

If we cast our comparative net wider, it is also apparent from a variety of sources that Arab navigators sailing in the Indian Ocean oriented on and steered by horizon stars and employed a star compass.[117] Although it is possible that this correspondence between Arab and Austronesian navigation is a function of independent, parallel development, given that Southeast Asian waters border on the Indian Ocean as well as the open Pacific, it seems more likely that the similar Arab and Austronesian uses of the stars may be connected. After all, just as the Arab traders were noted for sailing to Southeast Asian and southern Chinese ports, so did Austronesian sailors sail west into the Indian Ocean, as is evinced by the spread of outrigger canoes to South India and Sri Lanka, where they are still used by fishermen, and the Austronesian colonization of Madagascar.

It is curious, however, that the closest correspondences between Arab and Austronesian navigation involve the Carolinian star compass. The Arab and Carolinian star compasses share eighteen points demarcated by the rising and setting points of nine stars. Furthermore both compasses are aligned on rising Altair, not on Orion, which would give true east, or on Polaris, which would give true north.

In this chapter I have presented the Carolinian star

Goodenough (Philadelphia: American Philosophical Society, 1996), 28–35, and Wilhelm G. Solheim, "The Nusantao Hypothesis: The Origin and Spread of Austronesian Speakers," *Asian Perspectives* 26, no. 1 (1984–85): 77–88.

113. While passing through Jakarta in 1972, I learned from the navigators of trading boats anchored in its harbor that they used horizon stars for orientation and steering. Subsequently, David Lewis briefly investigated traditional Indonesian navigational practices (David Lewis, "Navigational Techniques of the Prahu Captains of Indonesia" [unpublished manuscript, 1980]), and Baharuddin Lopa outlined some traditional navigational practices in his dissertation, "Hukum Laut, Pelayaran Dan Perniagaan (Penggalian dari bumi Indonesia sendiri)" (Ph.D. diss., Universitas Diponegoro, Semarang, Indonesia, 1982).

114. Gene Ammarell, "Navigation Practices of the Bugis of South Sulawesi, Indonesia," in *Seafaring in the Contemporary Pacific Islands: Studies in Continuity and Change,* ed. Richard Feinberg (DeKalb: Northern Illinois University Press, 1995), 196–218, a preliminary article drawn from his dissertation research ("Bugis Navigation" [Ph.D. diss., Yale University, 1995]).

115. Ammarell, "Navigation Practices," 209–14.

116. Although Ammarell does not consider the issue of mapping in his article, Gosling, writing about the seamen of Trengganu on the Malay Peninsula, observed that in coastal piloting they relied on "mental" maps of headlands and ports covering the coastline of the entire Gulf of Thailand. L. A. Peter Gosling, "Contemporary Malay Traders in the Gulf of Thailand," in *Economic Exchange and Social Interaction in Southeast Asia: Perspectives from Prehistory, History, and Ethnography,* ed. Karl L. Hutterer (Ann Arbor: Center for South and Southeast Asian Studies, University of Michigan, 1977), 73–95, esp. 85.

117. Gabriel Ferrand, *Le K'ouen-louen et les anciennes navigations interocéaniques dans les Mers du Sud* (Paris: Imprimerie Nationale, 1919); Gerald R. Tibbetts, *Arab Navigation in the Indian Ocean before the Coming of the Portuguese* (London: Royal Asiatic Society of Great Britain and Ireland, 1971); idem, "The Role of Charts in Islamic Navigation in the Indian Ocean," in *The History of Cartography,* ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), vol. 2.1 (1992), 256–62; Joseph von Hammer [Hammer-Purgstall], trans., "Extracts from the Mohit," *Journal of the Asiatic Society of Bengal* 3 (1834): 545–53 and 7 (1838): 767–74; James Prinsep, "Note on the Above Chapter ['Extracts from the Mohit']," *Journal of the Asiatic Society of Bengal* 7 (1838): 774–80; and idem, "Note on the Nautical Instruments of the Arabs," *Journal of the Asiatic Society of Bengal* 5 (1836): 784–94. On Indian navigation in the Indian Ocean and the use of the compass card, see Joseph E. Schwartzberg, "Nautical Maps," in *History of Cartography,* vol. 2.1, 494–503.

compass, as well as *etak* reckoning and other features of the Carolinian navigation system, as elaborations that were developed from a more general Austronesian base to fit navigational requirements in the Caroline Islands chain. As I mentioned previously, the alignment of the Carolinian star compass on Altair seems uniquely adapted to the way the Caroline Islands are spread out along a long, narrow band between 6° and 10° north latitude, because this means that Altair, which rises 8.8° north, passes overhead within no more than a few degrees of all the islands in the chain. If this reasoning is correct, then why would Arab navigators sailing between Indian Ocean ports, many of which are ten degrees or more north of the path of Altair, employ a star compass centered on that star and seemingly adapted to sailing in a latitude much closer to the equator? Surely a compass centered on Polaris, which the Arabs used extensively to measure latitude, would have made more sense for them.

In his detailed study of this issue, Michael Halpern concludes that the most likely explanation is that the Carolinian compass, including its focus on Altair and the star referents for eighteen of its thirty-two points, must have diffused westward from Micronesia to Arab navigators, who adopted it for their own use.[118] Although the tendency among researchers has been to assume that once the islands of Remote Oceania were settled there was little or no contact with the outside world until Europeans began to enter the Pacific, a good case can be made that the people living along the western edge of Micronesia had some communication with the islands to the west of them. As we have seen in the case of Klein's early chart of the Carolines, canoeloads of Caroline Islanders periodically were driven to the Philippines. Furthermore, at the time of first European contact, the people of Belau, the group of islands at the western edge of the Carolines, were using a kind of glass money composed of beads and segments of bracelets that apparently came from the Philippines and may ultimately have had Roman or Chinese origins.[119] If Halpern's thesis is correct, it may be that one of Oceania's exports to the wider world system prevailing before Western Europeans began their maritime expansion was intellectual: a highly sophisticated, albeit instrumentless, way to use the heavens for navigation.

118. Michael Halpern, "Sidereal Compasses: A Case for Carolinian-Arab Links," *Journal of the Polynesian Society* 95 (1986): 441–59.

119. Douglas Osborne, *The Archaeology of the Palau Islands,* Bernice P. Bishop Museum Bulletin, no. 230 (Honolulu: Bishop Museum Press, 1966), 477–94.

Appendix 13.1
Documented Stick Charts in Museum Collections, Made before 1940

Institution	Reference	Date Acquired	Dimensions (cm)	Provenance
Amsterdam, Universiteitsbibliotheek	Kaartenzl. 100-03	1900	25 × 55	
	Kaartenzl. 100-03	1900	47 × 50	
Basel, Museum für Völkerkunde	VC 32	1904		Acquired in exchange, Museum für Völkerkunde, Freiburg
	VC 202	1904		Acquired in exchange, Museum für Völkerkunde, Freiburg
Berlin, Museum für Völkerkunde	VI 24670	1905	167 × 123	
	VI 14669	1897	87 × 48	
	VI 24668	1905	77 × 54	
	VI 15281	1898	102 × 56	
	VI 15282	1898		
	VI 15283	1898		
	VI 5802	1883	105 × 36	
	VI 24667	1905	99 × 90	
	VI 24673	1905	91 × 91	
	VI 50452	1939	44 × 28	
	VI 8309	by 1898	38 × 36	
	VI 50453	1939	42 × 26	

APPENDIX 13.1 (*continued*)

Institution	Reference	Date Acquired	Dimensions (cm)	Provenance
Berne, Bernisches Historiches Museum, Ethnography Department	Mikr. 32	1920	55 × 86	Museum für Völkerkunde, Hamburg, before 1920
	Mikr. 33	1920	43 × 90	
Burgdorf, Switzerland, Museum für Völkerkunde	Nr. 04676	1936	43 × ?	Collected by Dr. Kordt
Cambridge, Mass., Peabody Museum of Archaeology and Ethnology, Harvard University	00-8-70/55584	1900	95 × 101	Collected by Agassiz and Woodworth, *Albatross* expedition, 1899–1900
	00-8-70/55587	1900	81.5 × 67.5	Collected by Agassiz and Woodworth, *Albatross* expedition, 1899–1900
Chicago, Field Museum of Natural History[1]	FM #38298 (acc. 1969)	1900	106.5 × 84	Collected by Alexander Agassiz and W. McM. Woodworth during U.S. Fish Commission *Albatross* expedition, 1899–1900. Acquired by exchange from Peabody Museum, Cambridge, 1932.
Cologne, Rautenstrauch-Joest Museum, Museum für Völkerkunde	43336	1902–4	42 × 26	An employee of a German company, Jaluit Gesellschaft, was active in the Ralik Group of the Marshall Islands in 1902–4. Both charts were later acquired by the museum from the employee in 1952.
	43337	1902–4	44 × 27.5	
Dresden, Staatliches Museum für Völkerkunde	Kat. Nr. 42524	1928	44 × 28	
Göttingen, Institut und Sammlung für Völkerkunde, Universität Göttingen	Stabkarte Sign. OZ 462	1930	44 × 27.5	Collected by Adolf Rittscher
	Stabkarte Sign. OZ 463	1930	41.5 × 25.5	Collected by Adolf Rittscher
Hamburg, Museum für Völkerkunde	E 977	1885		
	E 978	1885		
	E 1864	by 1900		Godeffroy Collection. In the second half of the nineteenth century, the Godeffroy family owned a trading company in Hamburg specializing in ethnographic objects from the South Pacific and Australia; the family also collected and had its own museum. At the end of the nineteenth century, the Godeffroy Collection was acquired by the Hamburg Museum für Völkerkunde, which had been one of its customers.
	E 1865	by 1900		Godeffroy Collection
	E 1866	by 1900		Godeffroy Collection
	E 1867	by 1900		Godeffroy Collection
	391:10	1910		
	392:10	1910		
	393:10	1910		
	394:10	1910		

APPENDIX 13.1 (*continued*)

Institution	Reference	Date Acquired	Dimensions (cm)	Provenance
(*cont.*) Hamburg, Museum für Völkerkunde	395:10 396:10	1910 1910		
Honolulu, Bernice P. Bishop Museum	Original cat. no. 3481; current acc. no. 1892.011	1892	96 × 61.5	Gift of Rev. C. M. Hyde, Hawaiian Board of Missions. May have been collected by Hawaiian missionaries serving in the Marshall Islands, who sent or brought it back to Hawai'i. Appears to be a *meddo*.
	Original cat. no. 6806(A); current acc. no. 1892.005	17 December 1892	112 × 50	Gift of Hawaiian Board of Missions. Listed in catalog as "chart Mede." Appears to be a *meddo*.
	Original cat. no. 6808(B); current acc. no. 1892.005 [same as above]	17 December 1892	99 × 71	Gift of Hawaiian Board of Missions. Listed in catalog as "chart Mede." Appears to be a *meddo*.
London, British Museum, Department of Ethnography[2]	Navigational Chart 1904.6-21.34	1904	100 × ?	
Munich, Staatliches Museum für Völkerkunde[3]	Inv. Nr. 91.835 Inv. Nr. 08.583 Inv. Nr. 08.584	1891 1908 1908	107 × 59 100 × 24.5 100 × 49	W. Schubert Wolfgang Dröber Wolfgang Dröber
New York, American Museum of Natural History[4]	80.0-3317	1914	95 × 93	One of two charts commissioned for and purchased by Robert Louis Stevenson in June 1890 (see below, University Museum, Philadelphia, for the second chart). After Stevenson's death, the chart was on concession to the Edinburgh Museum in 1901. Purchased in 1914 for the American Museum of Natural History by Robert Lowie for $80 (auctioned with Stevenson's "curios," New York). Restored in 1965 and again ca. 1979.
Oxford, England, Pitt Rivers Museum, School of Anthropology and Museum of Ethnography[5]	1897.1.2	1897	53 × ?	Dr. Irmer, governor of the Marshall Islands, obtained it from Chief Nelu, Jaluit, 1896. Graham Balfour, who traveled in the Pacific in the 1880s and 1890s, presented it to the museum. (Graham Balfour may have been a cousin of Henry Balfour, the museum's first curator.)
Paris, Musée de l'Homme	MH.31.33.24	1931	43 × 27.5	
Philadelphia, University Museum, University of Pennsylvania[6]	P 3297	1914	124.5 × 73.5	Robert Louis Stevenson (see American Museum of Natural History entry, above)

APPENDIX 13.1 (*continued*)

Institution	Reference	Date Acquired	Dimensions (cm)	Provenance
Salem, Mass., Peabody Essex Museum	E. 12210	1900	75 × 75	Collected by Alexander Agassiz and W. McM. Woodworth during U.S. Fish Commission *Albatross* expedition, 1899–1900. From Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, Mass.
Sydney, Australian Museum	E.5513	by 1872	97 × 84	
	E.15861	1906	112 × 86	Donated by P. G. Black
Vienna, Museum für Völkerkunde	Inv. no. 25.735	1887	124 × 76	Museum für Völkerkunde, Hamburg
	Inv. no. 123.604	by 1903	44 × 28	Adolf Rittscher
	Inv. no. 123.605	by 1903	42 × 26	Adolf Rittscher
Washington, D.C., Smithsonian Institution, National Museum of Natural History, Department of Anthropology	E 206186	1900		All four charts donated by Charles H. Townsend and H. F. Moore
	E 206187	1900		
	E 206188	1900		
	E 206189	1900		

Note: This appendix was prepared from a survey of fifty-eight institutions thought to hold stick charts, and therefore is not a complete list. Publications that illustrate and discuss several of these charts include Captain [Otto?] Winkler, "On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islanders in General," *Annual Report of the Board of Regents of the Smithsonian Institution, 1899,* 2 vols. (Washington, D.C.: United States Government Printing Office, 1901), 1:487–508 (a translation of "Ueber die in früheren Zeiten in den Marschall-Inseln gebrauchten Seekarten, mit einigen Notizen über die Seefahrt der Marschall-Insulaner im Allgemeinen," *Marine-Rundschau* 10 [1898]: 1418–39, but with more illustrations); A. Schück, *Die Stabkarten der Marshall-Insulaner* (Hamburg, 1902); Bruno F. Adler, "Karty pervobytnykh narodov" (Maps of primitive peoples), *Izvestiya Imperatorskago Obshchestva Lyubiteley Yestestvoznanya, Antropologii i Etnografii: Trudy Geograficheskago Otdeliniya* (Proceedings of the Imperial Society of the Devotees of National Sciences, Anthropology, and Ethnography: Transactions of the Division of Geography) 119, no. 2 (1910), 198–217; and Augustin Krämer and Hans Nevermann, *Ralik-Ratak (Marshall Inseln)* (Hamburg: Friederichsen, De Gruyter, 1938), 221–30.

[1]Ralph Linton and Paul S. Wingert, *Arts of the South Seas* (New York: Museum of Modern Art, 1946), 67.

[2]T. A. Joyce, "Note on a Native Chart from the Marshall Islands in the British Museum," *Man* 8 (1908): 146–49, fig. 1.

[3]Rose Schubert, Ernst Feist, and Caroline Zelz, "Zur frühen Seefahrt in der Südsee: Schiffahrt und Navigation in Polynesien und Mikronesien," in *Kolumbus: Oder Wer entdeckte Amerika?*, ed. Wolfgang Stein (Munich: Hirmer, 1992), 90–99, and Wolfgang Dröber, *Kartographie bei den Naturvölkern* (1903; reprinted Amsterdam: Meridian, 1964), 56.

[4]Fanny Stevenson, *The Cruise of the "Janet Nicol" among the South Sea Islands* (New York: C. Scribner's Sons, 1914), 150–51 and 159–60.

[5]H. Lyons, "The Sailing Charts of the Marshall Islanders: A Paper Read at the Afternoon Meeting of the Society, 14 May 1928," *Geographical Journal* 72 (1928): 325–28; this item is referenced as 18″ × 11″.

[6]Henry Usher Hull, "A Marshall Islands Chart Presented to the Museum by the Honorable John Wanamaker," *Museum Journal* 10 (1919): 35–42, fig. 15.

14 • Māori Cartography and the European Encounter

Phillip Lionel Barton

New Zealand (Aotearoa) was discovered and settled by migrants from eastern Polynesia about one thousand years ago. Their descendants are known as Māori.[1] As by far the largest landmass within Polynesia, the new environment must have presented many challenges, requiring the Polynesian discoverers to adapt their culture and economy to conditions different from those of their small-island tropical homelands.[2]

The quick exploration of New Zealand's North and South Islands was essential for survival. The immigrants required food, timber for building *waka* (canoes) and *whare* (houses), and rocks suitable for making tools and weapons. Argillite, chert, *matā* or *kiripaka* (flint), *matā* or *mātara* or *tūhua* (obsidian), *pounamu* (nephrite or greenstone–a form of jade), and serpentine were widely used. Their sources were often in remote or mountainous areas, but by the twelfth century A.D. most of the rock sources in New Zealand had been discovered.[3]

As the Māori became familiar with the terrain, significant features such as mountains, rivers, streams, lakes, harbors, bays, headlands, and islands were given toponyms that denoted their appearance or commemorated an associated event. Māori occupation sites such as *pā* (forts) and *kāinga* (villages) were also named. The knowledge gained through repeated travel and the reiteration of toponyms enabled the Māori to visualize the land in the form of a map. For example, in 1793 Tuki was able to draw a map of the whole of New Zealand (except Stewart Island and other large offshore islands), apparently from his visual image of it (see below, pp. 506–9).

The extent to which geographical knowledge was shared among Māori is not known. Because of its strategic importance in the frequent wars and skirmishes between *iwi* (nations or peoples) before 1840, especially in the North Island, such knowledge may have been restricted to tribal experts (*iwi tohunga*). At the time of organized European settlement in New Zealand in 1840, the North Island (Te Ika a Māui) had a much larger Māori population than the South Island (Te Wai Pounamu). The warmer climate made it much more suitable than the southern two-thirds of the South Island for growing traditional crops. In the latter area agriculture was limited, and the Māori had to adopt a seminomadic, subsistence strategy. The land east of the Southern Alps and south of the Kaikoura Peninsula south to Foveaux Strait was much less heavily forested than the western part of the South Island and also of the North Island, making travel easier. Frequent journeys gave the Māori of the South Island an intimate knowledge of its geography, reflected in the quality of geographical information and maps they provided for Europeans.[4]

The information on Māori mapping collected and dis-

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1. Janet Davidson, *The Prehistory of New Zealand* (Auckland: Longman Paul, 1984), 1–29, and Geoffrey Irwin, *The Prehistoric Exploration and Colonisation of the Pacific* (Cambridge: Cambridge University Press, 1992), 105–10.

Aotearoa is the Māori name for New Zealand; some Māori place-names have been provided in this chapter in parentheses following the modern place-names. See also Malcolm McKinnon, ed., *New Zealand Historical Atlas, Ko Papatuanuku e Takoto Nei* (Albany, Auckland, N.Z.: Bateman, 1997). For the meanings of place-names, see A. W. Reed, *Place Names of New Zealand* (Wellington: A. H. and A. W. Reed, 1975).

2. For example, navigational skills had to be adapted for coastal and land exploration. For more on Oceanic navigation, see chapter 13.

3. Davidson, *Prehistory of New Zealand,* 195 (note 1). The highly valued *pounamu* was the best rock for making cutting tools before European contact, but it was hazardous to obtain and difficult to work.

4. At least one nineteenth-century observer found the Māori to be inveterate travelers; see J. S. Polack, *Manners and Customs of the New Zealanders, with Notes Corroborative of Their Habits, Usages, Etc.,* 2 vols. (1840; reprinted Christchurch: Capper Press, 1976), 2:147.

TABLE 14.1 Māori Words with Possible Cartographic Connotations

	Dictionary			
	Kendall, 1815	Kendall, 1820	Williams, 1844	Williams, 1852
Wenua	(n) land, country	(n) land, country	(n) the earth, soil	
Whenua				(n) land, country
Hua			(n) division of land	(n) division of land
Tuhituhi			(vt) to write	(vt) to write
Tuhi				
Hoa, Hoahoa				
Huahua				
Mahere				

Abbreviations: n, noun; vi, verb intransitive; vt, verb transitive.
Sources: Thomas Kendall, *A Korao no New Zealand; or, The New Zealander's First Book, Being an Attempt to Compose Some Lessons for the Instructions of the Natives* (Sydney, 1815; reprinted Auckland, Auckland Institute and Museum, 1957); Thomas Kendall, *A Grammar and Vocabulary of the Language of New Zealand,* ed. Samuel Lee (London: Church Missionary Society, 1820); William Williams, *A Dictionary of the New-Zealand Language, and a Concise Grammar to Which Are Added a Selection of Colloquial Sentences* (Paihia, 1844); 2d ed. (London: Williams and Norgate, 1852); 3d ed. (London:

cussed here has never before been described in a synthesis. This chapter began as a paper I presented and published in 1978 and then revised, expanded, and published again in 1980.[5] Before that, one could find only short descriptions and illustrations of some of the best-known maps in books and articles on other topics. For example, Johannes Carl Andersen's *Jubilee History of South Canterbury* (1916) illustrates and briefly discusses part of the Māori map of the South Island made for Edmund Storr Halswell in 1841 and some of the map segments (as a composite map) Te Ware Korari made for Walter Baldock Durrant Mantell in 1848.[6] About 1940, work commenced on the *Historical Atlas of New Zealand* as part of the commemoration of European settlement in the country from 1840 to 1940, but that atlas was never completed or published. A specially and accurately redrawn version of Tuki's map and the two versions of the map made for Halswell were prepared for the atlas.[7] Robert Roy Douglas Milligan made an extensive study of Tuki's map in 1964.[8] Milligan died before his book was complete, and although there are problems with the published account, it is nevertheless a landmark in the study of

5. The original 1978 paper was Phillip Lionel Barton, "Maori Geographical Knowledge and Maps of New Zealand," in *Papers from the 45th Conference [New Zealand Library Association], Hamilton, 6–10 February 1978,* comp. A. P. U. Millett (Wellington: New Zealand Library Association, 1978), 181–89. The revised and expanded version was published as "Maori Geographical Knowledge and Mapping: A Synopsis," *Turnbull Library Record* 13 (1980): 5–25. Much new information has been located and incorporated in the intervening eighteen years.

6. Johannes Carl Andersen, *Jubilee History of South Canterbury* (Auckland: Whitcombe and Tombs, 1916), 38–39.

7. The maps and correspondence relating to the atlas are held by the Cartographic Collection and the Manuscripts Collection, Alexander Turnbull Library, Wellington. The version of Tuki's map redrawn for the atlas is fifty-eight by forty-three centimeters, oriented with north at the top, and prepared from the published map in David Collins, *An Account of the English Colony in New South Wales,* 2 vols., ed. Brian H. Fletcher (1798–1802; Sydney: A. H. and A. W. Reed, 1975), 1:434–35. The two versions of the map made for Halswell were prepared from the manuscript copy and the published lithographic copy (see below); sizes are sixty-one by forty-eight and sixty-two by thirty-four centimeters, respectively, and in both cases the South Island has been realigned roughly northeast-southwest to coincide with the actual alignment of the island.

Tuki's map and the lithographed version of the map of the South Island made for Halswell also appear in Peter Bromley Maling's *Early Charts of New Zealand, 1542–1851* (Wellington: A. H. and A. W. Reed, 1969), 126–29, with brief discussion, and in Maling's latest work, *Historic Charts and Maps of New Zealand: 1642–1875* (Birkenhead, Auckland: Reed Books, 1996), 128–32.

8. Robert Roy Douglas Milligan, *The Map Drawn by the Chief Tuki-Tahua in 1793,* ed. John Dunmore (Mangonui, 1964).

Dictionary				
Williams, 1871	Williams, 1892	Williams, 1915	Williams, 1917	Williams, 1957
(n) land, country	(n) land, country	(n) land, country	(n) land, country	(n) land, country
(n) section of land	(n) section of land	(n) section of land	(n) section of land, outline, leading lines of a carving leading lines of a carving	(n) section of land, outline, leading lines of a pattern in carving
(vt) write	(vt) to write	(vt) write	(vt) draw	(vt) draw, write
(vt) delineate, draw	(vt) delineate, draw, adorn with painting	(vt) delineate, draw, write, adorn with painting	(vt) delineate, draw, write, adorn with painting	(vt) delineate, draw, write, adorn with painting
			(vt) lay out, plan, arrange, (n) plan of a house	(vt) lay out, draw, (n) plan of a house
			(vt) sketch out a pattern before carving	(vt) sketch out a pattern before carving
				(vi)/(n) plan, portion, division, section**

Williams and Norgate, 1871); 4th ed. (Auckland: Upton, 1892); 4th rev. ed. (Wellington: Whitcombe and Tombs, 1915); Herbert William Williams, *A Dictionary of the Māori Language,* ed. under the auspices of the Polynesian Society, 5th ed. (Wellington: Marcus F. Marks, Government Printer, 1917); 6th rev. ed. (Wellington: R. E. Owen, Government Printer,1957).

**Note Hawaiian *Mahele* (n), portion, division, section.

Māori cartography and a valuable starting point for an exhaustive assessment of that map. In the early 1990s Anne Salmond briefly discussed Tuki's map, and in another publication she refers to the map drawn by Toiawa for James Cook.[9]

Cultural Attributes with Affinities to Mapping

Māori Language Concepts for Map

Word lists compiled in 1815 and 1820 and seven authoritative editions of Williams's dictionaries published between 1844 and 1957 contain no record of an indigenous Māori word for map (see table 14.1). This may have been because the right questions were not asked. Also, the ability to draw a map might have been regarded as more important than the map itself, and certainly the ephemeral maps that we know were drawn left no artifacts. Indeed, there were and are Māori words for lay out, plan, arrange, outline, delineate, draw, write, section of land, and country, all with affinities to mapping. The Māori words *hoa* (lay out, plan) and *hua* (section of land, outline) seem to refer to the process of making a drawing or map, as do the words *tuhi* (delineate, draw) and *tuhituhi* (draw). The word *mahere* (plan, portion, division, section) does not appear in Williams's dictionary until the sixth edition of 1957, but it is currently used together with *whenua* to mean map. The Māori version of the English word "map" (*mapi*) does not appear until Williams's fourth edition (1892), and then only in the English-to-Māori section. The earliest recorded uses of *mapi* were in the South Island purchase deeds of 1859 and 1860.[10]

Linear Measurement

The Māori did not have units of measure for recording long distances. Edward Shortland found that the sketches made by the Māori *ariki* (chief) Hone Tūhawaiki were informative, although "in cases where it was more necessary to obtain an accurate knowledge of a distance, I was

9. Anne Salmond, "Kidnapped: Tuki and Huri's Involuntary Visit to Norfolk Island in 1793," in *From Maps to Metaphors: The Pacific World of George Vancouver,* ed. Robin Fisher and Hugh Johnston (Vancouver: UBC Press, 1993), 191–226, and idem, *Two Worlds: First Meetings between Maori and Europeans, 1642–1772* (Auckland: Viking, 1991), 191–207, esp. 207.

10. Harry C. Evison, *Te Wai Pounamu, the Greenstone Island: A History of the Southern Maori during the European Colonization of New Zealand* (Christchurch: Aoraki Press, 1993), 313–14, n. 100, which also lists some additional Māori terms for "map" in the deeds of the period.

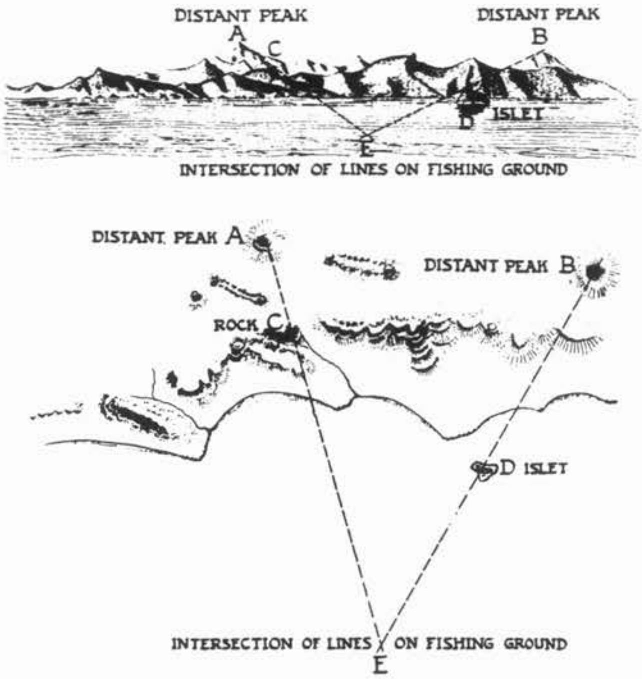

FIG. 14.1. DIAGRAM SHOWING HOW UNMARKED FISHING GROUNDS ARE LOCATED AT SEA. In the diagram, line ACE connects a prominent rock on a hilltop and a more distant hill peak, while line EDB connects a distant hill peak and an offshore island. When both sets of features are lined up, the boat is at the fishing grounds (the intersection of the two lines).
Size of the original: 12 × 11.5 cm. From Elsdon Best, *Fishing Methods and Devices of the Maori* (1929; New York: AMS Press, 1979), 5.

obliged to make him compare it with the distances of objects we could see, in order that I might reduce it to our standard. This is, in fact, the only way by which natives can describe long distances, as they have no fixed unit of measurement corresponding with a mile or league."[11] Ernst Dieffenbach reported that "distances are often reckoned by nights (po), that is, how many nights they have to encamp before reaching a place. One 'po' means rarely more than from twelve to fifteen miles; often less."[12]

Māori body-based measurements were the *mārō* (roughly 6 ft. or 1.83 m), the average measure of outstretched arms, and the *kumi,* comprising ten *mārō.*[13] These measures were adequate for constructing *pā, whare,* and *waka.*

GEOGRAPHICAL ORIENTATION

William Henry Skinner, in an account of a survey in the North Island north of present-day Stratford, noted a striking case of Māori sense of direction that occurred in 1874. It was related by his brother, T. K. Skinner, while engaged on the survey of the eastern boundary of the Patea-Waipuku Block, preliminary to government purchase from the Māori.

> The chief, Te Peneha Mangu, was director, or guide, as to the boundaries of the Block. The line in question was to run straight from a definite point on the Waipuku River to a sub-tribal boundary mark, a kopua, a large deep pool in a bend of the Patea River, called Kopua-tama. . . .
>
> After directing the surveyor to set up his instrument on the south bank of the Waipuku, the old tohunga recited an ancient karakia (incantation) calling on the atua [god], the spirits of the forest, to guide him aright in directing the line. This ceremony concluded, he stood by the surveyor and directed the clearing of the undergrowth in the general direction desired, and finally, after careful consideration, had a stake placed ahead of the instrument on the true line to Kopuatama. The line was duly cut and run from this origin and after going straight across 8½ miles of dense unbroken forest growth the party finally came out on the western rim, a few yards off centre, of the pool Kopuatama–a striking proof of the chief's keen sense of direction. The old Maori himself was fully assured that his success was principally due to the powers of his atua.[14]

Charles Heaphy reported that the Māori E Kehu had a remarkable sense of direction.

> [E Kehu] appears to have an instinctive sense, beyond our comprehension, which enables him to find his way through the forest when neither sun nor distant object is visible, amidst gullies, brakes, and ravines in confused disorder, still onward he goes, following the same bearing, or diverging from it but so much as is necessary for the avoidance of impediments, until at length he points out to you the notch in some tree or the foot-print in the moss, which assures you that he has fallen upon a track.[15]

11. Edward Shortland, *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines* (London: Longman, Brown, Green, and Longmans, 1851; reprinted Christchurch: Capper Press, 1974), 82.

12. Ernst Dieffenbach, *Travels in New Zealand: With Contributions to the Geography, Geology, Botany and Natural History of That Country,* 2 vols. (London: John Murray, 1843; reprinted Christchurch: Capper Press, 1974), 2:121.

13. Elsdon Best, "The Maori System of Measurement," *New Zealand Journal of Science and Technology* 1 (1918): 26–32.

14. William Henry Skinner, "The Old-Time Maori," N.Z. *Surveyor: The Journal of the New Zealand Institute of Surveyors* 18, no. 2 (1942): 6–9, esp. 8–9. Reference to a modern map shows the distance to be closer to 6.5 miles (10.46 km) than the 8.5 miles (13.67 km) quoted.

15. Charles Heaphy, "Account of an Exploring Expedition to the South-west of Nelson," in *Early Travellers in New Zealand,* ed. Nancy M. Taylor (Oxford: Clarendon Press, 1959), 188–203, esp. 192, by permission of Oxford University Press. Thomas Brunner, William Fox, Charles Heaphy, and E Kehu formed the party that explored the

Accurate locating of fishing grounds at sea was essential, since these were sometimes a considerable distance from the land. Great care had to be taken not to trespass on the traditional fishing grounds of other *hapū* (section of *iwi*, subtribe). Best described the method used to locate a fishing ground (see fig. 14.1):

> All fishing grounds, banks, and rocks had special names assigned to them. . . . Inasmuch as many fishing-grounds had no rock or part of their surface above water, it behoved the Maori fisherman to be careful in locating the *tohu*, or signs (landmarks), by means of which he located such grounds. He did so by lining [aligning] prominent objects on shore, such as hill-peaks, capes, prominent rocks, trees, &c. The *taunga ika*, or fishing ground, on the East Coast [of the North Island] known as Kapuarangi was named after a prominent hill that served as one of the lining-in objects. This ground was located by observing four hills, two in one direction and two in another; when the two series were in line, then the ground was reached.[16]

This account of locating by the intersection of alignments is not unique.[17] There is no evidence, however, that Māori used alignment or intersection when making maps.

East Polynesians probably brought with them to New Zealand the concept of a sun-wind compass, although it is not known whether this was incorporated in artifacts made for instructional purposes.[18] In the eighteenth and nineteenth centuries, Europeans certainly found the concept among the Pacific Island navigators. Unfortunately, however, accounts are few, are probably Eurocentric, and omit critical details that might have made it possible to reach reliable conclusions. In particular, they do not distinguish between sun, star, and wind referents or indicate how allowances were made for seasonal variations in them. One of the earliest accounts was reasonably explicit in stating that Tahitians had "no mariner's compass," presumably meaning they had no equivalent of the European navigator's magnetic compass. "[They] divide the horizon into sixteen parts, taking for the cardinal points those at which the sun rises and sets. . . . When setting out from port the helmsman reckons with the horizon thus partitioned counting from E, or the point where the sun rises."[19] The sixteen points were each named, and about half have been shown to be "the names of winds, according to the direction they blow from, and their force."[20] With reference to this late eighteenth-century account, Lewis concluded that "the link between sun and wind compass is obvious."[21] Best illustrates a Ngāti Porou wind compass with a north-south orientation, probably a result of European acculturation (fig. 14.2).

East had religious significance for the Māori for centuries after first settlement, a custom probably derived from Polynesia. Archaeological excavations at Wairau

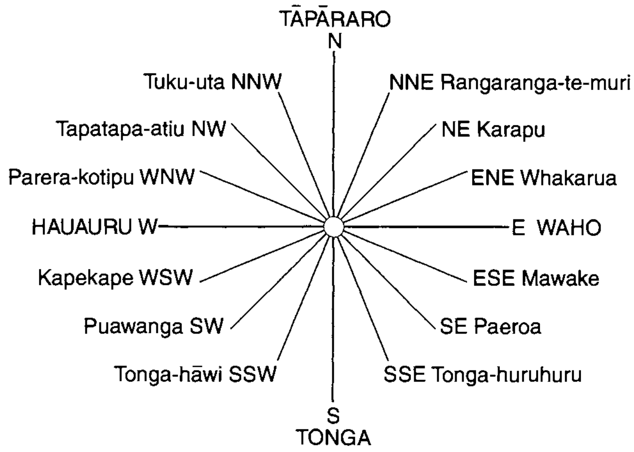

FIG. 14.2. NAMES OF THE COMPASS POINTS. These are the names given by Mohi Turei of the Ngāti Porou people of the east coast of the North Island. Best states that the Māori had specific names for the four cardinal directions (*raki*, north; *rāwhiti*, east; *tonga*, south; *uru*, west), which do not completely agree with Mohi Turei's names. Other names for the directions from which winds blow differ depending on the *iwi* and area.
Size of the original: 7 × 12 cm. After Elsdon Best, *The Astronomical Knowledge of the Maori* (Wellington: Government Printer, 1922; reprinted 1978), 38.

Bar, South Island, have revealed burials in which bodies, most likely males of rank, were laid roughly east-west, and similarly aligned burials were reported in the Society Islands, eastern Polynesia.[22] Māori believe that after death the *wairua* (spirit) descends into Rarohēnga (the Underworld), in the Great Ocean of Kiwa in the West.[23] But

area covering Lakes Rotoiti and Rotoroa and the upper Buller (Kawatiri) River between 2 February and 1 March, 1846.

16. Elsdon Best, *Fishing Methods and Devices of the Maori* (1929; New York: AMS Press, 1979), 4.

17. Skinner, "Old-Time Maori," 8 (note 14); Tamati Rihara Poata, *The Maori as a Fisherman and His Methods* (Opotiki: W. B. Scott and Sons, 1919; reprinted Papakura: Southern Reprints, ca. 1992), 9.

18. See chapter 13.

19. Bolton Glanvill Corney, ed. and trans., *The Quest and Occupation of Tahiti by Emissaries of Spain during the Years 1772–1776*, 3 vols., Hakluyt Society Publications, ser. 2, nos. 32, 36, 43 (London: Hakluyt Society, 1913–18), 2:284–85, from the journal of Spaniard Don José Andía y Varela.

20. Corney, *Quest and Occupation of Tahiti*, 2:285 n. 1.

21. David Lewis, *We, the Navigators: The Ancient Art of Landfinding in the Pacific*, 2d ed., ed. Derek Oulton (Honolulu: University of Hawai'i Press, 1994), 115.

22. Heads were to the east, facing toward the setting sun; Roger Duff, *The Moa-Hunter Period of Maori Culture*, 3d ed. (Wellington: Government Printer, 1977), 58–59. In the same work, Michael Malthus Trotter carbon dates the excavations to A.D. 1015 ± 110 to 1360 ± 60 years (see the chapter "Moa-Hunter Research since 1956," 348–78, esp. 354). On the Society Island burials, see Kenneth Pike Emory and Yosihiko H. Sinoto, "Eastern Polynesian Burials at Maupiti," *Journal of the Polynesian Society* 73 (1964): 143–60.

23. Elsdon Best, *The Maori as He Was: A Brief Account of Maori Life*

there is no evidence that this favoring of an east-west axis had any relevance to the structure of Māori maps.

TOPONYMS

There was no written Māori language or orthography before 1820.[24] Hence information was communicated orally and depended on high-capacity memories aided by mnemonics. The landscape was one important mnemonic. Toward the end of the nineteenth century James West Stack, a missionary in the South Island, wrote: "Every part of the country was owned and named. Not only were the large mountains, rivers, and plains named, but every hillock, streamlet, and valley. These names frequently contained allusions to persons or events, and thus served to perpetuate the memory of them and to preserve the history of the past. Every Maori was required to know by what title the land claimed by his tribe was held, whether by right of original occupation, conquest, purchase, or gift."[25] Toponyms were abundant in areas important to the Māori; in other areas their density was less. Many were aligned along linear features: rivers, coasts, ridge crests, and routes. For example, a plan of land purchased from the Māori in 1860 included as the southern boundary a 7.5 kilometer stretch of the forested Ihuraua River northeast of what is now Masterton. Somewhat surprisingly, this remote stretch contained thirty-eight toponyms (fig. 14.3), and they did not include tributary streams. They may have designated family food-gathering places as distinct from conspicuous or critical topographic features.

Māori place-names also commemorate historical or mythical events. Indeed, a recently published guide to the understanding of Māori toponyms calls them the

> survey pegs of memory, marking the events that happened in a particular place, recording some aspect or feature of the traditions and history of a tribe. If the name was remembered it could release whole parcels of history to a tribal narrator and those listening. The daily use of such place names meant that the history was always present, always available. In this sense living and travelling reinforced the histories of the people.[26]

The use of toponyms without maps often confused Europeans, in part because sets of names sometimes recurred in two or more regions. Sometimes place-names associated with a tribe's history and tradition were of such significance that when a "tribe migrated elsewhere it 'replanted' its history in its new home by naming its new landscape with the names of the place of origin."[27]

The use of Māori toponyms in the absence of maps sometimes led to serious misunderstanding when Europeans purchased land before land surveys. In 1839 William Hirst bought from the Ngai Tahu a block of land on the east coast of the South Island north of what is now Dunedin. He thought he had acquired a block of twenty thousand acres but had failed to understand the Māori toponyms that had been used to define the limits. Hone Tūhawaiki, the paramount *ariki*, knew exactly what land had been sold, and after a hearing in 1843 the land commissioners awarded Hirst less than 2 percent of what he thought he had purchased.[28]

There are a few accounts where Māori have used sequences of toponyms for features and locations to be passed through in the course of journeys. As a boy, Tama Mokau te Rangihaeata of D'Urville Island heard elders recount the journeys of perhaps three hundred kilometers or more down the northwest coast of the South Island. "Feature name after feature name would be mentioned during the recital and so vividly were they described that Mokau himself was able to identify many localities and recall their names when he made his first visit to the land of greenstone as a young man."[29] In 1846 Charles Heaphy and Thomas Brunner traveled along essentially the same coast as Tama Mokau te Rangihaeata. They were accompanied by the Māori E Kehu (known as Hone Mokehakeha or Hone Mokekehu), who had supplied them in advance with a sequence of toponyms of places and features to be seen en route. When he was a boy and a young man, E Kehu had traveled extensively as a prisoner within Nelson Province, particularly on the west coast and in the watersheds of the Buller (Kawatiri) and Grey (Mawhera) Rivers, and he had thus acquired an extensive knowledge of the land.[30] "[E Kehu's] description of the country the party would be required to traverse as

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as It Was in Pre-European Days (1924; Wellington: Government Printer, 1974), 37, 44–45. Tuki's map (below, fig. 14.6) depicts the path of the spirits.

24. Herbert William Williams, *A Dictionary of the Maori Language*, 7th ed. (Wellington: Government Printer, 1971), XXIII.

25. James West Stack, *South Island Maoris: A Sketch of Their History and Legendary Lore* (1898; reprinted Christchurch: Capper Press, 1984), 12. John White, another nineteenth-century Māori scholar, similarly wrote that "there is not one inch of land in the New Zealand Islands which is not claimed by the Maoris . . . not one hill or valley, stream, river, or forest, which has not a name–the index of some point in Maori history"; quoted in W. T. Locke Travers, *The Stirring Times of Te Rauparaha (Chief of the Ngatitoa)* (Christchurch: Whitcombe and Tombs, 1906), 16.

26. Te Aue Davis, Tipene O'Regan, and John Wilson, *Ngā Tohu Pūmahara: The Survey Pegs of the Past* (Wellington: New Zealand Geographic Board, 1990), 5.

27. Davis, O'Regan, and Wilson, *Ngā Tohu Pūmahara*, 5.

28. National Archives of New Zealand, Wellington, Old Land Claims, file 232; K. C. McDonald, *History of North Otago* (Oamaru, 1940), 18–19; and H. Beattie, *Maori Place-Names of Otago* (Dunedin, 1944), 17–18.

29. G. G. M. Mitchell, *Maori Place Names in Buller County* (Wellington: A. H. and A. W. Reed, 1948), 18.

30. Hilary Mitchell and John Mitchell, "Kehu (Hone Mokehakeha):

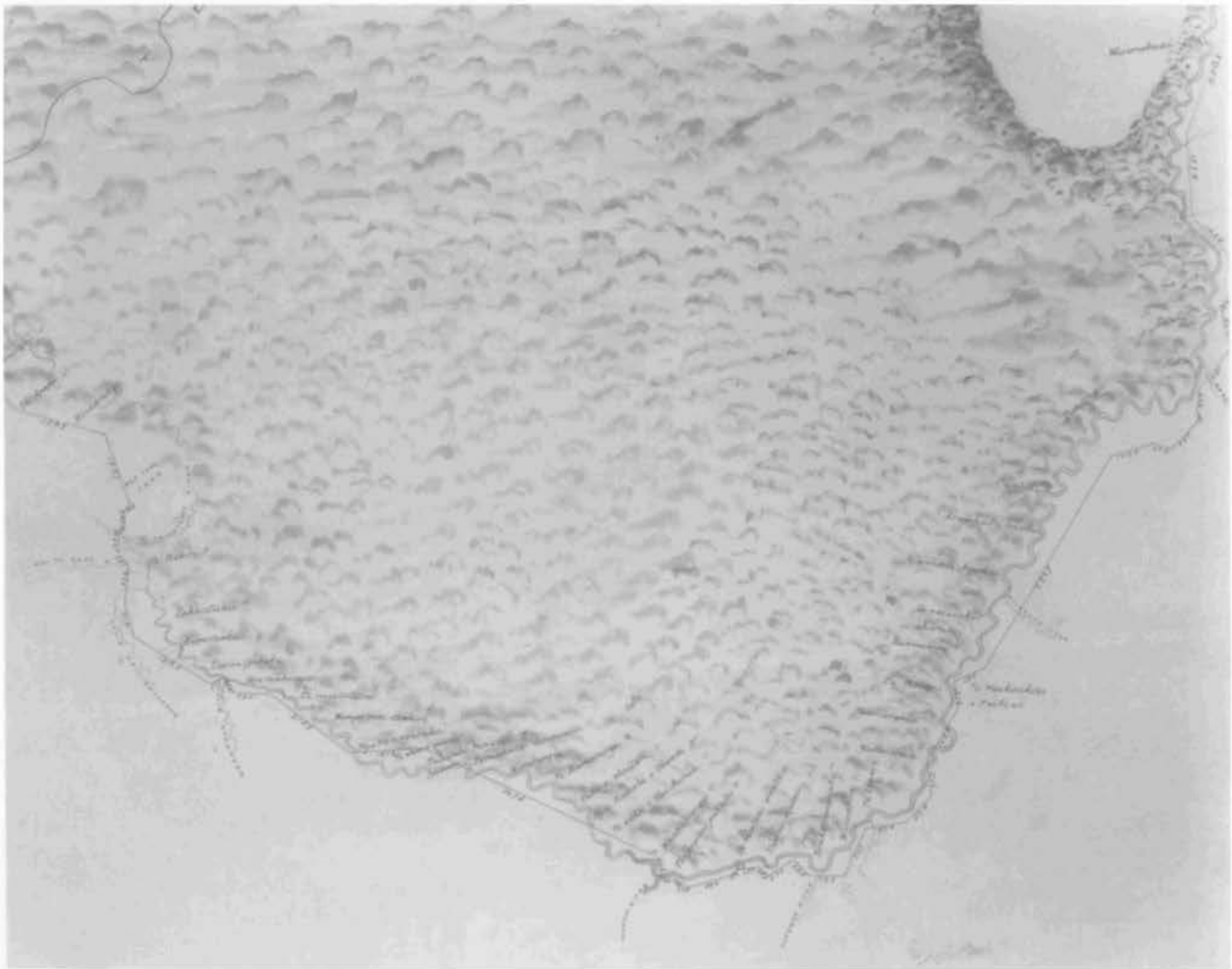

FIG. 14.3. SOUTHERN SECTION OF THE PLAN OF THE IHURAUA BLOCK, 1860? This section shows place-names along the Ihuraua River, which formed the southern boundary of the block. North is at the top of the map. The plan is manuscript, ink on paper with watercolors, linen backed, 1:31,680. Size of the entire original: 90 × 68 cm; size of this section: 30 × 42 cm. Photograph courtesy of the National Archives Head Office, Wellington (AAFV 997, W24).

recited to the two explorers before they set out on their journey, amazed them as they progressed southward and recognized mountains, hills, rivers, streams, headlands and other natural features from Ekehu's prior description."[31] Toponyms were apparently associated with each trail. Presumably they could also be memorized for intersecting trails. In the South Island, especially in the northern part, there were a number of major and many minor intersecting trails.[32] Especially in the northern part of the island they constituted a fairly dense network with many intersections. In the North Island there were numerous major and subsidiary trails because of the density of the population in the numerous *kāinga* and *pā*. A Māori memorizing toponyms for part of this network would have the basic structure from which to draw a map.[33] Yet only one extant Māori map is structured along a linear sequence of toponyms–that of the Waitaki River drawn by Te Ware Korari for Walter Baldock Durrant Mantell in 1848 (see below, figs. 14.28–14.32).

Many Māori place-names have been lost through the deaths of elders and *tohunga* who had memorized this knowledge and did not pass it on. Many toponyms do appear on current large-scale topographic maps of New Zealand, although in some cases those on printed maps

Biographical Notes," *Nelson Historical Society Journal,* 1996, 3–19, esp. 5–6.

31. Mitchell, *Maori Place Names,* 20 (note 29).

32. See the end maps in Barry Brailsford, *Greenstone Trails: The Maori Search for Pounamu* (Wellington: A. H. and A. W. Reed, 1984), and 2d ed., titled *Greenstone Trails: The Maori and Pounamu* (Hamilton: Stoneprint Press, 1996).

33. The map of part of the South Island reported to have been made by two Rangitāne in 1850 (see below, p. 503) could well have been structured in this way.

are incorrectly recorded or applied to the wrong topographic feature. There are many toponyms recorded on manuscript maps, manuscripts, and other unpublished sources that do not appear on any printed maps. Considerable information on toponyms is still held by Māori *iwi.*

European Accounts of Māori Maps and Mapping

Several references in European sources mention the drawing of maps for European explorers, officials, and surveyors–although none of these maps still exist in any form. The earliest such record involves James Cook and the *Endeavour,* which was anchored at Mercury Bay from 4 to 15 November 1769. Te Horeta te Taniwha was a boy of about twelve when he saw a map being drawn on the deck of the ship.[34] In 1852, when he was about ninety-five, he was interviewed by Charles Heaphy, a surveyor, concerning the episode.

> His [James Cook's] officers made charts of the islands about, and to the entrance of Witianga [Whitianga]; and our [Māori] men, at his [Cook's] desire, drew on the deck with charcoal a chart of all the coast: we drew the Thames, and Cape Colville, and Otea [Aotea; Great Barrier Island], and on to the North Cape. Captain Cook copied this on paper; and asked us the names of all the places, and wrote them down, and we told him of the spirits flying from the North Cape, from the cavern of Reinga to the other world.[35]

John White, a nineteenth-century Māori scholar, recorded two accounts from Te Horeta te Taniwha. The dates of White's reports are not known, but they must have been within a few years of Heaphy's because of Te Horeta te Taniwha's age.

> We had not been long on board of the ship before this lord of these goblins [James Cook] made a speech, and took some charcoal and made marks on the deck of the ship, and pointed to the shore and looked at our warriors. One of the aged men [probably Toiawa] said to our people, "He is asking for an outline of this land"; and that old man stood up, took the charcoal, and marked the outline of Ika-a-maui (the North Island of New Zealand). And the old chief spoke to that chief goblin, and explained the chart he had drawn. . . . After some time the chief goblin took out some white stuff [paper], on which he made a copy of what the old chief had made on the deck, and then spoke to the old chief. The old chief explained the situation of the Reinga (lower region, world of spirits) at the North Cape; but, as the goblin chief did not appear to understand, the old chief laid down on the deck as if dead, and then pointed to the Reinga as drawn by him in the plan. But the goblin chief turned and spoke to his companions, and, after they had talked for some time, they all looked at the map which the old chief had drawn on the deck; but the goblins did not appear to understand anything about the world of spirits spoken of by the old chief, so they scattered about the deck of the ship.[36]

The aged man thought to have drawn the map and been mentioned in this first account by White was Toiawa, a Māori *ariki.* He visited the *Endeavour* on 5 November 1769 and several other times.[37] White's second version of Te Horeta te Taniwha's account gives us more information concerning the geographical area covered by the map:

> Some of the great men of that ship made sketches of the land on shore, and also of the islands in the sea of [off] Whitianga, and the great chief [James Cook] commanded our old chiefs to make a drawing of Ao-tea (New Zealand) [here John White has confused the name of Aotearoa (New Zealand) with Aotea (Great Barrier Island)] with charcoal on the deck of the ship. So those old chiefs, as asked, made a sketch on the deck of the vessel with charcoal. This included Hau-raki (Thames), Moe-hau (Cape Colville), and the whole of the Island of Ao-tea (North Island of New Zealand) [Great Barrier Island was meant], and taking in Muri-whenua (North Cape); and the great chief copied this into his book. He asked the names of all the places drawn by them, even to Reinga (North Cape, the exit of spirits).[38]

Even though Cook asked for a map of New Zealand,

34. For more on Te Horeta te Taniwha (later the Ngāti Whanaunga *ariki*), see Angela Ballara, "Te Horeta, ?–1853," in *The People of Many Peaks: The Maori Biographies from "The Dictionary of New Zealand Biography, Volume 1, 1769–1869"* (Wellington: Bridget Williams Books, 1991), 173–75.

35. Charles Heaphy, "Sketches of the Past Generation of Maoris," *Chapman's New Zealand Monthly Magazine: Literary, Scientific and Miscellaneous* 1 (August 1862): 4–7, quotation on 6.

36. John White, *The Ancient History of the Maori, His Mythology and Traditions,* 6 vols. (Wellington: Government Printer, 1887–90), 5:124–25.

37. "One old man whose name was *Torava* [Toiawa] came on board; he seemed to be the cheif [*sic*] both today and yesterday," Joseph Banks, *The Endeavour Journal of Joseph Banks, 1768–1771,* ed. J. C. Beaglehole, 2 vols. (Sydney: Trustees of the Public Library of New South Wales in association with Angus and Robertson, 1962), 1:427. See also John Hawkesworth, *An Account of the Voyages Undertaken by Order of His Present Majesty for Making Discoveries in the Southern Hemisphere,* 3 vols. (London: Printed for W. Strahan and T. Cadell, 1773), 2:332–33, and Salmond, *Two Worlds,* 191–207, esp. 207 (note 9). Other Māori also visited the ship. In communications between Europeans and Māori there was a language barrier, but the Tahitian Tupaia, who was on board the *Endeavour,* would have been of some assistance because the Tahitian and Māori dialects were derived from a proto-Polynesian language. Tupaia had spent three months on the *Endeavour* before it arrived in New Zealand. He had very likely learned some English and the ship's officers some Tahitian, and thus he was able to act in a limited way as an interpreter.

38. White, *Ancient History,* 5:129 (note 36).

the Māori drew a map of the northern part of the North Island, the area he knew well. It is clear from Heaphy's account and White's second account that the map drawn in charcoal was of the Coromandel Peninsula, Great Barrier Island, the Hauraki Gulf (including the Firth of Thames), and the eastern coast of the Auckland Peninsula as far as Cape Rēinga (see fig. 14.4). White's first account says that the map covered the whole of the North Island, and this confusion could have arisen from Te Horeta te Taniwha's great age and possible memory loss or from White's misunderstanding.[39]

All three accounts state that Cook made a copy of the map (which does not appear to have survived), but Cook does not record the incident in his journal.[40] All three accounts also mention Rēinga (Te Rēinga, Cape Rēinga). In White's account, when Cook did not appear to understand, the *ariki* himself became part of the map by pretending death and pointing to the place (Te Rēinga) where the *wairua* (spirit) went en route to the Underworld. The importance of this location is further illustrated below in the map made by Tuki (fig. 14.6), which shows the path the *wairua* follow through the North Island to Cape Rēinga after death.

This was the first contact that the Māori of the area had with Europeans, and it seems very unlikely that they had seen any charts on the *Endeavour.* If they did, they probably did not know their use. Yet when Cook spoke and made marks with charcoal on the deck, they knew that he required an outline of the land and supplied it. The drawing of the map, the understanding of what Cook wanted, and the alacrity in supplying the information are convincing evidence that Māori were familiar with drawing maps and had been doing so before the visit of the *Endeavour.*

We know of two accounts that describe maps of the entire North Island being drawn by Māori. The first is by John Liddiard Nicholas, a settler in New South Wales, Australia, who traveled to New Zealand from November 1814 to March 1815 aboard the *Active.* Most of his time was spent at or near the Bay of Islands, where he met a Māori *ariki* named Korra-korra (Korokoro?) who lived in a village near Cape Brett. On a date and at a location unknown he drew a map for Nicholas. "Yet in a rude sketch of Eaheinomauwe or the Northern Island, which Korra-korra drew for me upon paper, he described between the East Cape and Queen Charlotte's Sound, a high island on the eastern side, which at intervals vomited forth fire and smoke, and from which place I should suppose the above volcanic substances were procured."[41] The volcano referred to must have been White Island (Whakāri) in the Bay of Plenty, which was and still is the only active island volcano. Nicholas must have misunderstood the direction and location of the island–he did not visit the Bay of Plenty.

The other account of a map of the North Island comes from a conversation between Te Heuheu Tukino II, paramount *ariki* of the Ngāti Tūwharetoa *iwi,* and George Augustus Selwyn, Anglican bishop of New Zealand. A party of Europeans (including Selwyn and his chaplain William Cotton) and Māori (including Renata Kawepo Tama ki Hikurangi) were traveling from Waimate North to Wanganui.[42] On the way south the party crossed Lake Taupo (Taupō) by *waka* and stayed at Te Rapa, the principal *pā* of Te Heuheu Tukino II. On or about 5 November 1843, when the rest of the party was present, Selwyn had a brief conversation with Te Heuheu Tukino II that Cotton recorded in his journal. The *ariki* became very vocal.

> He [Te Heuheu Tukino II] is very excited on all questions connected with land, in consequence of the late disturbances at the south [near Wellington]. He said there were enough Pakehas [Europeans] in the country, that no more shd come. That Taupo his rangatiratanga (kingdom) is the toenga (the remnant) of the whole country, and that keep it he would. This he illustrated in a most graphic manner.
>
> He picked up a stick and drew a circle on the ground, about six feet over and sundry other around it. In the middle of the large circle, which he intended to represent Taupo, he set up a fern stick, to stand for Tongariro [active volcanoes], and a smaller one leaning against it for himself. I never saw such a grand figure as Te Heuheu's when bending in silence over his drawing. . . .
>
> He stood for some minutes contemplating his work, and satisfying himself that it was all right.
>
> "This" said he, "is Port Nicholson [Wellington] kua riro ki te Pakeha" it has gone away to the Pakeha. This

39. Heaphy's training as a surveyor and his twelve years' experience in New Zealand (1840–52) would have enabled him to get the basic facts from Te Horeta te Taniwha, whereas White lacked Heaphy's experience. I have examined White's original manuscript, but it is the same as the published accounts.

40. This is odd, because Cook was a meticulous recorder. In addition, the map covered an area of the coast that had not been visited or surveyed by Europeans before, and Cook would naturally have been interested in it and concerned about the safe navigation of the *Endeavour* and supplies of food and water. A careful examination of the charts and coastal views of the area drawn by Cook and his officers does not reveal any of the place-names mentioned in the description of the map: Andrew David, ed., *The Charts & Coastal Views of Captain Cook's Voyages,* vol. 1, *The Voyage of the Endeavour, 1768–1771* (London: Hakluyt Society in association with the Australian Academy of the Humanities, 1988), 205–34.

41. John Liddiard Nicholas, *Narrative of a Voyage to New Zealand,* 2 vols. (London: J. Black, 1817), 2:252. The volcanic substances were likely to be *matā* (obsidian), used for knives, and *tāhoata* (pumice), used for files. *Tāhoata* could be obtained from White Island (Whakāri) and *matā* from Mayor Island (Tūhua), both in the Bay of Plenty.

42. The group left on 4 October 1843, with one part of the party traveling to Wellington, and returned to Waimate North on 1 March 1844.

FIG. 14.4. REFERENCE MAP OF NEW ZEALAND. This map shows the locations of most of the place-names mentioned in this chapter.

is Wanganui–kua riro ki te Pakeha. This is Auckland etc. "This is the Waimate" etc But this pointing to Taupo is mine & mine it shall remain."[43]

Te Heuheu Tukino II did not sign the Treaty of Waitangi in 1840 by which the British gained sovereignty over New Zealand, and he was very opposed to the sale of land to Europeans, as is evident from his comments concerning the map he drew. Te Heuheu Tukino II used the name Tongariro to describe all the present volcanoes in the Tongariro National Park (Mounts Tongariro, Ngauruhoe, and Ruapehu), and he likened his *mana* (influence, prestige, power) to that of three mountains by selecting a fernstick to represent Tongariro and a smaller fernstick to represent himself. He was an *ariki* of great *mana*, as is further shown in the Ngāti Tūwharetoa proverb, "Ko Tongariro te Maunga; ko Taupo te Moana; ko Te Heuheu te Tangata" (Tongariro is the mountain; Taupo is the lake; Te Heuheu is the man).

We have one account of a map of Chatham Island (Rēkohu/Rākohu or Whare Kauri) being drawn. Ernst Dieffenbach, a surgeon and naturalist for the New Zealand Company, came to New Zealand from London in 1839. As part of his duties he made a number of extensive journeys into the interior of the North Island and visited Chatham Island in May–June 1840.[44] There he met a Māori named E Mare, who drew a chart of the island. "E Mare proved, on every occasion, a very intelligent and reasonable man. He had been for some time at Sydney, and had visited nearly the whole coast of New Zealand. He drew for me a chart of the Chatham Island, which exceeds in accuracy all the previous sketches made by Europeans. He was remarkably polished in his behaviour, and took the greatest interest in all my inquiries."[45] The date, the method by which the chart was made, the material on which it was drawn, and particulars about the geographic coverage are not known. Chatham Island had been E Mare's home since 1835, so he was likely to have known the island well. Because he had traveled on sailing vessels, he may have seen and been influenced by hydrographic charts.

Dieffenbach includes a detailed map of the Chatham Islands, including Rangihaute (Rangiauria, or modern Pitt Island), in the same article that mentions E Mare's chart (fig. 14.5). However, E Mare's contribution to the published map cannot be determined, and there is reason to believe that Charles Heaphy, who was at Chatham Island at the same time, was largely responsible for that map.[46]

We have four descriptions of portions of the South Island being drawn in the mid-nineteenth century. The earliest is that of a route on the northeast of the island from Nelson to Port Cooper (modern Lyttelton). The settlers in Nelson and environs wanted to find a route through the complex mountain and river system over which stock could be driven to Port Cooper. John Tinline–clerk of the court, sheriff, Māori interpreter, and part-time surveyor–gave information to the *Nelson Examiner and New Zealand Chronicle* that was published on 6 April 1850.

> The information received by Mr. Tinline, is from two natives of the Ranghitani [Rangitāne] tribe, the original possessors of all the country at the northern end of this island [South Island]. . . . These are the only natives who appear to have any knowledge of the interior of this part of the country, or of the passes through the rugged chains of mountains which intersect it in so many directions. The two natives of whom we have spoken, were members of a party who, about twenty years ago, made a hostile incursion on the tribe then resident in the neighbourhood of Port Cooper [Ngai Tahu?], and, by a plan which they drew in chalk on the floor of the Sheriff's office, they have described circumstantially, and with apparent intimate knowledge of the country, the route which they took.[47]

The article goes on to describe the route in great detail–the terrain and rivers and streams crossed–and makes clear not only the vast extent of the Māori's geographical knowledge but also what may have been demonstrated on the map.[48] Tinline, as the Māori interpreter, would have been able to talk to the Māori and ask them questions, but we cannot know whether or how this may have influenced the map. The two Māori may have been Eopi and Ewi, who were known to have accompanied two British Indian army officers on a journey to explore the route during this same period.[49]

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43. Helen M. Hogan, ed. and trans., *Renata's Journey: Ko te Haerenga o Renata* (Christchurch: Canterbury University Press, 1994), 89–90. This account appears in William Cotton's Journal, vol. 5, which is held in the Dixson Library, State Library of New South Wales, Sydney.

44. Dieffenbach returned to England in 1841, having kept a meticulous record of his journeys; see Dieffenbach, *Travels in New Zealand* (note 12).

45. Ernst Dieffenbach, "An Account of the Chatham Islands," *Journal of the Royal Geographical Society of London* 11 (1841): 195–215, quotation on 213. E Mare (Heikai Pomare) was paramount *ariki* of the Ngāti Mutunga *hapū* of the Te Ati Awa *iwi,* which was the first Māori *iwi* to invade Chatham Island; see Michael King, *Moriori: A People Rediscovered* (Auckland: Viking, 1989), 57–58.

46. See Rhys Richards, *Whaling and Sealing at the Chatham Islands* (Canberra: Roebuck Society, 1982), 55 (first pagination).

47. Editorial, *Nelson Examiner and New Zealand Chronicle* 9, no. 422 (6 April 1850), cols. A and B.

48. The route the Māori *taua* (war party) followed about 1830 was through headwaters of the rivers named in the account (crossing at the headwaters would have been much easier than crossing the rivers near the coast, where they are much larger and swifter).

49. The officers and their companions split into two parties. Atrocious weather conditions, exposure, and dysentery caused the group Eopi and Ewi traveled with to abandon the search; the other group reached Port Cooper in late May 1850, after the incident in which the map was drawn. See W. G. McClymont, *The Exploration of New*

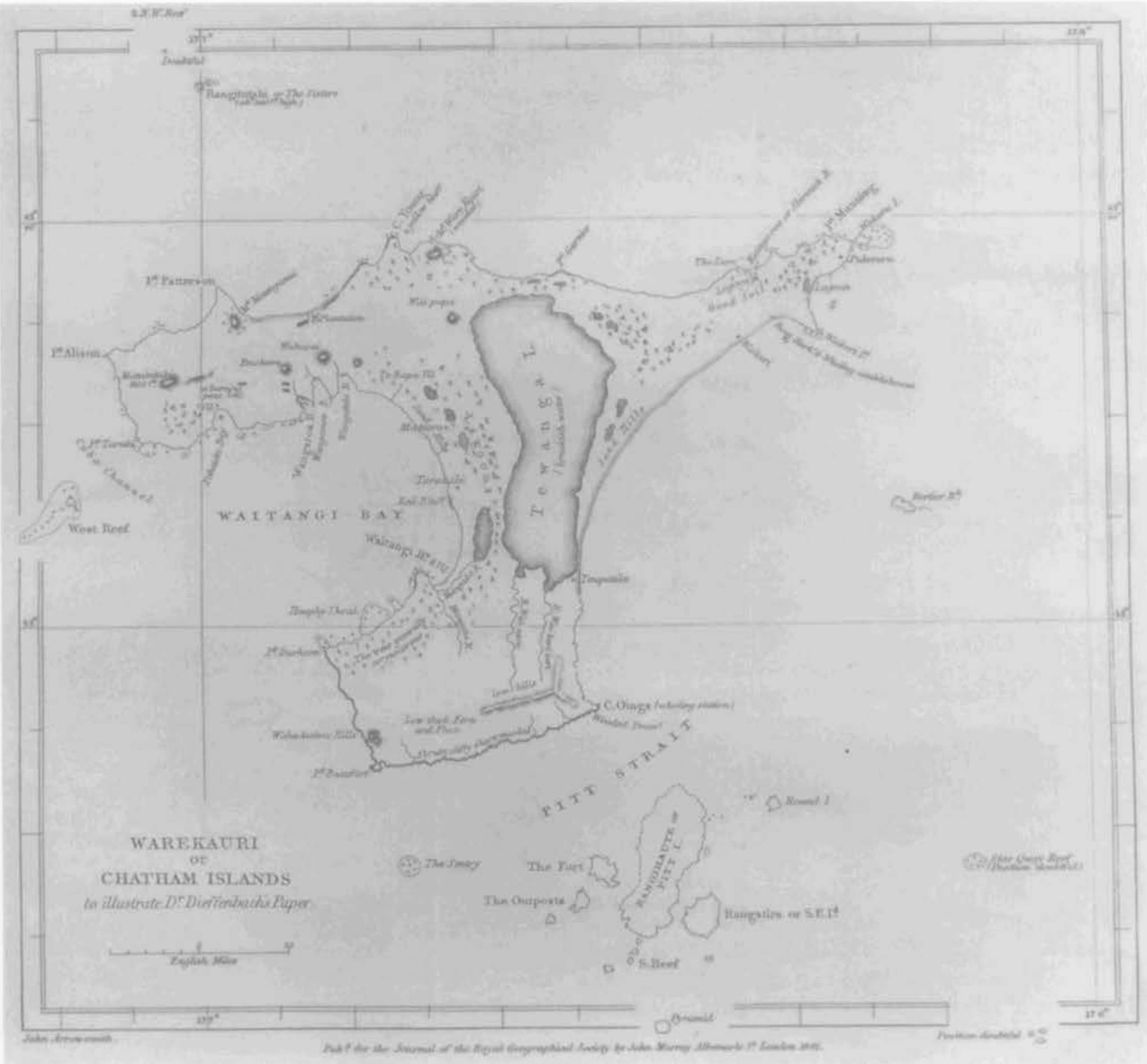


FIG. 14.5. MAP OF CHATHAM ISLANDS, 1841. We do not know what role E Mare played in preparing this map, which was published by Dieffenbach.
Size of the original: 18 × 20 cm. From Ernst Dieffenbach, "An Account of the Chatham Islands," *Journal of the Royal Geographical Society of London* 11 (1841): 195–215, map facing 196. Photograph courtesy of the Royal Geographical Society, London.

It is recorded that two maps of portions of the South Island were drawn by Reko, the Ngai Tahu *ariki* at Tuturau. Reko had detailed knowledge of the southern half of the South Island obtained through extensive travel, but apart from his exploits and geographical knowledge we know very little about him.[50] Sometime in 1856 he met John Chubbin, who was at that time a cattle farmer.[51] Chubbin records:

Zealand, 2d ed. (London: Oxford University Press, 1959), 57.

50. His extensive knowledge of the southern half of the South Island is confirmed by two accounts. Thomas Ballantyne Gillies, a government official, describes Reko as "a very intelligent, though rather unintelligible, old fellow . . . possessed of an extensive knowledge of the country, and a surprising ability of sketching out its natural features," H. Beattie, *Pioneer Recollections: Second Series, Dealing Chiefly with the Early Days of the Mataura Valley* (Gore, New Zealand: Gore Publishing, 1911), 78. John Turnbull Thomson's view of Reko is discussed on p. 505. For information on Reko as a guide and informant, see McClymont, *Exploration of New Zealand,* esp. 60, 68, and 70 (note 49), and Roger Frazer, "Chalmers, Nathanael, 1830–1910," in *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 76–77.

51. Beattie, *Pioneer Recollections,* 65–67. Chubbin, born on the Isle

> Soon after I arrived at the Mataura Plains I was seized with the ambition to do a bit of "sight seeing" further north amongst the unexplored parts of Otago. Reko, the Maori chief at Tuturau, was very good at describing the interior of the country, and he drew a map of the course of the Mataura for me. He drew it in the sand with a stick, the streams being represented by hollows and the mountains by little mounds of sand. He told me how to get to Wakatipu, a lake which at that time had not been reached by white men.[52]

It is interesting to note how Reko showed topographic and hydrographic features on his map–hollows (grooves) in the sand representing the Mataura River and its tributaries, and little mounds of sand representing the mountains in the upper part of the river basin (the south, Kingston Arm, of Lake Wakatipu is surrounded by mountains that reach 2,301 meters). Later that same year Chubbin, accompanied by others and using information from the map, traveled along the upper valley of the Mataura River to the Kingston Arm of Lake Wakatipu. All members of the party may have seen Reko's map, even though Chubbin's remarks suggest they had not.[53]

Reko also drew a map for John Turnbull Thomson, who, arriving in Auckland in February 1856, was almost immediately offered the position of chief surveyor, Province of Otago, South Island, and was appointed the first surveyor general of New Zealand on 1 May 1876.[54] One of his first tasks as chief surveyor was to carry out a reconnaissance survey of the southern part of the province and to select a site for the proposed town of Invercargill. On this first survey he and his assistant Roderick Macrae stayed several days at Tuturau because the Mataura River was in high flood and could not be crossed. They stayed in Reko's *whare,* and in his journal Thompson gives a lively description of their visit.[55] While they were there, Reko drew a map of the lakes and rivers in the interior of the South Island in the dust on the floor.

> With great alacrity and intelligence, he drew first a long line across the floor, which he denominated the Matau–the Molyneux of Captain Cook, and the Clutha of Captain Cargill–both great men in their own spheres. He then described an irregular circle round the floor, which he denominated the sea shore. At the head of the Matau, he drew three eel-shaped figures [a very apt description], which he called Wakatipu, Wanaka and Hawea. He now drew the Mataura issuing closely from the south end of the Wakatipu. The Oreti river he also drew as coming from near the same source. The Waiau and the Waitaki rivers he described as issuing from large lakes, to which he also gave their present names. . . .
>
> He now showed how he travelled from the Kaipoi (over the Lindis Pass), through the interior till he came to Tuturau.[56]

If Thomson made a sketch of Reko's map, it has not been found.[57] But in December 1857 the chief surveyor traveled up the Waitaki River and over Lindis Pass using the information Reko gave him,[58] and thus Reko made a substantial contribution to the mapping of the South Island.

The last literary account of maps drawn by Māori is also of a small portion of the South Island and is recorded by James McKerrow, a member of the Survey Department, Province of Otago, who made exploratory surveys of the lakes in the west of the province.[59] While making a reconnaissance survey of the area west of the Waiau River between 4 August 1862 and late April 1863, McKerrow and party obtained a pencil sketch of the two lakes to the west of the river from Soloman (probably Horomona Patu).[60]

> When at Riverton I obtained, through the introduction of Mr Daniels, a pencil sketch of the Waiau district from the Maori, Soloman. In that sketch both of these lakes are put down–the Howloko [Hauroko] from the traditions of the tribe, and the Monowai

of Man in 1826, had sought adventure in the United States (on the Mississippi riverboats and in the California goldfields) and Australia (in the goldfields). He left Australia for Auckland in 1855 and in 1856 decided to see the rest of New Zealand.

52. Beattie, *Pioneer Recollections,* 67. A similar incident was said to have occurred during Julius von Haast's exploration of Nelson Province in 1860 when "Tarapuhi, the chief at the Mawhera pah, and his brother, Tainui (Verítas), from Kaipoi [Kaiapoi], made me a sketch in the sand; showing rivers by deep furrows, and the mountains by little hillocks, which I have since found to be perfectly correct. They made it in order to show me the best way to the east coast." See Julius von Haast, *Report of a Topographical and Geological Exploration of the Western Districts of the Nelson Province, New Zealand* (Nelson: Printed by C. and J. Elliott, 1861), 129.

53. Beattie, *Pioneer Recollections,* 67 and 73.

54. John Hall-Jones, "Thomson, John Turnbull, 1821–1884," in *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 537–38. Thomson left England to survey in Penang (Pinang), off the West Malaysian coast, and was appointed government surveyor and engineer in Singapore, 1841–53.

55. John Hall-Jones, *Mr. Surveyor Thomson: Early Days in Otago and Southland* (Wellington: A. H. and A. W. Reed, 1971), 33–38.

56. Hall-Jones, *Surveyor Thomson,* 36. The references to the alternative names for the Matau come from James Cook's *Endeavour* sailing master, Robert Molyneux, and from William Cargill, resident agent of the New Zealand Company. The Otago Association preferred the name Clutha, which is the Gaelic for Clyde.

57. John Hall-Jones, personal communications, 20 September 1973 and 6 March 1993. Hall-Jones is Thomson's great-grandson.

58. Hall-Jones, *Surveyor Thomson,* 71–74.

59. McKerrow was Scottish and came to New Zealand in 1859. He became surveyor general of New Zealand in 1879. See "McKerrow, James (1834–1919)," in *A Dictionary of New Zealand Biography,* 2 vols., ed. Guy Hardy Scholefield (Wellington: Department of Internal Affairs, 1940), 2:30.

60. Atholl Anderson (Prehistory Department, Research School of Pacific and Asian Studies, Australian National University, Canberra), personal communication, 20 April 1994.

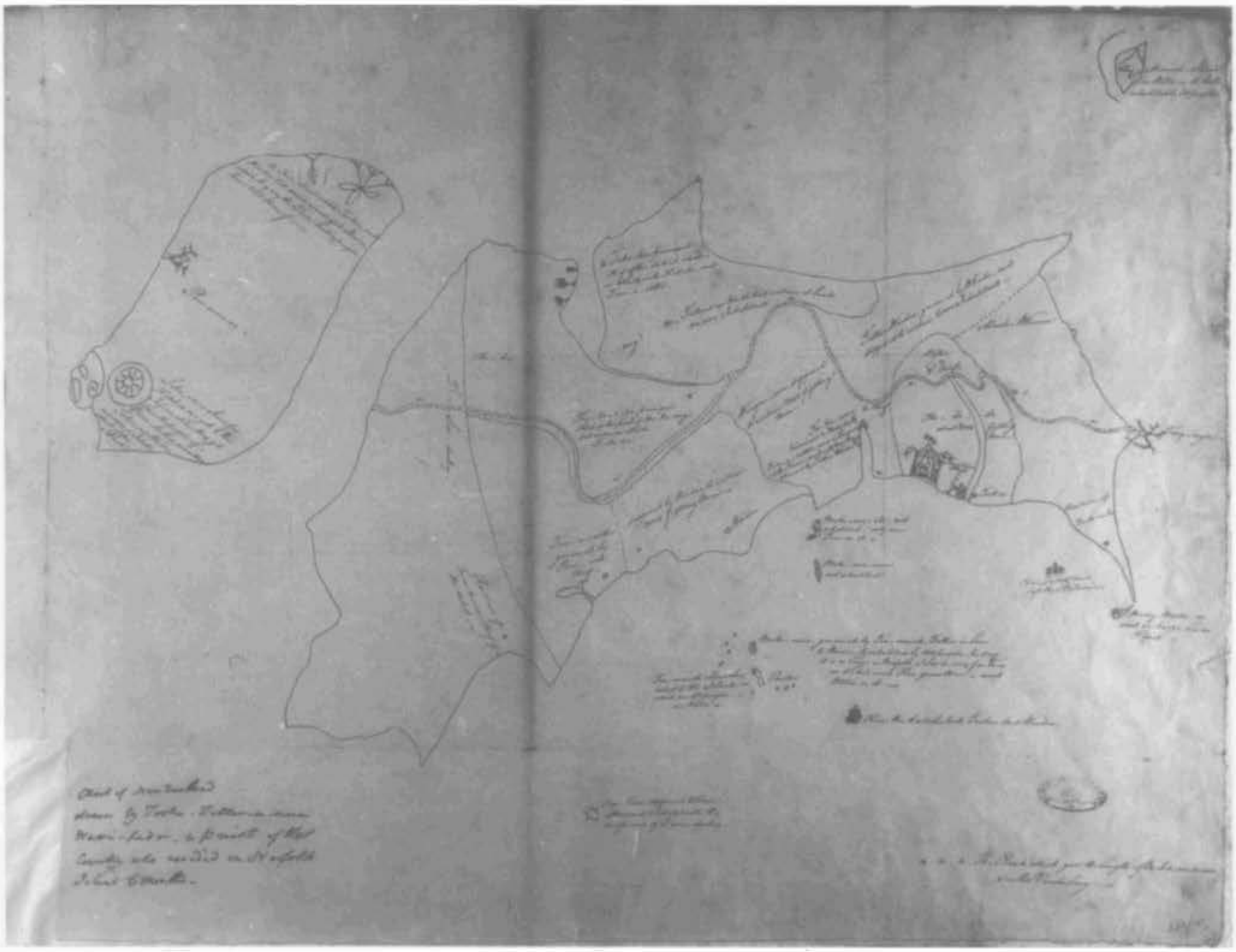


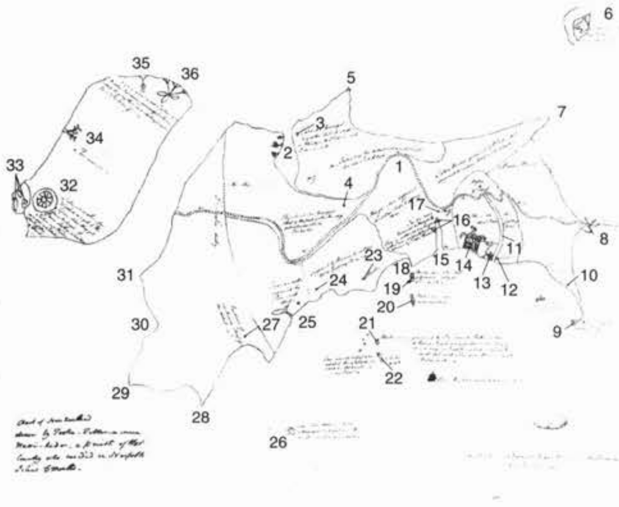
FIG. 14.6. MAP OF NEW ZEALAND DRAWN BY TUKI, 1793. The inscription in the lower left reads: "Chart of New Zealand drawn by Tooke-Titter-a-nui Wari-pedo–a priest of that country who resided on Norfolk Island–6 months." West is roughly at the top of the map. The map is manuscript, black ink on paper, the scale is indeterminable. See also figures 14.7 and 14.8.
Size of the original: 41 × 53 cm. Royal copyright, by permission of the Public Record Office, London (MPG 532/5).

> from actual knowledge. Soloman stated, in his own way, that although neither he nor any of his people had seen the Howloko, yet he fully believed that it was somewhere behind the head of the Lillburn, and that its outlet was to the West Coast [the outlet is the Wairaurahiri River, which is west of the Waiau River and flows into the sea on the south coast of the South Island]; both of which surmises are correct, as was also the general outline of the sketch.[61]

McKerrow was twenty-nine when this account was published. Many years later, when he was seventy-one, another account was published by James Cowan, Māori scholar and journalist, that differed in some respects. In the Cowan account McKerrow says Soloman learned of the two lakes from an old woman, and that Soloman had seen neither. The names of the lakes were discussed, but the drawing of a map was not mentioned.[62] The inconsistencies between the two accounts could stem from the

61. James McKerrow, "Reconnaissance Survey of the Lake District. . . . Report to J. T. Thomson, Chief Surveyor, Otago," *Otago Witness,* no. 597 (9 May 1863): 7, cols. B–D.

62. After meeting Soloman in September 1862, Cowan writes that he (McKerrow) "learned from him that there were two lakes in the bush west of the river [Waiau]. He said that he had never seen them, but an old woman in his *kaika* had seen them when a girl, and that their names were–as I made out from his pronunciation–'Howloko' and 'Monowai.' 'Howloko' has since been corrected to 'Hauroto.' And 'Manokiwai,' which you [Cowan] state is the name by which the lake is known to the Middle [South] Island Natives to-day, may probably be the name that Solomon gave me, although I was unable at the time to come nearer to it than the hybrid 'Monowai,' meaning 'one water.' That designation, as it happens, is not inapt, as the lake is mainly fed by one river." James Cowan, "Maori Place-Names: With Special Reference to the Great Lakes and Mountains of the South Island," *Transactions and Proceedings of the New Zealand Institute* 38 (1905): 113–20, esp. 118n.



1. Double-dotted line represents Te Ara Whānui, mythical pathway of the *wairua* of Māori dead. It ends at Terry-inga (see 8 below).
2. Large inlet Cho-ke-ang-a (Hokianga River); tree-like symbols probably represent large kauri trees that grew there.
3. Small square represents *pā* or *kāinga*, probably of *ariki* Toko-ha.
4. Small square on upper reaches of Hokianga River represents *pā* or *kāinga*, probably of *ariki* Thy-ta-r-ra.
5. Milligan suggests Tauroa Point.
6. Manoui-tavai (Manawatawhi), largest of the Three Kings Islands.
7. Milligan implies Cape Maria van Diemen and Cape Rēinga (which are close together); Salmond suggests Tauroa Point.
8. Terry-inga (Te Rēinga; Cape Rēinga; end of Te Ara Whānui); where traditional sacred tree grew on which the *wairua* descended to Rarohēnga.
9. Modey-Mootoo (Murimotu—a small island) where there was a fortified *kāinga* or *pā* shown as small square.
10. Milligan suggests small square is *kāinga* or *pā* of Ko-te-ko-ka (Te Kaka), *ariki* of Te Aupouri *iwi*.
11. Oruru River inlet, which flows into Doubtless Bay; may also represent river and bay combined.
12. Small square labeled Tookee (Tuki) could be Tuki's *pā* or *kāinga*.
13. Symbol may represent carved whare or *pā* or *kāinga* of Moodeewye (Muriwai), an *ariki*.
14. Elaborate symbol may represent carved whare or *pā* or *kāinga* of Tewy tewi (Te Wai te Wai), an *ariki*.
15. Whangaroa Harbor.
16. Milligan suggests both symbols may represent carved whare.
17. *Pā* or *kāinga*; may have been the place of Tu-ka-rowa (Tukarawa), an *ariki*.
18. Milligan suggests Mahinapua—but it is more likely Hororoa Point near Mahinapua.
19. Motu-aca-ete (Motuakaiti); no people were living on the island, although there is a symbol that may represent a former *pā*.
20. Motu-aca-nue (Motuakanui), now called Flat Island.
21. Motu-cowa (Motukawanui), one of the Cavalli Islands. The *ariki* was Tea-worock, who was related to Huru.
22. Panike (Panāki); Tea-worock's eldest son lived there.
23. *Pā* or *kāinga* of Woodoo (Huru). Salmond says Huru's abode was in a district in the south of the Bay of Islands, but Tuki has placed it some distance from the bay and in the opposite direction.
24. Probably *pā* or *kāinga*.
25. Bay of Islands (Tokerau). Symbol near the bay may represent *kāinga* or *pā* "governed by Pova-reck, Chief."
26. Oou-tore (Hauturu; modern Little Barrier Island); Milligan suggests Oturu, but that is currently a settlement south of Rangaunu Harbor.
27. Probably *pā* or *kāinga* of Toma-hownu, "chief of this district."
28. Milligan suggests East Cape.
29. Milligan suggests Cape Palliser.
30. Milligan suggests South Taranaki Bight.
31. Milligan suggests Cape Egmont.
32. "Lake where Stone for Hatchets are got"—probably Lake Wakatipu where there is *pounamu* of a whitish variety called *īnanga* (Tuki and Huru had heard of this rock, although they had no contact with the people of the South Island).
33. Three symbols situated at approximately Fiordland but appear more like lakes than fiords, as Milligan points out.
34. Two tree-like objects near "Poonammao" probably represent the two rivers where *pounamu* is found—the Taramakau and Arahura.
35. Tree-like object may represent Whanganui Inlet.
36. Symbol probably represents Marlborough Sounds, a complex series of waterways, bays, and peninsulas.

FIG. 14.7. FEATURES AND SYMBOLS ON TUKI'S MAP (FIG. 14.6). This map identifies many of the sites on Tuki's map. The information is derived from Robert Roy Douglas Milligan, *The Map Drawn by the Chief Tuki-Tahua in 1793,* ed. John Dunmore (Mangonui, 1964), and Anne Salmond, "Kidnapped: Tuki and Huri's Involuntary Visit to Norfolk Island in 1793," in *From Maps to Metaphors: The Pacific World of George Vancouver,* ed. Robin Fisher and Hugh Johnston (Vancouver: UBC Press, 1993), 191–226.

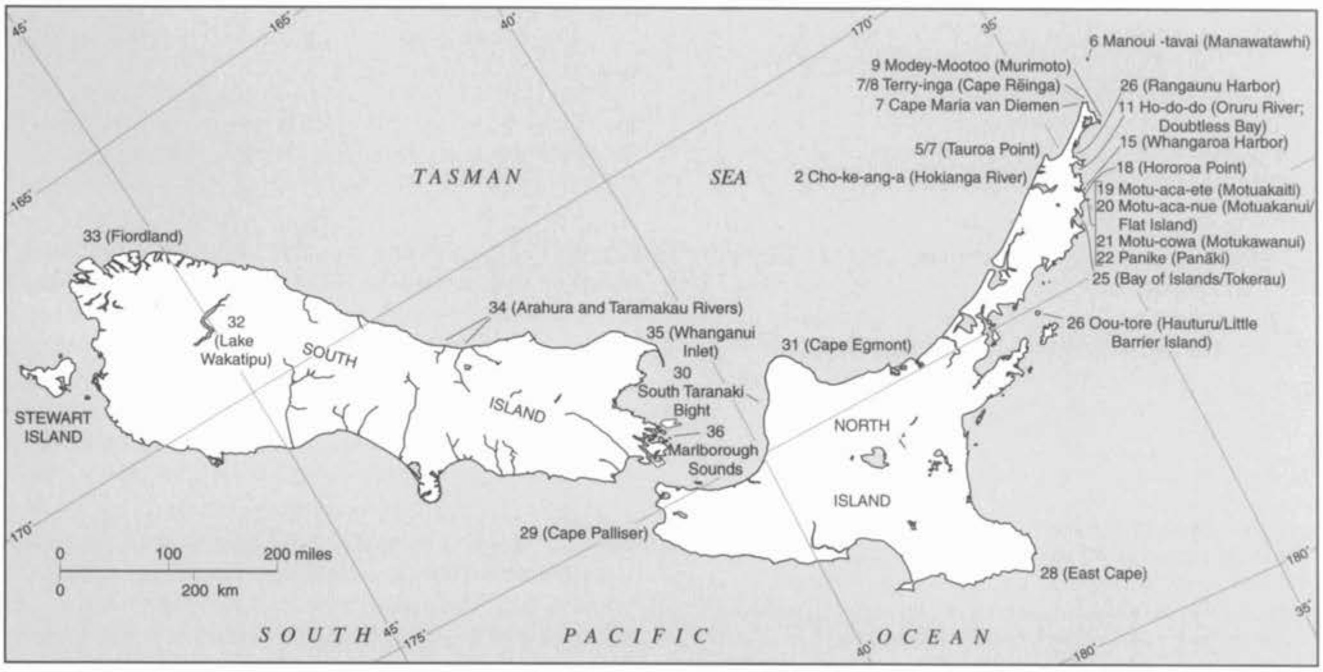


FIG. 14.8. MODERN MAP SHOWING LOCATIONS FROM TUKI'S MAP (FIG. 14.6). Northwest is at the top. Names not in parentheses appear on Tuki's map. The numbers refer to the features and symbols explained in figure 14.7, and as in figure 14.7, the information is based on Milligan and Salmond.

length of time between them, McKerrow's lack of fluency in the Māori language, or Soloman's memory loss. The two lakes are some distance from Riverton and are situated in the eastern part of Fiordland. Considerable archaeological evidence has been found in the fiords indicating that South Island Māori visited in family groups, and they probably explored areas inland from the fiords also, so it is not surprising that one of the women in Soloman's *kaika* (village; South Island version of *kāinga*) had seen the lake(s) when young.

Extant Māori Maps and Derivatives of Māori Maps

Several extant manuscript and printed maps were made by Māori or derived from Māori originals, and they are listed in appendix 14.1. The oldest, possibly the most studied, and the only example that covers all of both the North and South Islands is a map drawn by Tuki. Tuki and Huru, two young Māori men, were kidnapped in 1793 off the Cavalli Islands. They were taken via Port Jackson (Sydney) to Norfolk Island (an extremely isolated island north of New Zealand), arriving about 30 April 1793. At Norfolk Island they were supposed to teach convicts how to dress flax, but neither of them knew very much about it because in their communities women performed this task. The lieutenant governor of Norfolk Island, Philip Gidley King, was kindly disposed toward the two, who were miserable in captivity and feared for the safety of their families. They lodged at King's home, where he showed great interest in their language and culture.[63] At one point King's failure to comprehend caused Tuki to draw a map of New Zealand.

> When they began to understand each other, Too-gee [Tuki] was not only very inquisitive respecting England, etc. (the situation of which, as well as that of New Zealand, Norfolk Island, and Port Jackson, he well knew how to find by means of a coloured general chart);[64] but was also very communicative respecting his own country. Perceiving he was not thoroughly understood, he delineated a sketch of New Zealand with chalk on the floor of a room set apart for that purpose. From a comparison which Governor King made with Captain Cook's plan of those islands, a sufficient similitude to the form of the northern island was discoverable to render this attempt an object of curiosity; and Too-gee was persuaded to describe his delineation on paper. This being done with a pencil, corrections and additions were occasionally made by him, in the course of different conversations; and the names of districts and other remarks were written from his information during the six months he remained there.[65]

Since one can detect faint traces of pencil on the outline of New Zealand traced over with black ink, it is likely that the map illustrated here (fig. 14.6) is the one Tuki drew.[66] The title of the map describes Tuki as a priest: Tuki was the son of a *tohunga,* one meaning of which is priest.

Tuki's home area was the far north of the North Auckland Peninsula, and this occupies a disproportionally large part of his delineation of the North Island. Tuki had heard of the South Island only from others, and it was drawn very small; Stewart Island (Rakiura) is not shown.

Studies of Tuki's map have been made by Milligan and Salmond.[67] Salmond notes that among Māori maps Tuki's is "unique in that it includes social, mythical, and political information written at his dictation. In effect, Tuki's chart is a socio-political description of upper North Island, with some brief comments (and inaccurate coastlines) for southern New Zealand."[68] Tuki and Huru learned some English and King learned some Māori, so they were able to communicate in a limited way. However, their lack of fluency was bound to lead to mistakes, misunderstandings, and errors in spelling names, and the consequences have hindered a detailed and accurate interpretation of Tuki's map. Figure 14.7 is a synthesis of the essentials of Milligan's and Salmond's interpretations of Tuki's map.[69] Figure 14.8 shows the location of many of these places on a modern map.

Tuki's map contains references to the number of inhabitants in some of the *iwi.* In some cases it states the number of fighting men in a particular *iwi* and tells who

63. See Salmond, "Kidnapped" (note 9), which provides a detailed account of the entire episode. Tuki, son of a *tohunga,* was possibly Tuki te Terenui Whare Pirau, and Huru, a young *ariki,* was possibly Huru Kototi Toha Mahue (207 and 208).

64. This chart may have been Henry Roberts, *A General Chart Exhibiting the Discoveries Made by Captn. James Cook in This and His Two Preceding Voyages; with the Tracks of the Ships under His Command* (London, 1784), world map about 1:45,000,000 (Cartographic Collection, Alexander Turnbull Library); colored copies of the first edition are known. If Tuki had seen Roberts's chart he would have seen a reasonable outline of New Zealand.

65. Collins, *English Colony in New South Wales,* 1:431 (note 7). Collins was the judge advocate of New South Wales and probably based his account on conversations he had with King.

66. The map is on thick paper and is number 5 bound into a folder with four other items that relate to Norfolk Island. It was not possible to examine the map for watermarks.

67. Milligan, *Chief Tuki-Tahua* (note 8), and Salmond, "Kidnapped" (note 9). Milligan died before his study and interpretation could be completed, and his manuscript, edited for publication by Dunmore, is prolix, at times speculative, with at least one serious error and no final conclusion. Salmond's study was part of a wider survey of the events that led to the kidnapping of Tuki and Huru.

68. Salmond, "Kidnapped," 216.

69. Commenting on Milligan's study, Salmond notes that although he attempted to identify all the chiefs Tuki mentioned, a more detailed study of northern tribal histories would be necessary to evaluate his claims ("Kidnapped," 218). More intense study of the *iwi* histories might also reveal more positive information on the *pā* and *kāinga* locations, their names, and their boundaries in northern North Island.

FIG. 14.9. COPY BY HENRY STOKES TIFFEN OF A NATIVE SKETCH OF LAKES WAIRARAPA AND ONOKE, 1843. This map is found in Tiffen's field book; manuscript, pencil on paper, with northeast at the top.
Size of the original: 20 × 12 cm. Henry Stokes Tiffen, Field Book 28, Wainuiomata Level Books A, B, C, D, E, F, p. 3. Photograph courtesy of the Wellington Regional Office, Land Information New Zealand.

the *iwi* was friendly or unfriendly with. Also shown is the approximate position where Tuki and Huru were kidnapped and where they left the ship on their return on 13 November 1793. The double dotted line running across the North Island ends at Cape Rēinga and represents the path the *wairua* follow on their way to the Underworld.[70]

We have examples of four other maps of the North Island (and one related example of Chatham Island). All four depict only a small portion of the island–two focus on lakes, and two relate to the warfare between Te Kooti Arikirangi te Turuki and the New Zealand government along with other Māori *iwi* during the second half of the nineteenth century.

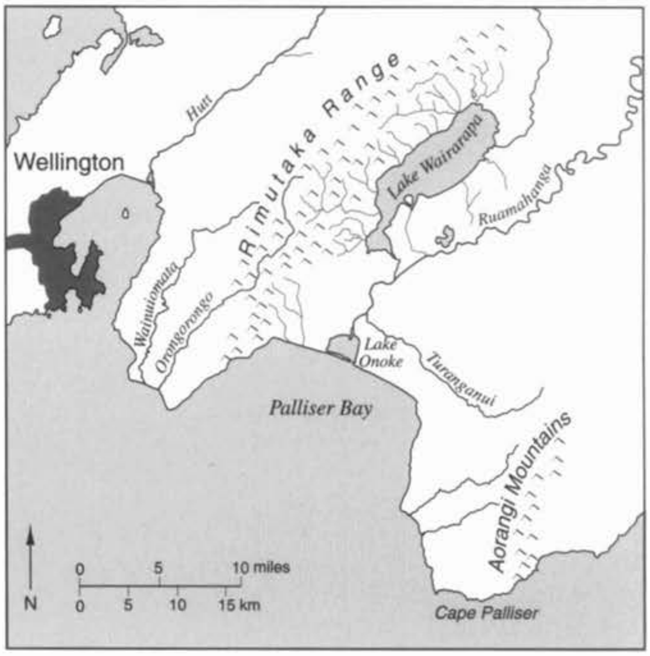


FIG. 14.10. REFERENCE MAP OF LAKE WAIRARAPA AND LAKE ONOKE AREA. Compare figure 14.9.

A map of Lakes Wairarapa and Onoke and the Ruamahanga River appears in the field book of Henry Stokes Tiffen, an assistant surveyor for the New Zealand Company who was engaged in surveying in the Lake Wairarapa area in November–December 1843.[71] An unknown Māori drew the map, and Tiffen made a copy of it (figs. 14.9 and 14.10). The map gives the distinct appearance of a human skull, but the double oval lines, eye socket, and teeth were added by some joker after the copy was made. Lake Wairarapa, with several streams feeding into it, is almost round but has an extension lower left; the Ruamahanga River is a wide channel flowing into the lake (it drains the eastern flanks of the Tararua Range and is fed by several rivers); a wide channel connects Lakes Wairarapa and Onoke; and the channel draining Lake Onoke into Palliser Bay is at the lower right. The present site of this latter channel is to the west of where the chan-

70. See above, p. 497. There is an apparent copy of Tuki's map in the Public Record Office, London (MPG 298). The linework and written information are in black ink on thick paper. The information was written by a different person and is easier to read than the original. This copy has no title, and a careful comparison with the original reveals only two additions and one different name spelling. The additions are, first, at number 10 on fig. 14.7, "Te-ka-pa is now dead/now governed by Ko-to-ko-ko," and second, at number 25 on fig. 14.7 an additional circle symbol with a smaller one inside it. The spelling alteration is at number 27 on fig. 14.7 where "Tama-hownu" appears (rather than Toma-hownu).

71. Ian McGibbon, "Tiffen, Henry Stokes, 1816–1896," in *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 539–40.

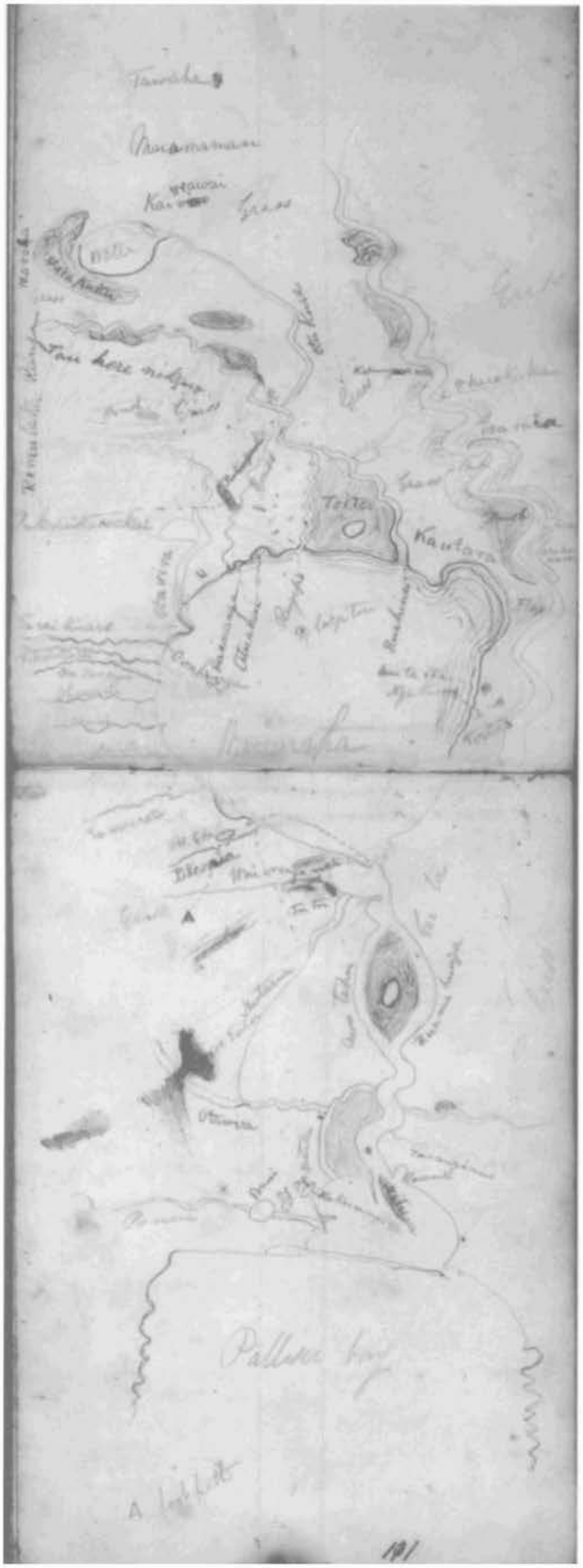


FIG. 14.11. SKETCH MAP OF RUAMAHANGA RIVER, LAKES WAIRARAPA AND ONOKE, AND ENVIRONS, 1843. This manuscript map, pencil on paper, was drawn by Tiffen covering the same geographic region and in the same field book as figure 14.9. North is at the top of the map.
Size of the original: 40 × 12 cm. Henry Stokes Tiffen, Field Book 28, Wainuiomata Level Books A, B, C, D, E, F, pp. 110–11. Photograph courtesy of the Wellington Regional Office, Land Information New Zealand.

nel is shown on figure 14.9–the 1855 earthquake may have caused its relocation. Water would have flowed very rapidly into the sea, and this drainage is represented by the short lines drawn at right angles to the channel. Both lakes were important sources of *tuna* (eels), waterfowl, and other food for the Māori of the Ngāti Kahungunu *iwi* who lived in the area.[72] Place-names and other topographic details were added by Tiffen.

On completing the survey Tiffen drew a map of the same region (fig. 14.11), which appears on pages 110–11 of his field book. It shows the lakes, river, considerable topographic detail, and place-names. It is interesting to compare the two maps–one drawn before the survey and titled "Native Sketch" and the other drawn by Tiffen after the survey. The maps were made within weeks of each other.

A third map in the same field book is titled "Native Sketch of Chathams" (fig. 14.12). It was made, as far as can be ascertained, during the period of the Lake Wairarapa survey and was drawn by a Māori who had probably lived on Chatham Island or spent considerable time on and around the island as a crew member of a whaling or trading vessel. The mapmaker had a detailed knowledge of the coast, the interior of the island, and its general shape (fig. 14.13). Richards, who has made an extensive study of the geography and history of the island, comments that "the map is surprisingly accurate for the north coast and decidedly truncated for the south coast."[73] The size of the field book (12 × 20 cm) influenced the shape of the map, which is "squashed" to fit the page. The information on the map was written by Tiffen.

Another portion of the North Island is shown on a map of Lake Rotokakahi drawn by an unknown Māori. Ferdinand von Hochstetter, engaged in an extensive geological survey of the area south of Auckland, visited the Rotorua area and Lake Rotokakahi (also called Green Lake) in May 1859.[74]

72. If the outlet of Lake Onoke to the sea could be kept closed for the greater part of the year, the catches of *tuna* would increase, and the lakes themselves would contain more water and cover a greater area. The lakes today are much smaller owing to the uplift resulting from the 1855 earthquake and reclamation of land from the lakes for farming.

73. Rhys Richards, personal communication, August 1993.

74. Charles Alexander Fleming, "Hochstetter, Christian Gottlieb Fer-

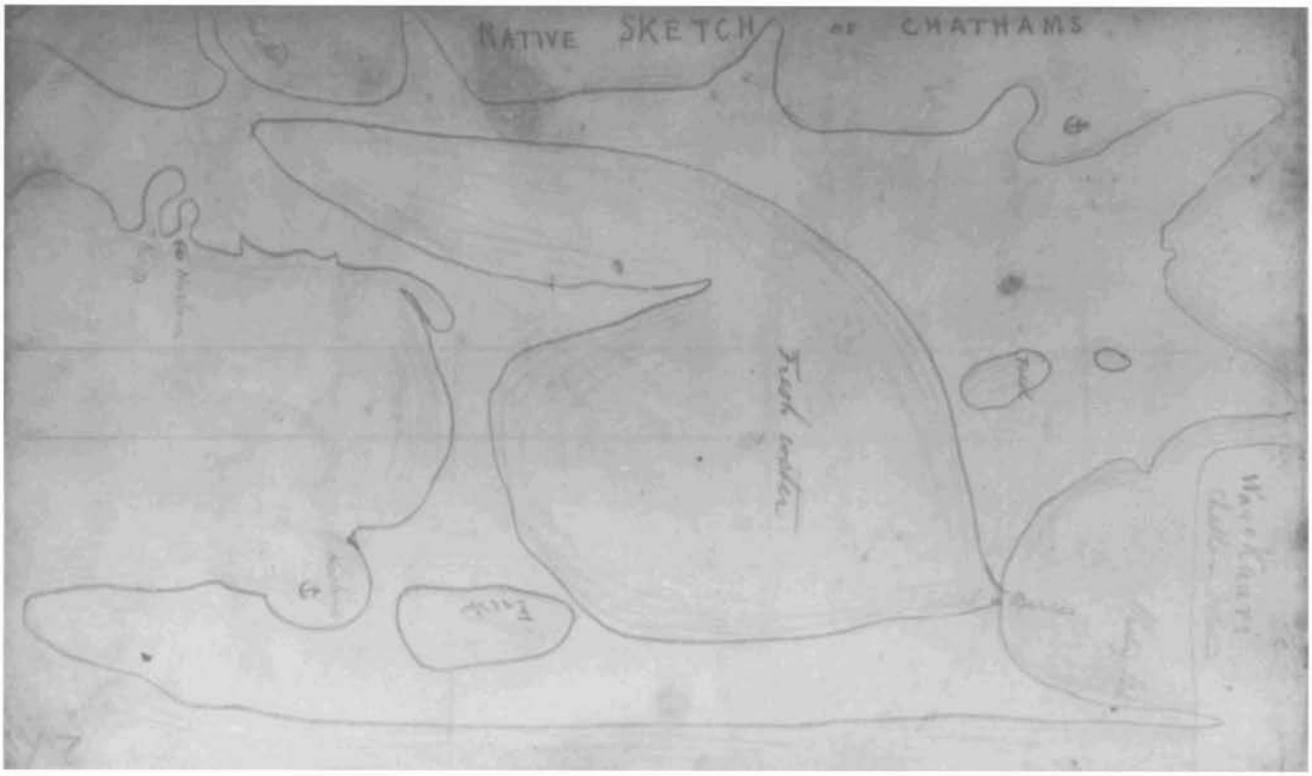


FIG. 14.12. "NATIVE SKETCH OF CHATHAMS," 1843. From Tiffen's field book; north is at the top. The large freshwater (brackish) lake is Te Whanga Lagoon, the two freshwater lakes to the right are Rangitai and Pateriki, and the lake to the lower left is Lake Huro. In the upper left "Seal Isd" refers to two reefs near Cape Pattisson. The anchor at the upper right is Kaingaroa Harbor. The word "Barred" at the lower right refers to the Hikurangi Channel, which is the outlet to the sea for the lagoon. The "Whaling Statn," also lower right, was at Owenga, and the "Harbour" and anchor lower left is at Waitangi Bay. The "Harbour" and anchor upper left is Port Hutt (Whangaroa Harbor), and "Barred" may refer to a reef near the entrance to Waipurua Bay or to reported reefs lying southwest of Point Somes.
Size of the original: 12 × 20 cm. Henry Stokes Tiffen, Field Book 28, Wainuiomata Level Books A, B, C, D, E, F, p. 21. Photograph courtesy of the Wellington Regional Office, Land Information New Zealand.

> From the natives, who received us with a most cordial welcome, I inquired the names of the most noteworthy points on the lake. Their zeal to serve me was so great, that, as a whole crowd were speaking at the same time, there was no possible chance to understand any thing at all, until one of them hit upon the excellent plan of tracing with his knife, after his own fashion, the outlines of the lake upon the sand, and thus to fix the various points of it. Although these outlines did hardly correspond with the real shape of the lake, such as it resulted from my own subsequent observations; yet the primitive sketch at the hands of a man, who had perhaps never in all his life seen a map,

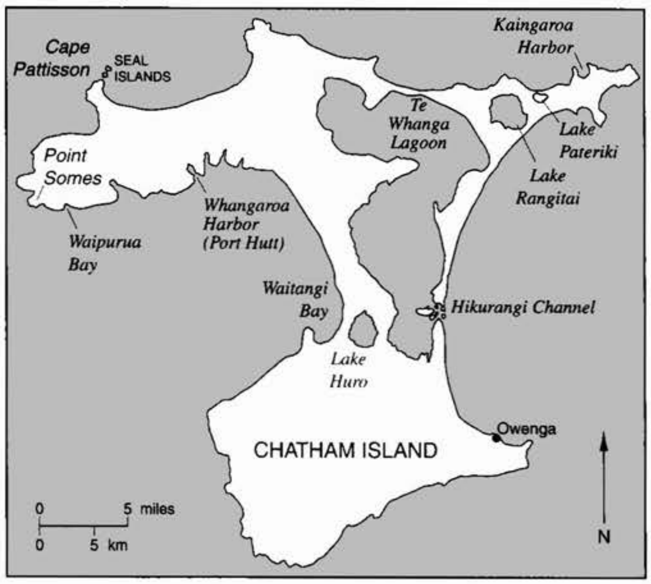


FIG. 14.13. REFERENCE MAP OF CHATHAM ISLAND. Compare figure 14.12.

dinand von, 1829–1884," in *The Dictionary of New Zealand Biography*, vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 199–200. Born in Württemberg, Germany, von Hochstetter studied theology and mineralogy, served in the Austrian geological survey, and was appointed geologist to the scientific expedition of an Austrian naval frigate circumnavigating the world when he arrived in Auckland in December 1858.

FIG. 14.14. MĀORI SKETCH OF LAKE ROTOKAKAHI, 1859. The map is oriented approximately to the northeast. Lake Rotokakahi is shown much wider and shorter than it is, and the two arms at the bottom are much narrower than the actual arms of the lake. The island shown, Motutawa, is considerably enlarged, but Punaruku Island, which should be in the left arm of the lake, is not shown.
Size of the original: 6 × 3 cm. From the English translation of Ferdinand von Hochstetter's 1863 work *New Zealand, Its Physical Geography, Geology and Natural History with Special Reference to the Results of Government Expeditions in the Provinces of Auckland and Nelson,* trans. Edward Sauter (Stuttgart: J. G. Cotta, 1867), 404. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington.

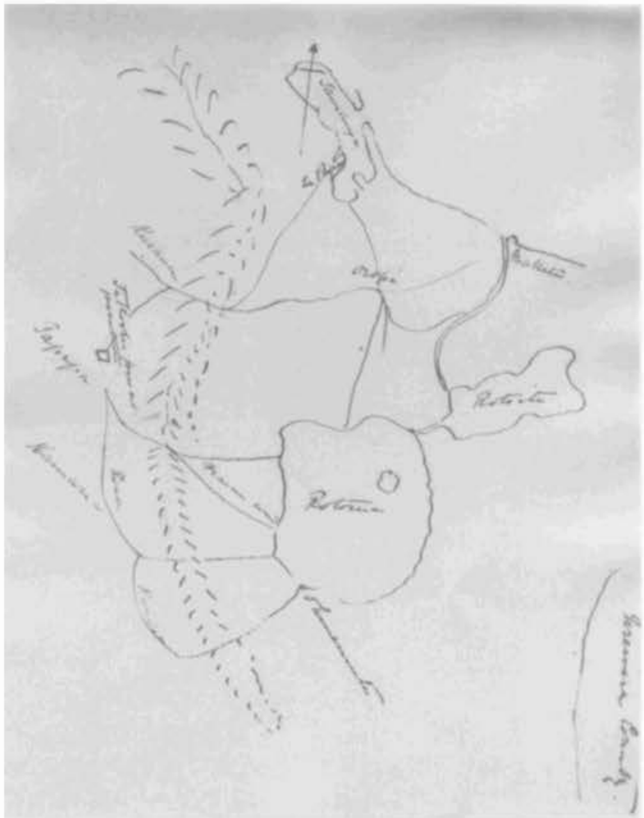


FIG. 14.15. MAP DRAWN BY UNKNOWN TE ARAWA MĀORI, 1870. The map is an attachment to a letter dated 25 January 1870, from Henry T. Clarke, Civil Commissioner, Tauranga, to Donald McLean, Native Minister. Manuscript, black ink on paper; the place-names are written by Clarke. North is at the top. The map shows the Bay of Plenty coastline, Tauranga Harbor and Maketu, Lakes Rotorua and Rotoiti, the Kaimai range, and Mamaku Plateau. The trails across the ranges are shown, as is Te Kooti's position on or about 25 January 1870.
Size of the original: ca. 23 × 19 cm. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington (MS papers 0032-0217, Donald McLean, private correspondence with H. T. Clarke [1], 1861–70).

> appeared to me noteworthy enough to copy and present it here.[75]

Von Hochstetter published a version of the map in 1863 (fig. 14.14).

The last two maps of portions of the North Island relate to Te Kooti Arikirangi te Turuki–Rongowhākata leader, military leader, prophet, and founder of the Ringatū Church. He was involved in guerrilla warfare with New Zealand government forces and Māori *iwi* from July 1868 to May 1872. The area of operations was roughly from Lake Taupo north to Tauranga and east to Tūranganui (Gisborne).[76] On 7–8 February 1870, Te Kooti and *taua* (hostile expedition, war party) passed from the western Bay of Plenty via Rotorua to the Urewera country around Lake Waikaremoana. They were pursued by government forces and Te Arawa Māori, but they escaped. Figure 14.15, drawn by an unknown Te Arawa

75. Ferdinand von Hochstetter, *Neu-Seeland* (Stuttgart: Cotta, 1863), 265; English edition, *New Zealand, Its Physical Geography, Geology and Natural History with Special Reference to the Results of Government Expeditions in the Provinces of Auckland and Nelson,* trans. Edward Sauter (Stuttgart: J. G. Cotta, 1867), 404.

76. Judith Binney, "Te Kooti Arikirangi te Turuku, ?–1893," in *The People of Many Peaks: The Maori Biographies from "The Dictionary of New Zealand Biography, Volume 1, 1769–1869"* (Wellington: Bridget Williams Books, 1991), 194–201.

Māori, shows the possible trails that the *taua* could use on their way to the Urewera.[77]

In late July 1870, Te Kooti and *taua* made an unsuccessful attack against the Te Aitanga a Hauiti people at Uawa (Tolaga Bay). On 31 July 1870, during their retreat to the Urewera, the members of the *taua* were ambushed at their camp at Waihapu by government forces including Ngāti Porou, but they escaped to the Urewera. Figure 14.16, showing the area of the ambush, appeared in a report of Ruka te Aratapu, leader of a Ngāti Porou expedition searching for Te Kooti.[78]

The corpus of Māori maps for the South Island is more substantial. There are several maps of small portions of the island and one of the entire island, including Stewart Island. The latter was drawn by unknown Māori for Edmund Storr Halswell and was described in a letter of 11 November 1841 from Halswell to the secretary of the New Zealand Company in London. "I have, at this time, some natives from the South with me, who are at work upon a map of the entire Middle [South] and Southern [Stewart] Islands, giving a minute description of every bay and harbour round the entire coasts, with their native names, which generally convey a correct idea of the headlands, soil, &c."[79] The original or a copy of the map was sent to London on the *Balley,* which left Wellington on 28 November 1841.[80] Henry Samuel Chapman, editor of the *New Zealand Journal,* reports receipt of the map, which was presented to the New Zealand Company, but it cannot now be located.

Either the original or a copy of the map would have been retained in New Zealand–it was usual to make copies of maps sent to the New Zealand Company in London. In 1894 a lithograph of the map was published with the annual report of the Department of Lands and Survey (fig. 14.17).[81] It is thought that two almost identical manuscript copies were made about 1900–1910 by draftsmen of the Department of Lands and Survey from either the original manuscript map or a copy of it. One was presented to the Alexander Turnbull Library in 1931 (fig. 14.18). The other remained in private ownership, and its current whereabouts are unknown.

The map is essentially a mariners' chart recording mainly coastal information relevant for Māori seamen sailing in *waka* or whaling boats, with very little information inland. It shows two deeply indented harbors and a number of less indented ones.[82] The map has two references to visits by the *Endeavour,* recalling the long memory of an event that occurred seventy-one years earlier.[83] On Ruapuke Island is marked "'Bloody Jack's' Place." Bloody Jack was a nickname given by sealers to the paramount *ariki* of Ngai Tahu in southern South Island, Hone Tūhawaiki.

Hone Tūhawaiki is known to have drawn several maps of portions of the South Island and Stewart Island. He traveled extensively in the South Island and visited Port

FIG. 14.16. LOCATION OF TE KOOTI AND *TAUA* AMBUSH ON 31 JULY 1870. Map shows the area of the camp at Waihapu where the ambush by government forces, including Māori, took place (the orientation of the map is indeterminable). Also depicted are forest (*ngahere*), fern (*rauaruhe*), swamp (*repo*), and four *whare,* including the one Te Kooti had occupied. Waihapu is about thirty-two kilometers west of Uawa (Tolaga Bay). The map appears on page 2 of a four-page report of the action by Ruka te Aratapu dated 30 August 1870. Ruka te Aratapu was of Ngāti Porou *iwi,* and the report was written at Tūranganui (Gisborne).
Size of the original: ca. 6 × 13 cm. Photograph courtesy of the National Archives Head Office, Wellington (AD1, 1870/3334).

Jackson (Sydney) twice. He had frequent contact with European sealers, whalers, and traders and could speak English.[84] In these contexts he may have seen hydrographic charts or maps.

Tūhawaiki's maps were published by Edward Short-

77. Judith Binney, *Redemption Songs: A Life of Te Kooti Arikirangi te Turuki* (Auckland: Auckland University Press, 1995), 205–8.

78. Binney, *Redemption Songs,* 229–34.

79. Edmund Storr Halswell, "Report of E. Halswell, Esq., on the Numbers and Condition of the Native Population," *New Zealand Journal,* 14 May 1842, 111–13, quotation on 112, col. A.

80. A letter of 4 December 1841 to Henry Samuel Chapman, probably from Thomas Mitchell Partridge, stated: "I sent you by the *Balley* a chart of the Middle Island drawn by some natives of Otago; it is of course a caricature but in many points useful"; "Letter from a Merchant of Wellington," 4 December 1841, *New Zealand Journal* 62 (28 May 1842): 125, col. A. The departure of the *Balley* was noted on p. 131 of the same issue.

81. *Appendix to the Journals of the House of Representatives of New Zealand,* C.1, 1894, facing 98.

82. Brailsford believes that anchorages (harbors) on the map are drawn large or small according to their importance; see Brailsford, *Greenstone Trails,* 144, caption to fig. 96 (note 32).

83. The reference to the *Endeavour* at Dusky Bay (Sound) is correct, but the other reference to Ohakea (Paterson Inlet) in Stewart Island is not–none of Cook's vessels visited Stewart Island.

84. Atholl Anderson, "Tuhawaiki, Hone, ?–1844," in *The People of Many Peaks: The Maori Biographies from "The Dictionary of New Zealand Biography, Volume 1, 1769–1869"* (Wellington: Bridget Williams Books, 1991), 334–37.

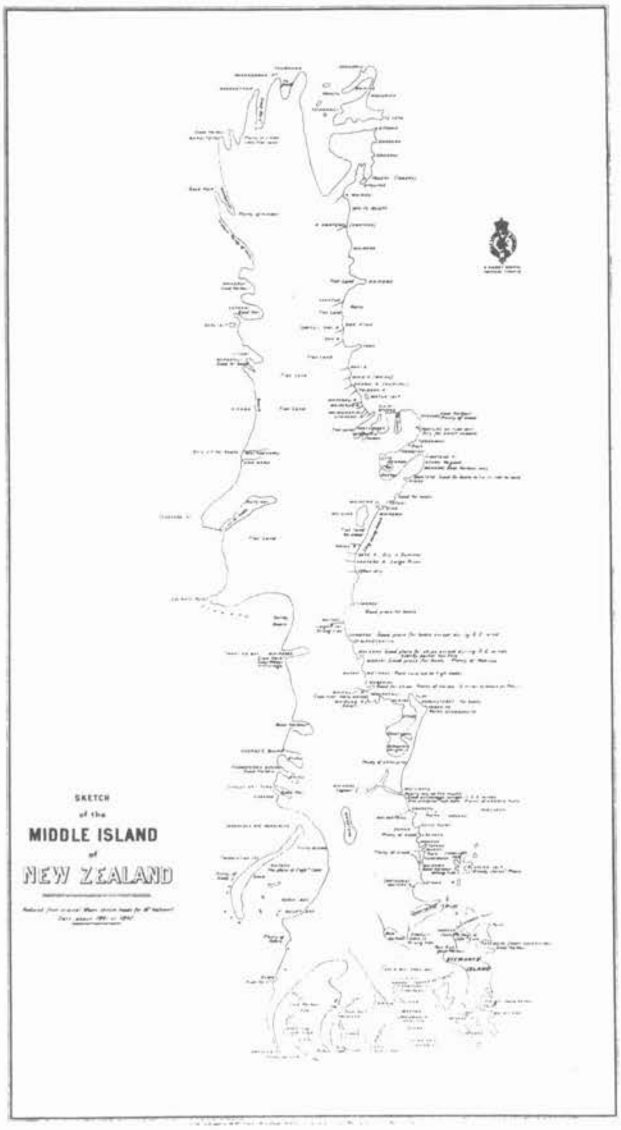


FIG. 14.17. 1894 LITHOGRAPH OF A SKETCH OF THE MIDDLE [SOUTH] ISLAND REDUCED FROM ORIGINAL MĀORI SKETCH MADE FOR EDMUND STORR HALSWELL, 1841 OR 1842. This version was published in the Department of Lands and Survey annual report; north is at the top. Included in the coastal information are harbors, headlands, islands, reefs, rocks, beaches, good sheltered anchorages marked with an anchor, tides, rivers if navigable, places where there are Europeans and Māori, shipwrecks, anchorage of James Cook's vessel, and places where seals can be found. Inland information is limited to four lakes, places where the land is flat, and places where there is a good supply of timber. The four lakes are named Wairewa (Forsyth), Waihore (Ellesmere), Waihore Lagoon (Waihola), and Wakatepa (Wakatipu), at the head of which there is a source of *pounamu* of the *īnanga* variety. The three lakes near the east coast were a good source of *tuna* and waterfowl.
Size of the original: 32 × 18 cm. From *Appendix to the Journals of the House of Representatives of New Zealand,* C.1, 1894, facing 98. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington.

land in 1851 (figs. 14.19–14.23). Shortland, appointed private secretary to Lieutenant Governor William Hobson in June 1841, became interested in Māori culture and land issues, which involved considerable travel in the South Island.[85] On 8 August 1843 he and Colonel Edward Lee Godfrey, a land commissioner, left Wellington to investigate European land claims in the South Island. Shortland was to act as interpreter and collect information relevant to native land tenure. It was in this context that he met Hone Tūhawaiki, who drew maps for Godfrey at Otakou (on Otago Peninsula).[86] Shortland notes that Godfrey "was much struck with the straightforward and willing evidence given by this chief in all the cases examined [at Otakou], and with the skill displayed by him in illustrating his descriptions of boundaries by tracing with a pencil the line of coast, and the positions of islands, rivers, &c."[87] He commented, however, on the relative inaccuracy of distances: "As I found afterwards by visiting some of the places described. . . . although fifteen or twenty miles distant from each other, in his chart they would not appear to be more than one mile apart."[88]

Hone Tūhawaiki's originals, copies made by Shortland, and the manuscript for Shortland's book have not been located.[89] The maps as published were obviously enhanced. For example, hachuring was used for mountains. The exact relationship of the maps published in Shortland's 1851 work to the maps drawn at Otakou is not known.

On 4 January 1844 Shortland set out for Banks Peninsula, having completed his tasks in the southern part of the South Island, continuing his work on the route. Reaching the Waitaki River on 10 January, he spent six days there in the company of the Ngai Tahu *ariki* Te Huruhuru, obtaining valuable geographical information.[90] In the record of his journey, Shortland writes,

> Huruhuru's leisure in the evenings was employed in giving me information about the interior of this part of the island, with which he was well acquainted. He drew, with a pencil, the outline of four lakes, by his ac-

85. Atholl Anderson, "Shortland, Edward, 1812?–1893," in *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 394–97.

86. Although Shortland and Godfrey arrived in Otakou together, Godfrey left on 15 October, leaving Shortland to continue the task. Anderson implies that maps were drawn by Hone Tūhawaiki when Edward Shortland made a later visit in November 1843, and possibly on Ruapuke Island, which was the *ariki*'s base; see Anderson, "Shortland," 395, and idem, "Tuhawaiki," 334.

87. Shortland, *Southern Districts,* 81 (note 11).

88. Shortland, *Southern Districts,* 81–82.

89. Michael Bott, Keeper of Archives and Manuscripts, University of Reading Library, England, personal communication, 29 April 1993. Longman's archives are held by the university.

90. Anderson, "Shortland," 395 (note 85).

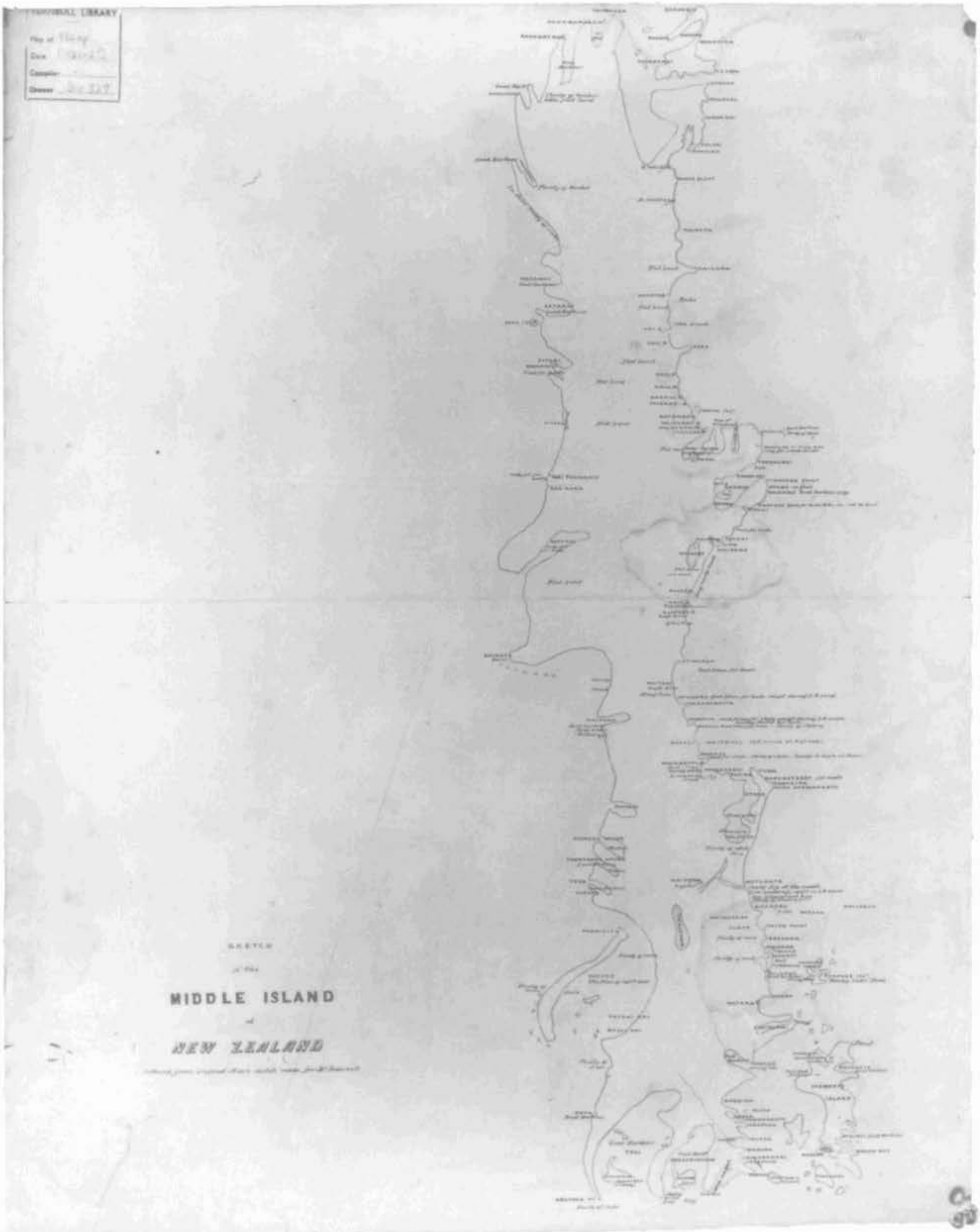


FIG. 14.18. SKETCH OF THE MIDDLE [SOUTH] ISLAND, CA. 1900–1910, REDUCED FROM ORIGINAL MĀORI SKETCH MADE FOR EDMUND STORR HALSWELL, NOVEMBER 1841. Manuscript, black ink on paper with blue watercolor around coastline, linen backed; north is at the top. This is essentially the same map as figure 14.17. Size of the original: 56 × 44 cm. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington (834ap/1841-2/acc. no. 527).

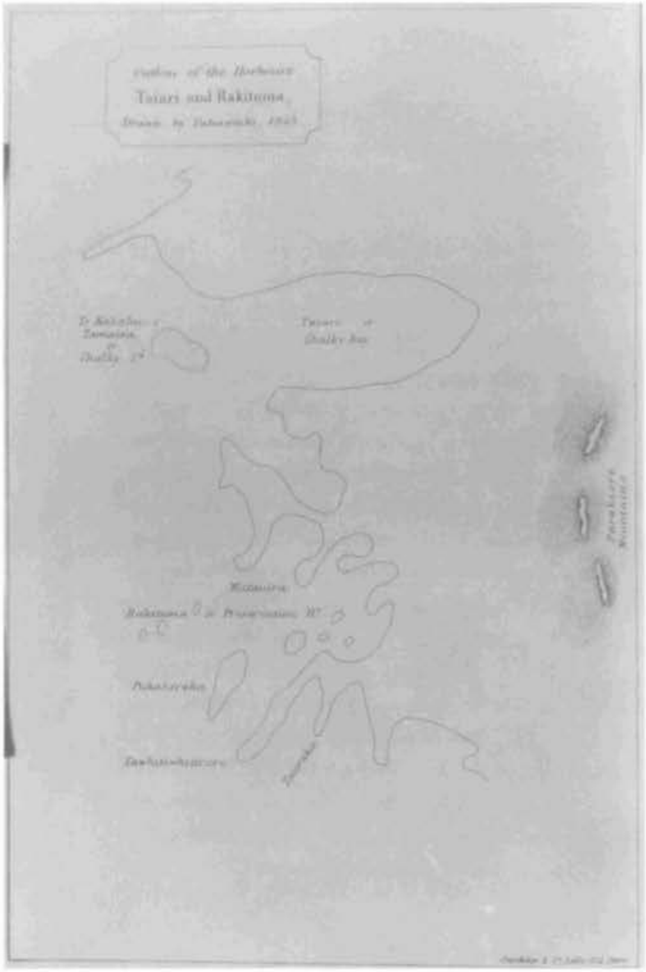


FIG. 14.19. "OUTLINE OF THE HARBOURS TAIARI AND RAKITUMA, DRAWN BY TŪHAWAIKI, 1843." North is at the top of the map. Compared with a modern map, it is clear that Chalky Inlet (Taiari) and Preservation Inlet (Rakituma) are generalized and far less indented on Tūhawaiki's map, with the peninsula separating the two inlets much narrower than it really is. Puysegur (Tawhitiwhitiroro) Point is shown much longer than in reality. Pukahereka is Coal Island (compare fig. 14.4 inset).
Size of the original: 17 × 11 cm. From Edward Shortland, *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines* (London: Longman, Brown, Green, and Longmans, 1851), facing 81. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington.

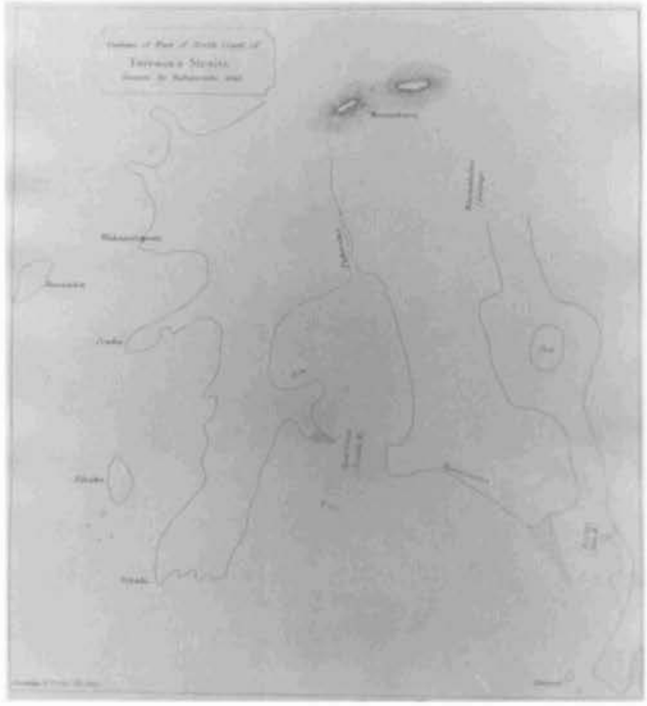


FIG. 14.20. "OUTLINE OF PART OF NORTH COAST OF FOVEAUX'S STRAITS, DRAWN BY TŪHAWAIKI, 1843." North is at the top. On this map, Aparima/Jacob's River Inlet estuary is greatly enlarged, with the Oreti (Koreti)/New River estuary not so distorted. The headland named Titahi is a very exaggerated present-day Howells Point. (Compare fig. 14.4 inset.)
Size of the original: 17 × 16 cm. From Edward Shortland, *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines* (London: Longman, Brown, Green, and Longmans, 1851), facing 81. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington.

> count, situated nine days' journey inland of us, and only two from the west coast, in a direction nearly due west of our position.
>
> One of these, named Wakatipua [Wakatipu], is celebrated for the "pounamu," found on its shores. . . . The three other lakes, Hawea, Waiariki, and Oanaka [Wanaka], had formerly inhabitants on their shores, who frequently went to and from Waitaki to visit their relatives.[91]

Figure 14.24 was copied from the map drawn by Te Huruhuru and published by Shortland. The four lakes he drew actually represent three–Waiariki is not a lake but an arm of Lake Wanaka (Wānaka; see fig. 14.25). Te Huruhuru would probably have shown mountains by some means on his map, and names have been given for some of the ranges, but the linework used to delineate the mountains in the published version is certainly by Shortland or the lithographers.

Several place-names appear, including one for the abode of Te Raki, the Ngai Tahu *ariki*; also, there are several notes such as the one relating to the source of *pounamu* at Wakatipu.[92] By Lake Hawea (Hāwea) we

91. Shortland, *Southern Districts*, 205 (note 11).

92. There is also a lengthy note where the Makarere (modern Makarora) River joins Lake Oanaka (Wanaka) that refers to Te Raki's son being taken prisoner with Wakarihariha and family. They were made slaves, and Wakarihariha's grandchild was killed. A *taua* (war

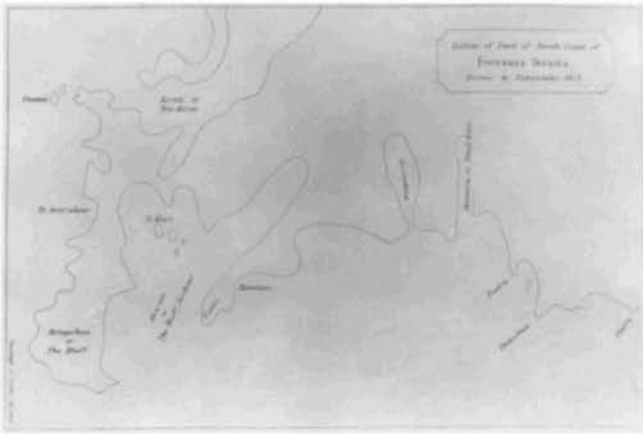


FIG. 14.21. SECOND "OUTLINE OF PART OF NORTH COAST OF FOVEAUX'S STRAITS, DRAWN BY TŪHAWAIKI, 1843." North is at the top. There is little similarity between the Oreti (Koreti)/New River estuary when compared with the same features on figure 14.20. Bluff Harbor (Awarua) is shown as having a wide entrance, which it does not have. The right arm of Bluff Harbor is oriented differently than on a modern map, as is the Waituna Lagoon (Waiparera inlet), and it is shown as open to the sea, but the lagoon now has no opening. The Mataura River is depicted as flowing straight into the sea, but it actually empties into a large lagoon or estuary now called Toetoes Harbor. (Compare fig. 14.4 inset.)
Size of the original: 11 × 17 cm. From Edward Shortland, *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines* (London: Longman, Brown, Green, and Longmans, 1851), facing 81. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington.

FIG. 14.22. "OUTLINE OF PART OF THE EAST COAST OF STEWART'S I^{d}., DRAWN BY TŪHAWAIKI, 1843." North is at the top. In comparing this map with a modern map, it seems likely that the name "Lord's Harbour" has been given to the wrong bay. Between Port Adventure and Lords Harbor there should be another large bay, which on modern maps is unnamed, but which has at its head a smaller bay named Tikotatahi Bay. It is odd that Hone Tūhawaiki should leave out this large bay–he knew the coast of Stewart Island well–and it seems more likely that Lords Harbor is misplaced.
Size of the original: 17 × 11 cm. From Edward Shortland, *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines* (London: Longman, Brown, Green, and Longmans, 1851), facing 81. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington.

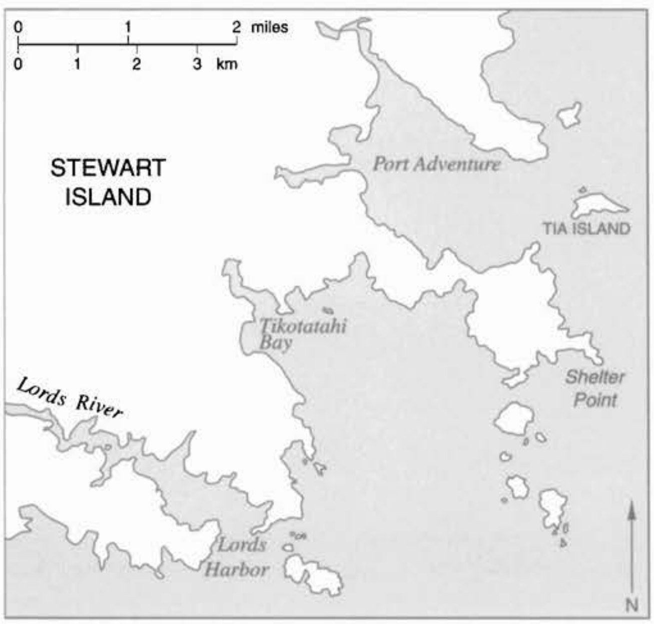


FIG. 14.23. REFERENCE MAP OF THE EAST COAST OF STEWART ISLAND. Compare figure 14.22.

FIG. 14.24. "MAP OF LAKES IN THE INTERIOR OF MIDDLE [SOUTH] ISLAND FROM A DRAWING BY HURUHURU." North is at the top. Lake Hawea is depicted as much smaller than Oanaka (Wanaka), but actually they are of similar size. The Clutha (Matau) and Kawarau Rivers, which have their sources in the three lakes, are shown, and rapids are depicted on the Matau, which is a very swift river. *Pākihi* (open grassland) exists in the form of tussock-covered land in the area between Wanaka, Hawea, and Wakatipu and is labeled on the map. *He noti,* between Lake Wakatipu and the river and also between Wanaka and Hawea, refers to the low saddles (although there is no low saddle between Wakatipu and the river). The map indicates distances in several places. The note "(2 days to Awarua on the West Coast)" in the upper left, however, is optimistic. Any Māori party that completed the journey in two days would have to be very fit, traveling with light loads and with no encumbrances such as children, and would need excellent weather. Perhaps Te Huruhuru's estimate of two days for the traverse to the west coast was based on hearsay rather than experience.
Size of the original: 17 × 12 cm. From Edward Shortland, *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines* (London: Longman, Brown, Green, and Longmans, 1851), facing 205. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington.

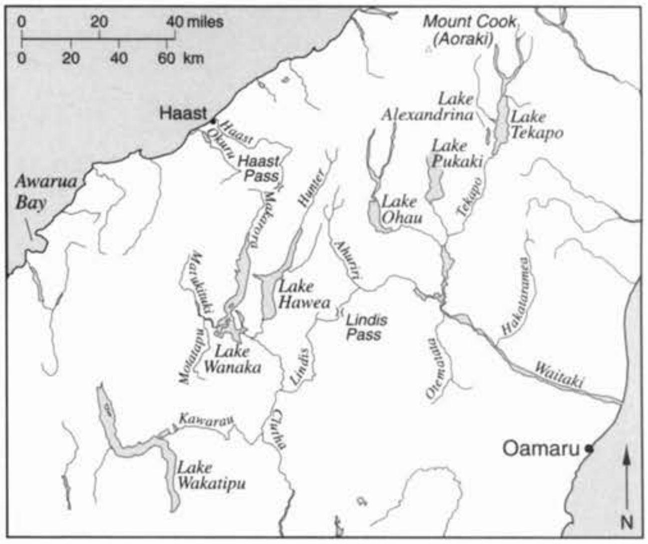


FIG. 14.25. REFERENCE MAP OF WAITAKI AND CLUTHA DRAINAGE.

find the label "Turahuka (abode of a Tipua)." A *tupua* or *tipua* is defined as a "goblin, demon, object of terror"; it is similar to a *taniwha,* a "fabulous monster supposed to reside in deep water."[93] Often the *tupua, tipua,* and *taniwha* were said to have taken the form of a large lizard. In Lake Hawea is an island labeled "Here is a floating Id. shifting its position with the Wind." Beattie links these last two notes on Te Huruhuru's map to a myth in which a *taniwha* created a floating island by setting adrift a point of land on which a Māori man was fishing.[94]

Shortland's account seems to indicate that Te Huruhuru's original chart showed much more of the South Is-

party) commanded by Te Puoho o te Rangi (Ngāti Tama *ariki*) was responsible. For a detailed account, see Atholl Anderson, *Te Puoho's Last Raid: The March from Golden Bay to Southland in 1836 and Defeat at Tuturau* (Dunedin: Otago Heritage Books, 1986), 23–28, 74–75. The exact route taken by Te Puoho is disputed, but Te Huruhuru told Shortland that Te Puoho took advantage of a mountain path to Wanaka from the mouth of the Awarua River (exact location unknown); see Irvine Roxburgh, *Jacksons Bay: A Centennial History* (Wellington: A. H. and A. W. Reed, 1976), esp. 9.

All the literal accounts of maps being drawn and all the extant maps described in this chapter were made by Māori males and recorded by European males. Anderson, however, does record an incident where Māori women acted as guides with obvious cartographic knowledge. Two young Ngai Tahu women, Ruta and Papako from Arahura, knew the trail from the west coast via Tioripātea (Haast Pass) to Otago. They acted as guides to Te Puoho and *taua* in 1836. Ruta and Papako must have acquired a mental map of the area, since they had probably traversed the trail before (Anderson, *Te Puhoho's Last Raid,* 15–16).

93. Williams, *Dictionary of the Maori Language,* 458 and 377, respectively (note 24).

94. H. Beattie, *Maori Lore of Lake, Alp and Fiord: Folk Lore, Fairy Tales, Traditions and Place-Names of the Scenic Wonderland of the South Island* (Dunedin, 1945; reprinted Christchurch: Cadsonbury, 1994), 39.

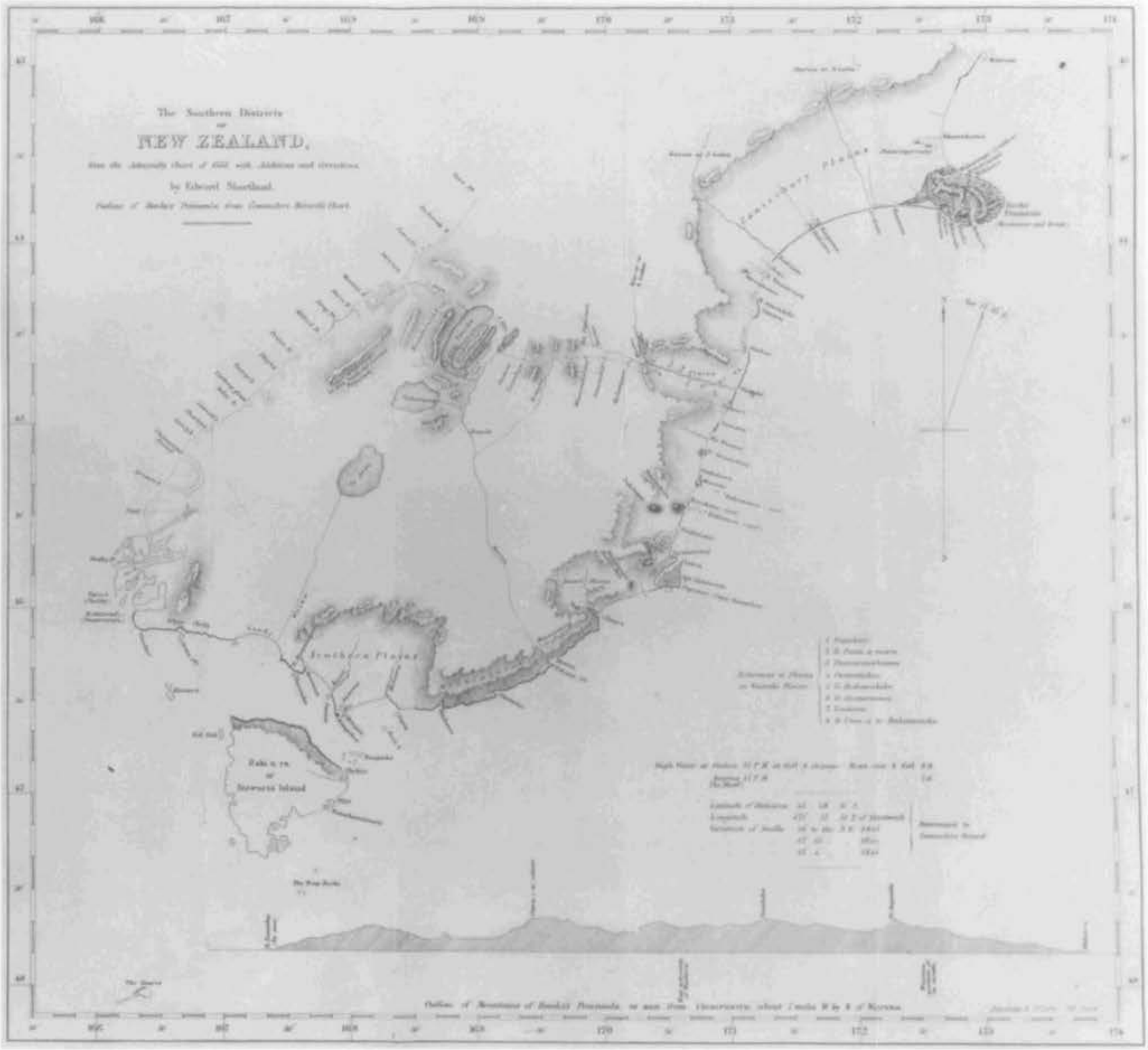


FIG. 14.26. "THE SOUTHERN DISTRICTS OF NEW ZEALAND, FROM THE ADMIRALTY CHART OF 1838, WITH ADDITIONS AND CORRECTIONS BY EDWARD SHORTLAND."
Size of the original: 25 × 27 cm. From Edward Shortland, *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines* (London: Longman, Brown, Green, and Longmans, 1851), frontispiece. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington.

land than just the three lakes and probably included the route across the island to the lakes from the east coast.

> Huruhuru pointed out on his chart the positions, and told me the names of several of their places of residence, and described the country through which the path across the island passed. He even told me the names of the principal streams and hills which it crossed, and of the places where parties travelling that way used to rest, at the end of each day. . . . It is probable that the resting places mentioned by him are at very unequal distances from each other, although I placed them in imaginary positions on the chart, from ten to fifteen miles apart.[95]

The chart referred to in the last sentence of the quotation is the frontispiece to Shortland's 1851 work (fig. 14.26), but unlike figure 14.24 it was not attributed to Te Huruhuru. It shows on the true right of the Waitaki River the points and names of the places at which traveling parties

95. Shortland, *Southern Districts*, 205–7 (note 11).

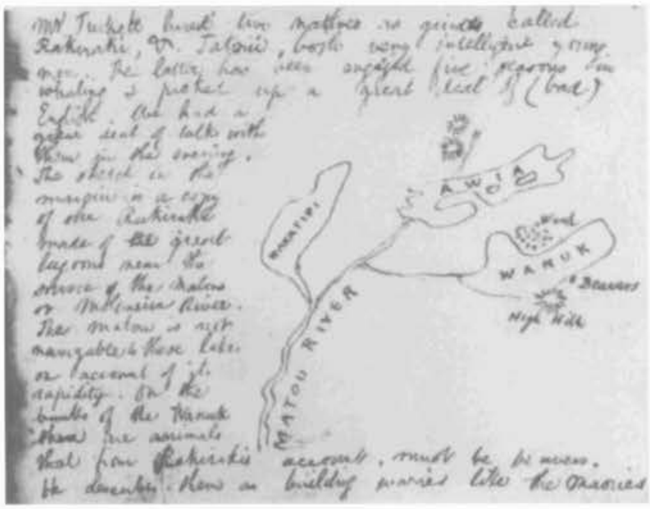


FIG. 14.27. MAP OF LAKES WAKATIPU, WANAKA, AND HAWEA, 1844. Manuscript, ink on paper. Northwest is at the top of the map. The names Awia (Hawea) and Wanuk (Wanaka) are transposed on the map. The lakes are easily recognizable by their appearance and orientation.
Size of the original: 6 × 7 cm. From John Wallis Barnicoat, Journal, 1841 to 1844, p. 41. Photograph courtesy of the Hocken Library, University of Otago, Dunedin.

FIG. 14.28. THREE MAP SEGMENTS OF THE WAITAKI RIVER AND LAKES AT ITS SOURCE, 1848, FROM PAGE 36 OF MANTELL'S SKETCHBOOK. The map sections (figs. 14.28–14.30) have various orientations in the manuscript and are pencil and ink on paper. The maps were drawn by Te Ware Korari and annotated by Mantell. The Waitaki River flows through an area of limestone rock and has numerous caves and rock-shelters. The page shown here depicts three segments of the river: the source and immediate true left bank; an enlargement of a portion of that segment; and a middle portion of the true right bank of the river. See also figures 14.31 and 14.32.
Size of the page: 14 × 24 cm. Walter Baldock Durrant Mantell, Sketch Book no. 2, p. 36. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington (E333).

of Māori would spend the night. The numbered points (1–8) on either side of the Waitaki River were where Shortland visited and spent nights during the six days he was with Te Huruhuru and his people (a key to the eight places is given at lower right).

A map of the same lakes is known to have been drawn about six months later by Rakiraki. He and Tatou were guides for John Wallis Barnicoat and Frederick Tuckett, surveyors for the New Zealand Company. Commencing in March 1844, Barnicoat and Tuckett explored the whole of the east coast of the South Island to Foveaux Strait to search for a suitable site for the future New Edinburgh (now Dunedin) settlement.[96] On 1 June 1844, at the mouth of the Matou (Matau; now Clutha) River, they hired the two Māori guides Rakiraki and Tatou (Tatou had been engaged in whaling for five seasons and spoke some English). Rakiraki drew a map of the three lakes in the interior of the South Island that were the source of the Clutha, and Barnicoat made a copy of the map in his journal. "The sketch in the margin is a copy of one Rakiraki made of the great lagoons near the source of the Matou or Molyneux River. The Matou is not navigable to these lakes on account of its rapidity. On the banks of Wanuk [Hawea] are animals that from Rakiraki's account must be beavers. He describes them as building waries [*whare*] like the Maories and as making a screaming noise. I also understood him to say that they build floating houses."[97] The map in Barnicoat's journal (fig. 14.27) shows all three lakes broadened and has two of the lake names transposed. In this generally mountainous region, the hachuring represents mountains to the west of Lake Wanaka and to the east of Lake Hawea. The hachuring would have been drawn by Barnicoat. The label "wood" represents the beech forest, which still exists in this generally treeless area.

The word "beavers" on the shore of Lake Hawea and the description in Barnicoat's journal refers to a large mythical carnivorous, amphibious lizard, the *kaurehe*.[98] It bears a clear resemblance to the *tipua,* whose abode by Lake Hawea was recorded on Te Huruhuru's map (fig. 14.24).

Six map segments showing the Waitaki River and its source lakes were drawn in pencil by Te Ware Korari in the sketchbook of Walter Baldock Durrant Mantell, who was appointed commissioner for extinguishing native

96. "Barnicoat, John Wallis (1814–1905)," in *A Dictionary of New Zealand Biography,* 2 vols., ed. Guy Hardy Scholefield (Wellington: Department of Internal Affairs, 1940), 1:41.

97. John Wallis Barnicoat, Journal, 1841 to 1844, 40–41, manuscript in the possession of the Hocken Library, University of Otago, Dunedin. There is also a typescript of the same title in the Manuscripts Section, Alexander Turnbull Library, Wellington (ATL qMS-0139), 178.

98. H. Beattie, *Traditional Lifeways of the Southern Maori,* ed. Atholl Anderson (Dunedin: University of Otago Press, 1994), 354; Williams, *Dictionary of the Maori Language,* 108 (note 24), defines this as a monster.

FIG. 14.29. TWO MAP SEGMENTS OF THE WAITAKI RIVER AND LAKES AT ITS SOURCE, 1848, FROM PAGE 37 OF MANTELL'S SKETCHBOOK. The top segment depicts the source lakes at a larger scale than on page 36 (fig. 14.28), and the true left and right banks of the river near the mouth. See also figures 14.31 and 14.32.
Size of the page: 14 × 24 cm. Walter Baldock Durrant Mantell, Sketch Book no. 2, p. 37. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington (E333).

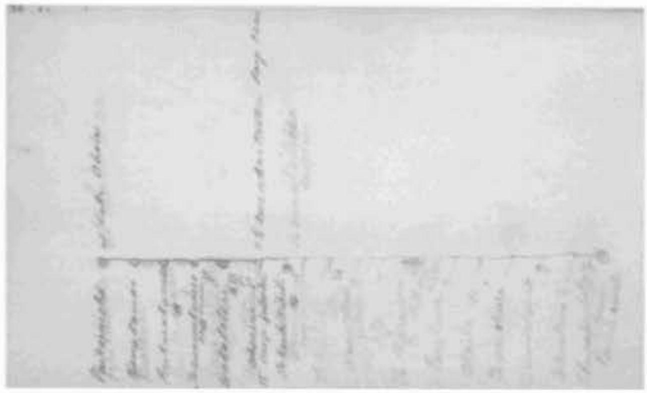


FIG. 14.30. ONE MAP SEGMENT OF THE WAITAKI RIVER, 1848, FROM PAGE 38 OF MANTELL'S SKETCHBOOK. This depicts the true right bank of the river just below the source lakes (see figs. 14.31 and 14.32). The Ahuriri and Otematakou (modern Otematata) Rivers are shown as being fordable, which was important to traveling Māori.
Size of the page: 14 × 24 cm. Walter Baldock Durrant Mantell, Sketch Book no. 2, p. 38. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington (E333).

titles, Middle Island (South Island). Mantell's initial responsibility was to set aside native reserves for the Ngai Tahu *iwi* within the Canterbury Block, which had recently been purchased from them.[99] He visited the mouth of the Waitaki River on 8 and 9 November 1848, where he met Te Ware Korari and obtained from him six sketch maps of segments of the Waitaki River and the lakes at its source. Roberts records that Te Ware Korari, probably a Ngai Tahu Māori, drew the maps and that the place-names were written along the sides of the maps by Mantell as told to him by the Māori.[100]

The six map segments (figs. 14.28–14.30) cover three pages in Mantell's sketchbook. All the place-names were originally written in pencil. Those that became indistinct were overwritten in black ink by Mantell, but since then some of the names and information left in pencil have become difficult to read. Figures 14.31 and 14.32 explain how the six segments are related to each other and make up a composite map of the Waitaki River, tributaries, lakes, place-names, and other features. Mantell later drew a colored map of the southern two-thirds of the South Island and included the same five lakes, the source of the Waitaki River, which were drawn for him in his sketchbook by Te Ware Korari (plate 24). The date of this map is about 1848–52. It is on a separate sheet, and its only relevance to the sketchbook is that it includes the same basic information about the lakes.[101]

Andersen, Roberts, and Beattie have made studies of the place-names in the Waitaki River area and refer to Te Ware Korari's map.[102] The meanings of many of the place-names cannot be determined with certainty, however. Te Ware Korari's map is a fascinating record of one

99. M. P. K. Sorrenson, "Mantell, Walter Baldock Durrant, 1820–1895," in *The Dictionary of New Zealand Biography*, vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 267–68.

100. W. H. Sherwood Roberts, *The Nomenclature of Otago and Other Interesting Information* (Oamaru: Printed at "Oamaru Mail" Office, 1907), 4.

101. Also shown on the map are Lakes Wakatipu Wai Maori (Wakatipu), Wanaka, and Kauea (Hawea). The information on the existence of these lakes most probably came from information given to Edward Shortland by Te Huruhuru and to John Wallis Barnicoat by Rakiraki. Lake Te Anau is shown and the Māori route to it. The first Pākehās to visit the lake were Charles James Nairn and W. H. Stephen in January 1852. A copy of Nairn's diary with an explanatory map was sent to Mantell. Mantell probably drew the major part of the map in 1848 and added details from Nairn's information in 1852 or later.

102. Andersen, *Jubilee History*, 39 (note 6), gives nineteen names for the true left of the river and eleven names for the true right; sixteen and ten of which, respectively, appear on Te Ware Korari's map (there are differences in the spelling, but I have endeavored to follow the exact spelling of the place-names as they appear on the map segments in the sketchbook). Roberts, *Nomenclature of Otago*, 4–7 (note 100), lists twenty-four names for the true left and twenty-one names for the true right, seventeen and fifteen of which appear on Te Ware Korari's map. H. Beattie, *Maori Place-Names of Canterbury* (Dunedin, 1945), 17–22, and idem, *Maori Place-Names of Otago*, 20–23 (note 28), list fifty-five names for the true left and twenty for the true right; fourteen and thirteen of which appear on Te Ware Korari's map. Many of Beattie's names were obtained from aged Māori folk, representing their collective memories of names that probably extend back centuries.

The maps and information given to Walter Baldock Durrant Mantell by Te Ware Korari, and those given to Edward Shortland by Te Huruhuru (above), appear on the *Map of the Colony of New Zealand from Official Documents by John Arrowsmith, 1850 and 1851*. Arrowsmith does not state the sources on his maps, but the only sources must have been those cited above.

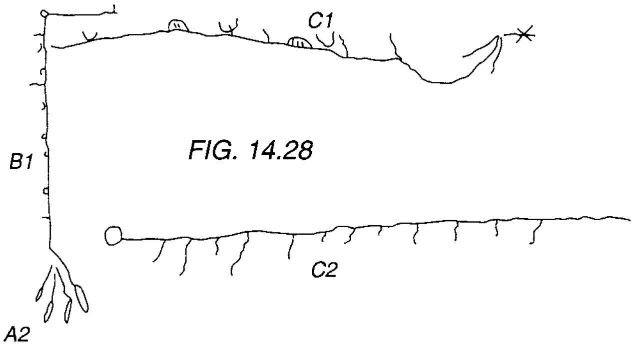


FIG. 14.28

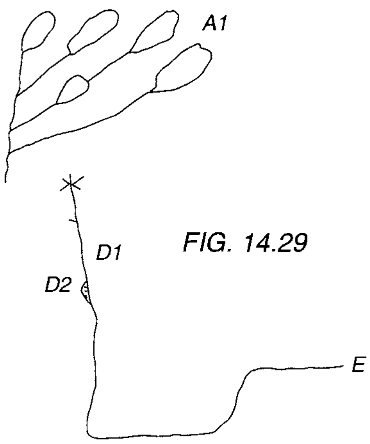


FIG. 14.29

FIG. 14.30

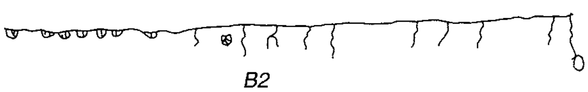


FIG. 14.31. EXPLANATION OF TE WARE KORARI'S SIX MAP SEGMENTS. This diagram shows how the segments relate to each other (A–E) from the source to the mouth of the Waitaki River. A1 is a detail of the source lakes; A2 is the source lakes at a smaller scale. B2, C2, and D2 join each other and detail the true right bank of the river. B1, C1, and D1 show the true left of the river; B1 and C1 overlap–C1 shows a section of B1 in greater detail. E is the mouth of the river. Compare figure 14.32.

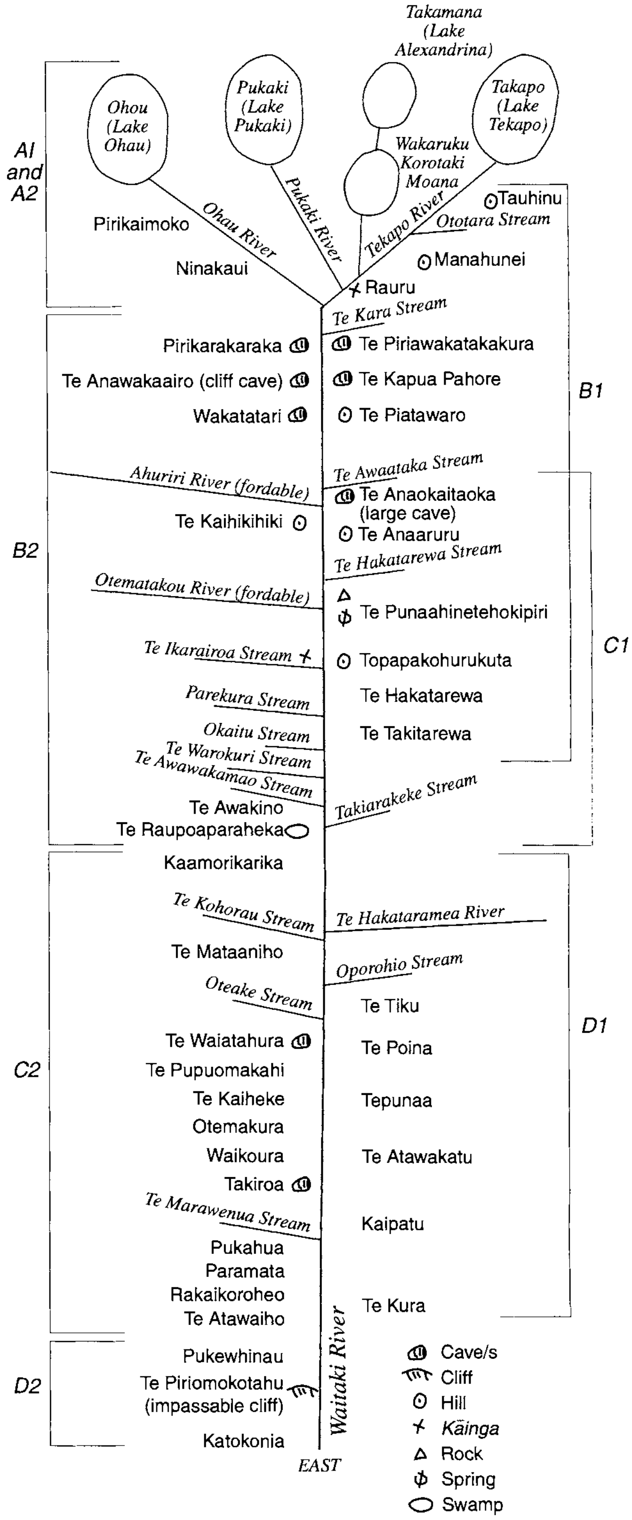


FIG. 14.32. DIAGRAM OF TE WARE KORARI'S SIX MAP SEGMENTS. Composite map of the Waitaki River compiled from the map segments. The number of place-names in such a harsh environment is striking, but unfortunately many of the meanings of these place-names are not certain. Both sides of the river gave Māori access to the interior of the island, but the true right had more caves, which were used for camps by parties of Māori traveling inland, and perhaps it was used more frequently.

Māori's knowledge of an important part of the interior of the South Island and provides much topographic information. If correct interpretations of more place-names could be obtained, the map could be regarded as an example of "singing the trail."

Another map of the interior of the South Island was obtained from an unknown Māori by Julius von Haast when, as the geologist for the Canterbury provincial government, he was exploring the major Canterbury River systems that drain the eastern flanks of the Southern Alps.[103] The Canterbury Māori supplied von Haast with information on the topography of the river systems, lakes, and passes leading to the west coast beyond[104] and drew him a map covering the headwaters of the Rakaia and Ashburton (Hakatere) Rivers (fig. 14.33; compare fig. 14.34). The main emphasis is on the upper Rakaia River and its tributaries, lakes, mountains, and pass to the west coast. The Ashburton River is included, but with little detail, and its labyrinthine drainage system is ignored. The specific Māori source and the exact date the map was drawn are not known, but the geologist began his exploration in 1862, so the map must have been drawn about that date. It is in black ink on paper with place-names probably written by a European, although the writing does not match von Haast's. The mountains in profile suggest European acculturation, but drawing them would require some sketching ability. It is also possible that rather than being the result of European influence, the profile view was used by the Māori to express their importance in Māori traditions and mythology.[105] The Arahura River and the route over Browning Pass (Nonoti Raureka; labeled "Pass" on the map) often appear in myths and traditions of the South Island because of their association with the much-valued *pounamu.*

Passes over the Southern Alps came to be of particular importance to Europeans when gold was discovered on the west coast of the South Island in the early 1860s. Land communications with the west coast were almost nonexistent, and the area could be reached only by sea. By 1865 a number of rich goldfields had been discovered, and John Hall, secretary of public works for the Canterbury provincial government, asked James West Stack to seek information from Māori on routes and mountain passes through the Southern Alps between Canterbury and the west coast.[106] Stack, born in New Zealand to missionary parents, became superintendent of the Christchurch Diocesan Māori Mission in 1860. He spoke fluent Māori and recorded and published much information on Māori culture and traditions, including a book on the South Island Māori.[107] He was thus the ideal person to obtain geographical information from the Māori. William Taylor reported that "on March 31st, 1865, the Rev. J. W. Stack replied:–'I am sorry to say the only Maori who has gone to the West Coast by the old route is now too infirm to leave his whare. There are no Maoris now living, except this old man, who know anything about the route beyond what they have heard in the past from others.' This old Maori furnished a sketch (reproduced) and gave detailed information."[108] In addition to a reproduction of a transcript of the map (fig. 14.35), a detailed description of the route, including topography and vegetation, followed in Taylor's text. However, none of the sources–the original map, Stack's copy, or the original translation from the Māori by Stack–has been located.[109]

The date when the map was drawn is uncertain, but it certainly existed by April 1865, when it was dispatched up the Waimakariri to an exploring party that included John Samuel Browning (after whom Browning Pass was named), Richard James Strachan Harman (after whom Harman Pass was named), and J. J. Johnstone.[110]

Harman reported that the Kaiapoi Māori's map and account for the trail over Browning Pass were received and states: "The account was however, in some respects very confused and perplexing, and we were obliged to form our own ideas as to the amount of positive information it contained. We came to the conclusion that the existence of a cave, a pass, and a large lake with a stream running out of it, were the only facts upon which we could depend, and we accordingly determined to make them our landmarks."[111] The survey party did not locate the cave, but it did cross the pass and saw the lake and stream.

The mountains are in profile as in figure 14.33. Stack

103. Von Haast, an explorer, geologist, writer, and museum founder, was born in Germany about 1822 and arrived in New Zealand in 1858, the day before von Hochstetter, another geologist, with whom he performed a geological survey of the area south of Auckland. See Peter Bromley Maling, "Haast, Johann Franz Julius von, 1822–1887," in *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 167–69.

104. See McClymont, *Exploration of New Zealand,* 83 (note 49), and Heinrich Ferdinand Von Haast, *The Life and Times of Sir Julius von Haast: Explorer, Geologist, Museum Builder* (Wellington, 1948), 275–76.

105. See, for example, Margaret Rose Orbell, *The Illustrated Encyclopedia of Māori Myth and Legend* (Christchurch: Canterbury University Press, 1995), 122–23.

106. William A. Taylor, *Lore and History of the South Island Maori* (Christchurch: Bascands, 1952), 188.

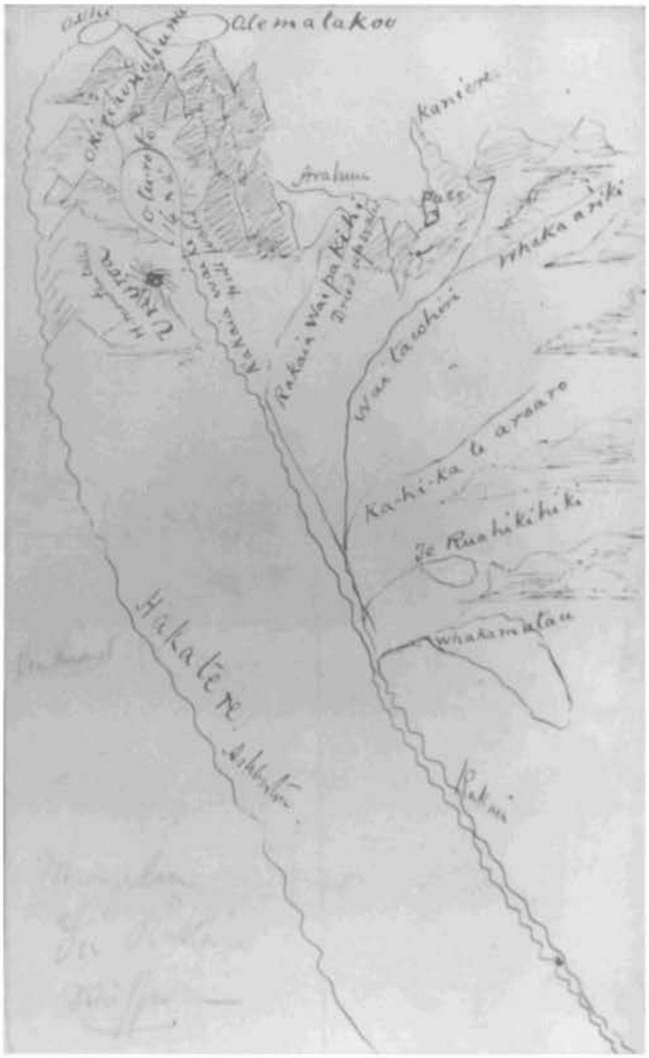
107. Stack, *South Island Maoris* (note 25).

108. Taylor, *Lore and History,* 188.

109. Taylor is notorious for not citing sources (Josie Laing, Librarian, Canterbury Museum, Christchurch, personal communication, 15 March 1994). It could be that Taylor rewrote or slightly altered the original description.

110. J. W. Hamilton, "The Best Route to the West Coast," letter, *Lyttelton Times,* 7 March 1865, 5, col. F, suggests the April–May 1863 date. See also the report in the *Lyttleton Times,* 8 April 1865, 4, col. D, and Philip Ross May, *The West Coast Gold Rushes,* 2d rev. ed. (Christchurch: Pegasus, 1967), 133–35.

111. *Press* (Christchurch), 6 May 1865, 2, col. E.



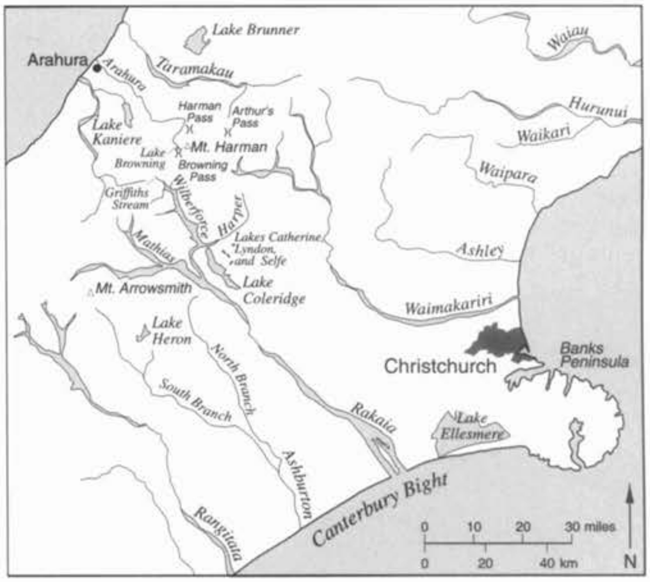


FIG. 14.34. REFERENCE MAP OF HEADWATERS OF WAIMAKARIRI, RAKAIA, AND ASHBURTON RIVERS.

may have added them to his copy, or, if drawn by Māori, they may be evidence of European acculturation. On the other hand, as in figure 14.33, they may have been drawn this way to show the mountains' importance in traditional lore and mythology. The informant had passed over Browning Pass many years before and therefore would have experienced the ritual necessary to undertake such a journey for *pounamu*. In 1865 the route over Browning Pass had not been used for a considerable time; Stack was told that a Māori party carrying *pounamu* was caught in a snowstorm on the pass or in the cave below

FIG. 14.33. MĀORI PLAN OF RAKAIA AND ASHBURTON RIVER HEADWATERS, CA. 1862. North is at the top; manuscript, black ink on paper. A number of place-names can be positively identified. Whakamātau is Lake Coleridge. Te Ruahikihiki has been suggested to be the name of a ridge of mountains (H. Beattie, *Maori Lore of Lake, Alp and Fiord: Folk Lore, Fairy Tales, Traditions and Place-Names of the Scenic Wonderland of the South Island* [Dunedin, 1945; reprinted Christchurch: Cadsonbury, 1994], 64), possibly the main peaks south of the Wilberforce (Waitāwhiri) River (Barry Brailsford, *Greenstone Trails: The Maori Search for Pounamu* [Wellington: A. H. and A. W. Reed, 1984], 131). Yet the name appears near a lake–lakes Catherine, Lyndon, and Selfe are all roughly in the area and near Lake Coleridge. Kāhika te Aroaro is approximately in the position occupied by the Harper River. Brailsford (p. 132) suggests that the Whakāriki is Gifford Stream. Figure 14.33 shows the Whakāriki as flowing into the Wilberforce (Waitāwhiri) from the true left. Figure 14.35 shows the Whakāriki as flowing into the Wilberforce from the true right. This is confusing. If figure 14.33 is correct, it suggests that the Whakāriki is Cronin Stream. If figure 14.35 is correct, the Whakāriki, which is shown as a substantial stream, is more likely to be Griffiths Stream than the Gifford. Kaniere, according to Waitaha traditional history, was the name of a mountain peak on the western side of the Southern Alps. The name is now that of a lake in the same area. Brailsford (pp. 128–29) identifies Mount Kaniere as lying to the northeast of Browning Pass. This mountain is clearly identified as Mount Harman; see Howard Keene, *Going for the Gold: The Search for Riches in the Wilberforce Valley* (Christchurch: Department of Conservation, 1995), map on 33 (although recently published, this book tells us very little about the Māori use of Browning Pass). Arahura is the present name of the west coast river from which *pounamu* is obtained. Nonoti Raureka is named after Raureka, a woman who according to traditional history was the first person to cross the pass and who was carrying *pounamu*. The Rakaia Waipākihi corresponds with the Mathias River; Rakaia Waiki is the western Rakaia River, which has Ō Tūroto (Lake Heron) at its head. The high mountain called Unuroa is possibly Mount Arrowsmith or, more probably, the Arrowsmith range of mountains.
Size of the original: 21 × 13 cm. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington (-834.44cdc/ ca. 1860/acc. no. 3739).

and all perished. The route was made *tapu* (under religious or superstitious restriction) in their memory and not used.[112]

Three maps made by Māori, two existing in the original, show boundary lines and are connected to land claim issues. The first, of the island of Motutapu in the Hauraki Gulf off Auckland, was entered as evidence in a court hearing in 1857, but it had been drawn in 1845, when the southern half of the island was sold by the Māori to two Europeans, James Williamson and Thomas Crummer.[113] Five years earlier, in 1840, Thomas Maxwell had agreed to purchase the entire island. He did not pay the full agreed price, however, and the Māori view was that he had purchased only the northern half. Maxwell later disappeared, and the 1857 court hearing related to the land claims of his five part-Māori sons. Robert Graham, who had purchased Williamson and Crummer's land, testified at the hearing and produced "a rough native sketch of the Island of Motu Tapu made by some of the Native Settlers shewing the boundaries assigned" (fig. 14.36).[114] He also testified that he and Maxwell's sons had checked the boundary and found it agreed with the map.

The map was drawn in pencil on paper by Ngātai, who had been acting in the interest of the young Maxwell children when the southern half of the island was sold. He wrote place-names and other information on the map, explaining in court that although his name was written on the northern part of Motutapu, he did not own it (see fig. 14.37). He did own land on Rangitoto, the triangular island shown on the map. A second boundary on this island marks the division between Ngātai's land and that of a Pākehā (European).

On 7 May 1861 James Mackay, acting land purchase commissioner for the New Zealand central government, who had been involved with extensive government land purchases and had a good grasp of Māori land matters, came across a group of Māori who had drawn a map in sand. The event took place on the beach by a Māori *pā* at the mouth of the Pariwhakaoho River, which empties into Golden Bay at the north end of the South Island. The Māori were of the Ngāti Awa *iwi* and included an important *ariki*, Ropoama te One. The map, drawn by Ropoama te One, showed land belonging to him and another *ariki*, Wiremu Kingi Rangitakei, in the North Island at Waitara. *Pā* were indicated on the map by small enclosures made of pieces of split flax stalks.[115]

Mackay felt that Ropoama te One's map was more reliable than one drawn at the behest of an officer of the Native Department, since the map was made for the Māori's own information and amusement, although Mackay did not know his intention in making it. The Ngāti Awa Māori were of the opinion that the map was accurate; Mackay got Ropoama te One to explain it to him and copied it in his notebook. He also recorded the names

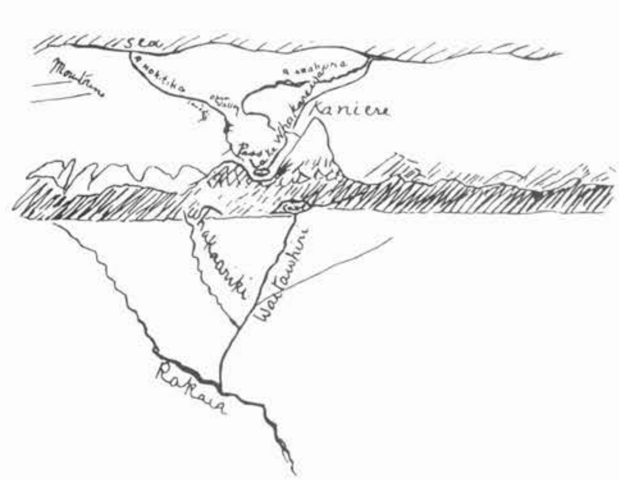


FIG. 14.35. PLAN OF ROUTE FROM CANTERBURY TO THE WEST COAST VIA BROWNING PASS, 1865. West is at the top. The sketch map contains much of the information contained in figure 14.33, the sketch of the Rakaia and Ashburton River headwaters. Whakarewa (now called Lake Browning) is the name of the lake on the northern side of Browning Pass, and the mountain called Kaniere appears to coincide with Mount Harman. The cave at the head of the Wilberforce (Waitāwhiri) River is where Māori are reported to have stored provisions. Taylor made this copy, which he published in 1952, and he added the place-names.
Size of the original: 8 × 10 cm. From Barry Brailsford, *Greenstone Trails: The Maori Search for Pounamu* (Wellington: A. H. and A. W. Reed, 1984), fig. 89 (p. 132). Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington. By permission of Stoneprint Press, Hamilton, New Zealand.

of the *pā* as they were told to him.[116] Figure 14.38 is a lithograph made from a copy of the map in Mackay's notebook.[117]

112. Report, *Lyttleton Times*, 8 April 1865, 4, col. D (note 110), and *Press* (Christchurch), 8 April 1865, 2, col. D.

113. The map and transcripts of the testimony at the hearing can be found in the National Archives of New Zealand, Wellington, Half Caste Claim of the Children of Thomas Maxwell, Old Land Claims (OLC) File 332. For information on Williamson, see Russell C. J. Stone, "Williamson, James, 1814–1888," in *The Dictionary of New Zealand Biography*, vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 598–99.

114. Half Caste Claim of the Children of Thomas Maxwell.

115. Memorandum, James Mackay to Donald McLean, Native Secretary, 20 June 1861, in *Appendix to the Journals of the House of Representatives of New Zealand*, E.23, 1863, 1. Following that memorandum was a letter from James Mackay to Henry Halcombe, curate of Golden Bay, who had been with him when the map was drawn, asking that he confirm the events, and Halcombe's subsequent confirmation. For more on Mackay, see Harry C. Evison, "Mackay, James, 1831–1912," in *The Dictionary of New Zealand Biography*, vol. 1, *1769–1869* (Wellington: Allen and Unwin, 1990), 252–53.

116. Memorandum, Mackay to McLean, 20 June 1861, 1.

117. James Mackay's notebook with the copy of the map he made has not been located. Neither have copies that were sent and forwarded to colonial officials (see Memorandum, Mackay to McLean, 20 June 1861;

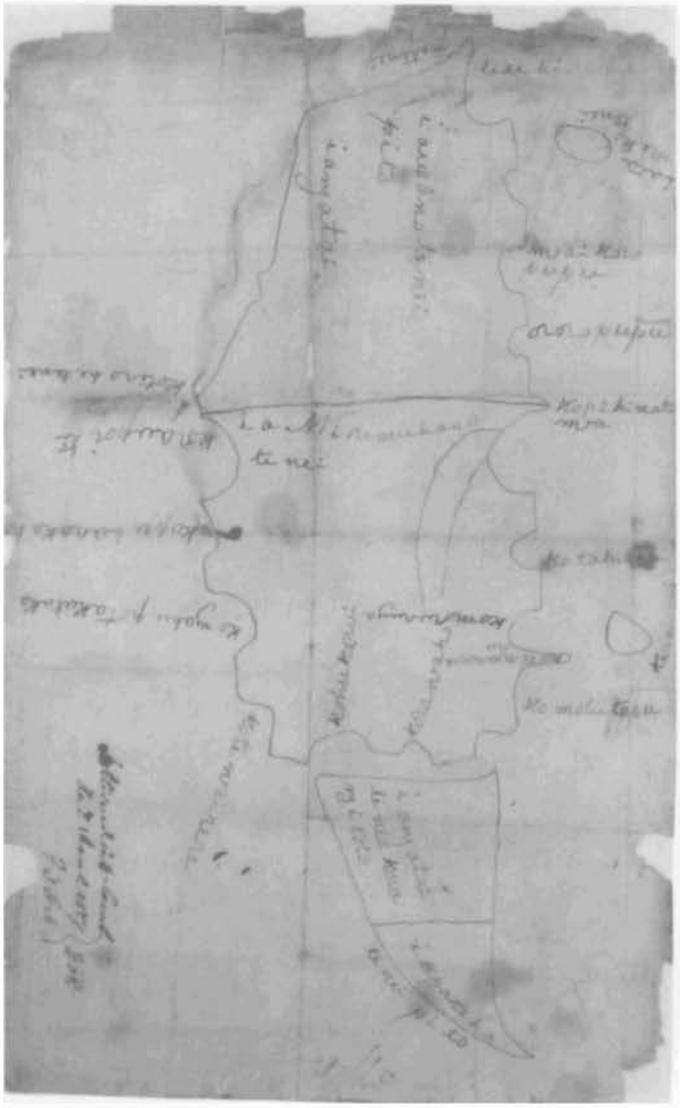


FIG. 14.36. MĀORI MAP OF MOTUTAPU AND RANGITOTO ISLANDS, 1845. North is at the top. Manuscript, pencil on paper. A number of coastal features on Motutapu Island have names, but regrettably only one, Tāhuhu, appears on current large-scale maps, as Otahuhu Point. This name was most useful in orienting Ngātai's map. The only way to identify other names on his map with coastal features on the island would be to traverse the entire coast on foot with a Māori linguist and local historian who knew the island's Māori history. Rangitoto Island has no place-names, perhaps because the island is of little value for growing crops. See also figure 14.37. Size of the original: 36 × 21 cm. Photograph courtesy of the National Archives Head Office, Wellington (Old Land Claims File [OLC] 1/332, Sep. 22).

FIG. 14.37. INTERPRETATION OF NGĀTAI'S MAP (FIG. 14.36). The translations in roman type are place-names.

(Facing page)
FIG. 14.38. "COPY OF SKETCH MADE BY ROPOAMA TE ONE," 1861. The map was made on the beach at Pariwhakaoho, Golden Bay, on 7 May 1861. This copy is oriented to the southeast. It is a monochrome lithograph, linen backed, and the legend implies that it was prepared from a manuscript copy that was in color. A copy of Ropoama te One's map and a copy of the map prepared from the official survey of the land at Waitara were sent to the colonial secretary–any copy of either map made and kept in New Zealand would have been in color. Six *pā* sites are shown on the map, five in the area of land under dispute. Only two *pā* sites can be located on modern maps: one is probably Pukekohe *pā*, and the other is definitely Puketakauere. The area had a large Māori population, and the land near the river was fertile for crops. The *pā* were there to protect the asset.
Size of the original: 29 × 24 cm. From *Appendix to the Journals of the House of Representatives of New Zealand*, E.23, 1863, tipped in between title page and p. 1. Photograph courtesy of the Alexander Turnbull Library, National Library of New Zealand, Te Puna Mātauranga o Aotearoa, Wellington (832.2gbbd/1861/acc. no. 6677).

COPY OF SKETCH MADE BY ROPOAMA TE ONE, ON THE BEACH, AT PARIWHAKAOHO, MASSACRE BAY, ON THE 7TH. MAY, 1861, SHEWING THE PORTIONS OF THE DISPUTED LAND AT WAITARA, WHICH BELONGED TO HIMSELF, TE TEIRA, AND WIREMU KINGI RANGITAKEI, RESPECTIVELY.

COLLINGWOOD, 20TH. JUNE, 1861.

SD. JAMES MACKAY JUNR., ASST. NATIVE SECY.

PINK—SHEWS THE LANDS BELONGING TO WIREMU KINGI RANGITAKEI.

GREEN—SHEWS THE LANDS BELONGING TO ROPOAMA TE ONE.

YELLOW—SHEWS THE LANDS BELONGING TO TEIRA.

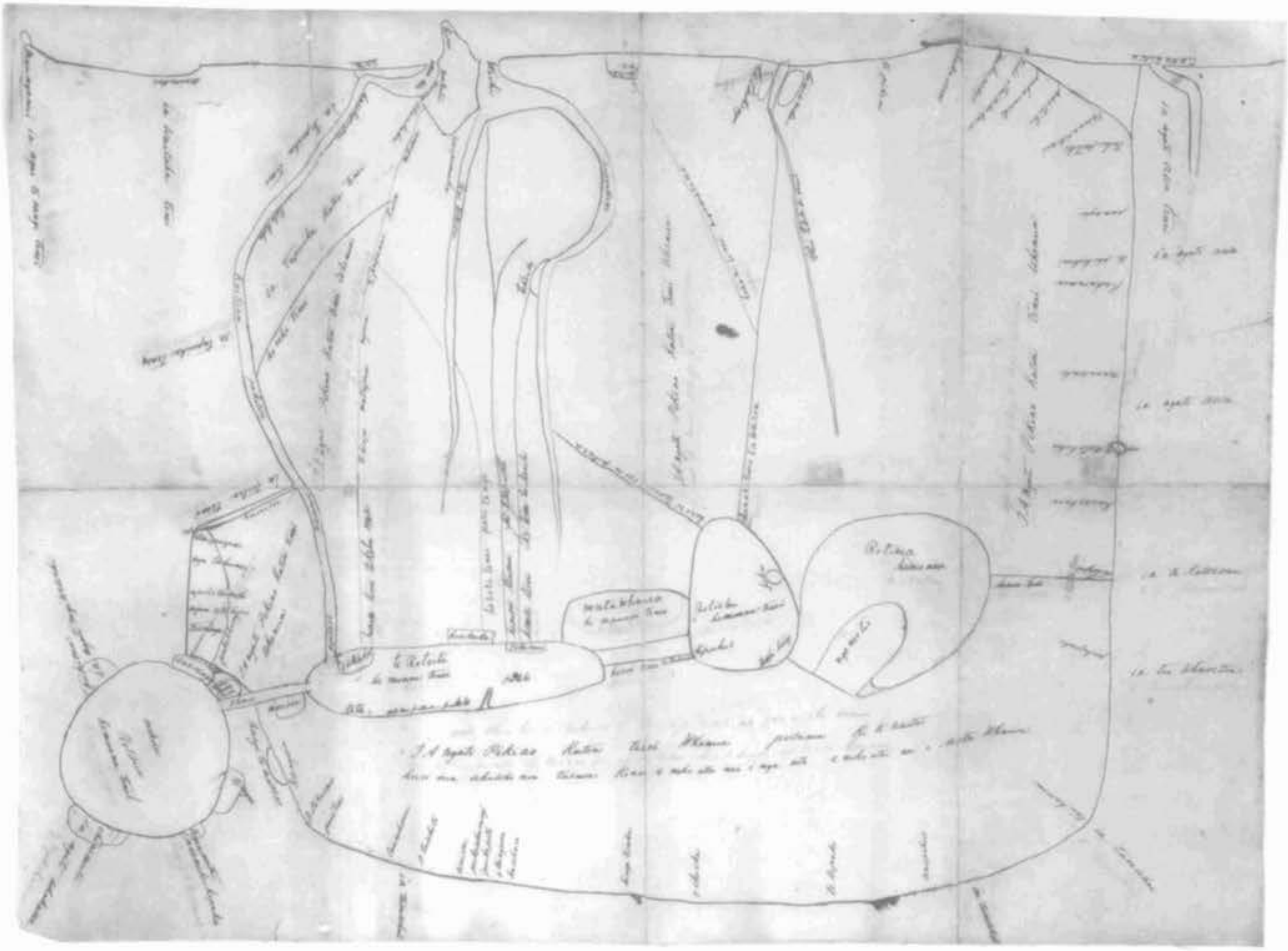


FIG. 14.39. MĀORI MAP OF ROTORUA LAKES AND NGĀTI PIKIAO LANDS, CA. 1877–95. The map is oriented approximately to the northeast; manuscript, black ink on paper, linen backed. Lake Rotorua is the most accurate of the four lakes on the map but lacks Mokoia Island. The coastlines of Lakes Rotoiti, Rotoehu, and Rotoma are very generalized. See also figures 14.40 and 14.41.
Size of the original: 60 × 85 cm. Photograph courtesy of the National Archives Head Office, Wellington (LS Misc. 2071).

Although Mackay did not ascertain why the map was made, the area covered was in dispute among Māori and between Māori and the Europeans, and the land had been offered for sale to the government in 1859 by a Māori called Te Teira, whose name appears on the map. Te Teira was paid an installment for the land, but he had no title to it. His right to sell was disputed by his *ariki*, Wiremu Kingi Rangitakei, who was opposed to selling land to Europeans. Wiremu Kingi Rangitakei not only had the right to forbid the sale of communal land, but he also had hereditary and personal claims to parts of the land in question. Government officials, however, believed he had no right to the land and regarded him as challenging the sovereignty of Queen Victoria. In February 1860, when an official survey of the land began, the surveyors were resisted, leading to the beginning of one of the land wars in the North Island.[118]

The provenance of figure 14.39, which shows the land of the Ngāti Pikiao *hapū* of the Te Arawa *iwi* and the Rotorua lakes, is uncertain, but it is thought it may have originated in the late nineteenth century under the auspices of the Great Committee of Rotorua. That committee, which represented several *hapū* of the Te Arawa *iwi*, was formed to investigate Māori land titles and settle claims without recourse to the native land court. Such investigation would avoid the costs of overlapping surveys, prevent litigant claimants from having owners pay for

Memorandum from Thomas H. Smith, Acting Native Secretary, to James Mackay, dated 31 August 1861; and Memorandum from Thomas Gore Browne, Governor-General to the Duke of Newcastle, Colonial Secretary, London, dated 31 July 1861; the last two are in the *Appendix to the Journals of the House of Representatives of New Zealand*, E.23, 1863, 2 and 3 respectively).

118. Keith Sinclair, "Browne, Sir Thomas Gore (1807–87)," in *An Encyclopaedia of New Zealand*, 3 vols., ed. Alexander H. McLintock (Wellington: Government Printer, 1966), 1:258–59.

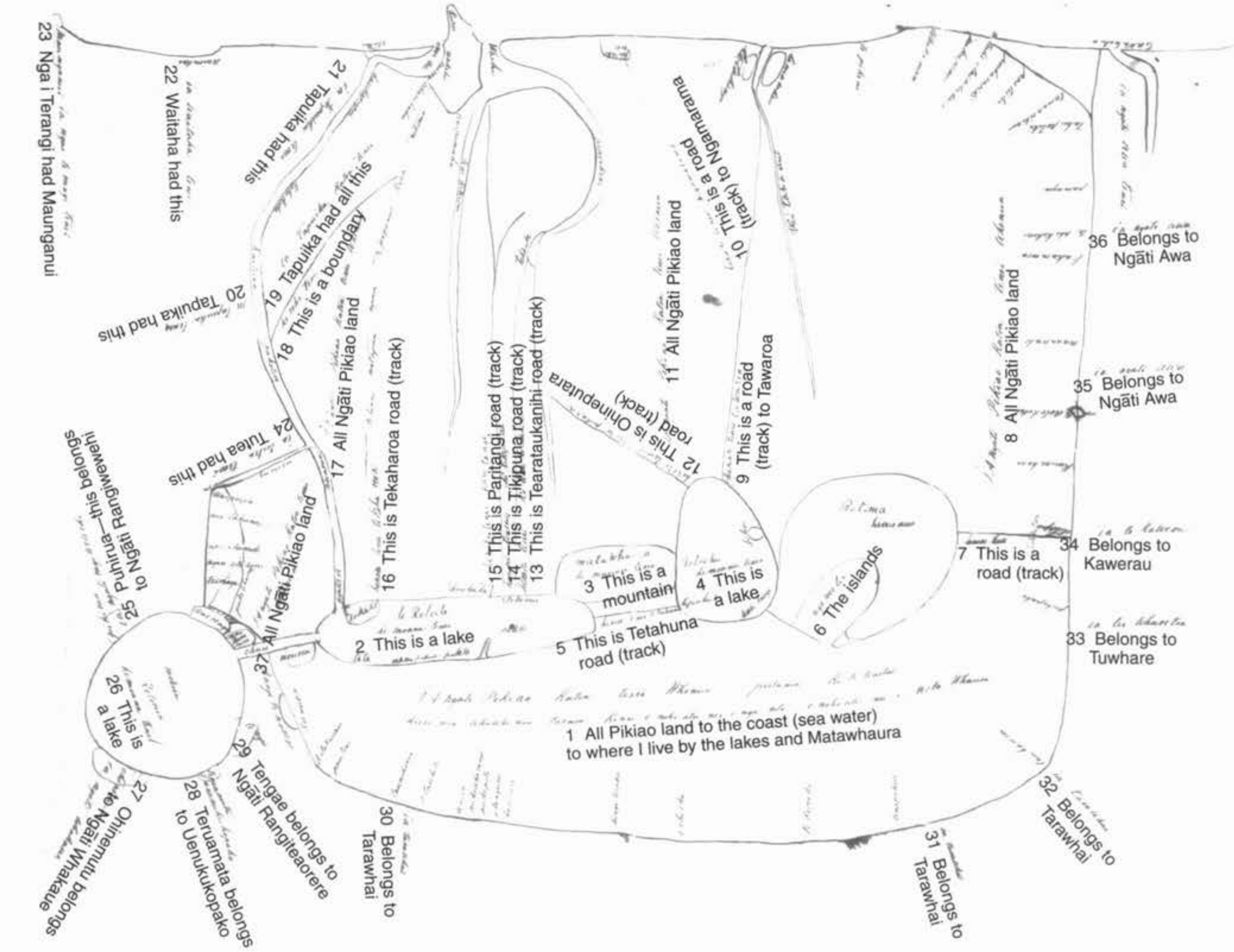


FIG. 14.40. TRANSLATION OF FEATURES ON MAP OF NGĀTI PIKIAO LAND (FIG. 14.39). A translation of thirty-seven names has been made by Manu' Whata–Te Runanganui o Ngāti Pikiao. The items include lakes, a mountain, islands (but none currently on Lake Rotoma), roads or tracks, landowners, and the boundary of Ngāti Pikiao land. The Bay of Plenty coastline, the Ngāti Pikiao boundary, and the Kaituna River form the periphery of the map. Landownership is shown beyond the Ngāti Pikiao boundary by the *hapū* and *iwi* name. The lines running from the lakes toward the bay (except the rivers and streams) are described as roads or tracks, most likely the latter connecting *hapū* lands and the lakes with the streams and rivers, estuaries, and the Bay of Plenty coast. None of the names given to the tracks can be found on modern maps.

surveys against their will, and gain the confidence of the Te Arawa Māori. Land titles in the Rotorua area were very complicated.[119]

D. M. Stafford, the Māori historian of the Rotorua area in the North Island, believes the map could have been made for the committee as early as 1877 or as late as 1895 on the occasion of one of the great meetings of all Ngāti Pikiao *hapū* held to settle boundary disputes before land court hearings.[120] Since the committee made its report in 1879, the earlier date is consistent with the committee's involvement.

The map was drawn by one Māori but represents the collective knowledge of the *hapū*. All the written information was added by the same person. A partial translation of the map has been made (fig. 14.40), and it includes lakes, a mountain, islands, roads or tracks, and names of landowners within the boundaries of Ngāti Pikiao land. Outside of Ngāti Pikiao boundaries, landownership is shown by the name of the *iwi* and *hapū*. The tracks connect lakes and streams with the coast, giving access to for-

119. Herbert William Brabant, "Report on the State of the Native Population in the Bay of Plenty and Lake Districts to the Under Secretary, Native Department, 31 May 1879," in *Appendix to the Journals of the House of Representatives of New Zealand*, G.1, 1879, session 1, 18.

120. D. M. Stafford, personal communication, 5 September 1994.

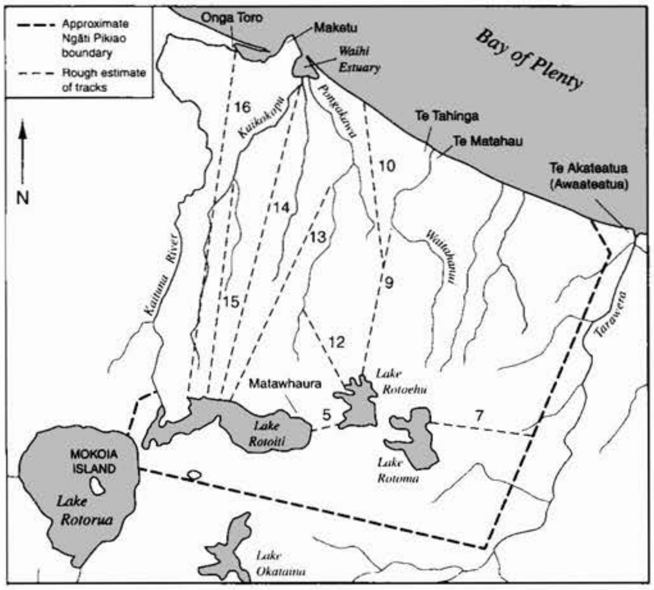


FIG. 14.41. PLACE-NAMES, BOUNDARY, AND TRACKS ON MAP OF NGĀTI PIKIAO LAND (FIG. 14.39). The place-names and numbers correspond to those on figure 14.40. Dashed lines are rough estimates of the tracks between lakes, lakes and coast, and lakes and rivers.

est, stream, estuary and coastal food resources, and serve as routes for trade and war (fig. 14.41).

The map has been used by Ngāti Pikaio in a dispute about a recent claim for much of their land, particularly for the forest around Lake Rotoehu, from Ngāti Awa *iwi* in the Whakatane area.[121] The present Ngāti Pikiao *hapū* had not known of the map, and much of the information and place-names on it were no longer known to them when it was brought to their attention. Members of the *hapū* had various interpretations of the names on the map and took some time to reach consensus on the translations given in map 14.40.[122]

Conclusion

Māori culture and survival were inextricably entwined with the natural environment. The Māori had great respect for the environment, especially for its visible expression as landscape. Furthermore, toponyms long associated with the landscape encapsulated much Māori traditional history that commemorated events and myth, both of which served as geographical mnemonics. Added to these mnemonics were names that suggested the appearance or shape of topographic features.

Māori obtained overviews of the landscape from high viewpoints called *taumata* (resting place and the brow of a hill). Best described their role thus: "The old type of Maori much appreciated a commanding *taumata* from which a fine view of his tribal lands might be obtained, and when resting at such places I have frequently heard them crooning old songs that referred to long past occurrences at the places they looked upon."[123] Few places in New Zealand are more than one hundred kilometers from the sea. The islands have a moist, temperate oceanic climate throughout the year, and generally the rainfall is much heavier on the western mountainous sides of both islands than on the eastern sides. In the North Island, Hawkes Bay and the Wairarapa receive less rainfall; in the South Island, the same is true from the Kaikoura Peninsula south to Foveaux Strait.

Before European settlement, the vegetative cover was an approximate reflection of the rainfall. The western and northeastern parts of the North Island were primeval forest. The Auckland Isthmus and the area south to Lake Taupo and northeast of the lake were covered in scrub and fern. Lowland tussock covered the area surrounding the three volcanoes. South from the Mahia Peninsula to Palliser Bay, the land was covered in scrub and fern. In the South Island, the western side from Cape Farewell south to Fiordland grew primeval forest to the bush line of the Southern Alps. Above the bush line, tussock, rock, and snow predominated. On the eastern side of the Southern Alps, primeval forest occupied the mountain valleys and sometimes the foothills. This gave way to lowland tussock from the Kaikoura Peninsula south to Foveaux Strait. In spite of the forest cover, there were probably many *taumata* in both islands that commanded panoramic views of extensive and distinctively etched terrains.

Māori were well traveled in the North Island and particularly so in the South Island. Both islands were covered with an extensive network of trails. The difficult coastal terrains of the west and southern coasts of the South Island were known and used. *Waka* and *mōkī/mōkihi* (rafts) were used for crossing major rivers, and *waka* were used for travel around the southern coast.

Culture, toponyms, *taumata,* environmental conditions, and travel combined to afford Māori the ideal bases from which to form geographical images of large areas. Hence, when a party of Māori visited the *Endeavour* in 1769, an *ariki* responded enthusiastically to Cook's request for geographical information by drawing an extensive map in charcoal on the deck. It represented 750 kilometers or more of the complex coastline of New Zealand, and Cook considered it sufficiently useful to make a copy and ask for the names of places and features. The *ariki's* coastal chart is the most convincing link in what was probably a continuous mapping tradition extending from prehistory to the late nineteenth century.

121. D. M. Stafford, personal communication, 28 June 1995.

122. D. M. Stafford, personal communication, 10 October 1994.

123. Elsdon Best, *Forest Lore of the Maori,* ed. Johannes Carl Andersen (1942; reprinted Wellington: Government Printer, 1977), 28.

Extant maps and maps described in accounts were almost without exception made for explorers, officials, and surveyors in response to questions about land, coasts and islands, and routes. All but three of the maps discussed in this chapter were made after the beginning of organized European settlement in New Zealand. Occasionally Māori responded by making maps with alacrity. This was certainly so not only in the case of the *ariki's* map made for Cook in 1769, but also of Tuki's map made for King in 1793, as well as perhaps of the unknown Māori's map of Lake Rotokakahi made for Hochstetter in 1859. In other cases, however, there is little indication of how much questioning and persuasion was used in obtaining maps or other geographical information from Māori. We know very little about maps Māori made for themselves or about how such maps may have differed from those they made for Europeans. Mackay may have been giving a clue when he observed, with reference to the map made in sand by Ropoama te One, that "in my opinion there is more reliance to be placed on the plan from its having been drawn by the Natives themselves and for their own information and amusement than if it had been drawn for, or at the request of an Officer of the Native Department."[124] As a negotiator for Māori land on behalf of the government's Native Department, Mackay's observation may well have stemmed from experiences involving misunderstandings between Māori and Pākehās arising from the use of maps.

In most cases the content of the original map is likely to have been influenced by the need to communicate with Europeans about matters of mutual or Pākehā interest. Deliberately or by default, content is likely to have been omitted, modified, or supplemented by Europeans in the course of copying and printing. In virtually every case, toponyms and inscriptions were inserted by Europeans, though the balance between careful transcriptions and altered or supplementary content must always remain in doubt. Nevertheless, we can make some generalizations about how frequently categories of features appear in the maps described in this chapter. Topographic and hydrologic features are most numerous and occur most often. Cultural features are almost as numerous but occur considerably less frequently. Biological features are few and rarely occur.[125] Abstract, mythological, and religious concepts are also embodied in Māori maps. When Te Heuheu Tukino II made his map he used a fernstick to represent Tongariro (the three volcanoes) and a smaller fernstick to represent his *mana*. When the map was made in charcoal for Cook, the *ariki* wanted to explain that immediately after death the Māori *wairua* went to Te Rēinga and there descended into the Underworld. The language problem made his explanation difficult, so he became a map symbol by lying on the deck miming death and then pointing to Te Rēinga on the map he had drawn. Rakiraki's map (see fig. 14.27) records where beaverlike animals were supposedly found, and Te Huruhuru's map (see fig. 14.24) mentions a floating island and the abode of a *tipua,* which have all been linked by some scholars to Māori mythology.

The symbols on the extant derivatives of Māori maps are the most Europeanized of all their characteristics. The most blatant example is the use of an anchor to symbolize anchorages on several maps (see figs. 14.12 and 14.19–14.22). These apart, however, point symbols are rare. Of the extant maps, Tuki's, the oldest, is by far the richest in symbols.

From the maps examined in this chapter we know that maps were made by Māori in sand or dust, on wood, on the floor, and on paper. Various instruments were used: sticks, knife, charcoal, chalk, pencil, and ink. Although Māori were excellent wood-carvers from the precontact period onward, there are no records of maps' being carved in wood until late historical times.[126] Roger Neich suggests that the reason for this virtual absence is found in the conceptual basis of Māori wood carving.

> Maori artists used woodcarving to convey conceptual symbolic ideas and values about ancestors and tribal relationships. They did not use woodcarving as a form of note taking, nor as a form of recording facts about the natural world. . . . All carvings of ancestors placed them in an ideal space and time without ever indicating any sort of landscape. Landscape features in carving only came in after acquaintance with European art. I think all this is fairly good reason why there are no maps carved on wood.[127]

The vast number of nineteenth-century cartographic manuscripts from New Zealand constitute an uncharted sea. Records kept by the eleven regional and district offices of Land Information New Zealand and by the National Archives of New Zealand, Wellington, and in England by the Public Record Office, London, and the Hydrographic Office, Taunton, represent the main corpus of

124. Memorandum, Mackay to McLean, 20 June 1861 (note 115).

125. These generalizations are based on my tallies of the number of maps that depicted the following items: for topographic and hydrological features I included bays and inlets, caves, cliffs, coastal features, estuaries, fjords, islands, lagoons, lake outlets to the sea, lakes, large rocks, marshes, mountains in plan (hachuring), *pākihi* lands, passes or saddles, rapids, reefs, rivers, springs, and streams; for cultural features I included anchorages, "camps," carved *whare,* European settlements, fordable rivers, harbors, *kāinga,* landownership boundaries, notes on flat land, *pā,* place-names, places where fighting happened, roads, tracks, travel times, and whaling stations; and for biological features I included forest, kauri trees, notes on timber, and seal rookeries.

126. A carved map of the North Island on a *waka* paddle is mentioned by Roger Neich, *Painted Histories: Early Maori Figurative Painting* (Auckland: Auckland University Press, 1993), 252.

127. Roger Neich, personal communication, 14 September 1994.

original nineteenth-century New Zealand cartography. The records consist of surveyors' field books, survey plans, manuscript maps, fair charts, coastal profiles, and other archival files–the latter often containing small manuscript maps. I made a search of the holdings of the Hydrographic Office in 1994 but saw only fair charts and coastal profiles. None of the other organizations' holdings have been systematically searched–this would be a tremendous task. The manuscripts in the Cartographic Collection of the Alexander Turnbull Library, Wellington, and the Hocken Library, University of Otago, Dunedin, are additional sources. Success in locating maps drawn by Māori or directly from information supplied by them in all these collections is difficult to predict, since such maps are unlikely to be cataloged as Māori maps and may lack documentation. However, it is likely that there are Māori maps buried in these records awaiting discovery by researchers.

APPENDIX 14.1
CHRONOLOGICAL LIST OF EARLY EXTANT MĀORI MAPS AND DERIVATIVES OF MĀORI MAPS

Date, Author of Original Map, and Area Covered	Derivative Versions	Where Held or Where First Published[1]	Size (cm) (h × w)	Orientation	Medium	Language	Description
1793, Tuki (fig. 14.6); the North and South Islands and some offshore islands		Public Record Office, London, MPG 532/5	41 × 53	Roughly west	Manuscript; pencil on paper over-drawn in black ink–place-names also in black ink	English and Māori	Record of sociopolitical situation in North Auckland Peninsula
	Slightly later version, apparently copied from original	Public Record Office, London, MPG 298	41 × 53	Roughly west	Manuscript; black ink on paper	English and Māori	Same as above; see also note 70 in text
1841, unknown Māori; the South Island, Stewart Island, and offshore islands	1894 (fig. 14.17)	*AJHR*, C.1, 1894, facing 98	32 × 18	North	Lithograph	English and Māori	Essentially mariner's chart of the South Island
	Ca. 1900–1910, by draftsmen of the Department of Lands and Survey (fig. 14.18)	Cartographic Collection, Alexander Turnbull Library, Wellington, 834ap/1841-2/acc. no. 527	56 × 44	North	Manuscript; black ink on paper, blue watercolor around coastline; backed	English and Māori	Same as above
	Ca. 1900–1910, by draftsmen of the Department of Lands and Survey	Location unknown					Same as above
1843, Hone Tūhawaiki; southwest part of Fiordland, South Island	1851, copy published by Shortland (fig. 14.19)	Shortland, *Southern Districts*, facing 81	17 × 11	North	Lithograph	English and Māori	Illustrates Chalky and Preservation Inlets and islands
1843, Hone Tūhawaiki; northern part of Foveaux Strait, South Island	1851, copy published by Shortland (fig. 14.20)	Shortland, *Southern Districts*, facing 81	17 × 16	North	Lithograph	English and Māori	Illustrates harbors and anchorages

APPENDIX 14.1 (*continued*)

Date, Author of Original Map, and Area Covered	Derivative Versions	Where Held or Where First Published[1]	Size (cm) (h × w)	Orientation	Medium	Language	Description
1843, Hone Tūhawaiki; northern part of Foveaux Strait, South Island	1851, copy published by Shortland (fig. 14.21)	Shortland, *Southern Districts,* facing 81	11 × 17	North	Lithograph	English and Māori	Illustrates harbors and anchorages
1843, Hone Tūhawaiki; eastern coast of Stewart Island	1851, copy published by Shortland (fig. 14.22)	Shortland, *Southern Districts,* facing 81	17 × 11	North	Lithograph	English and Māori	Illustrates harbors and anchorages
1843, unknown Māori; Lakes Wairarapa and Onoke, North Island	1843, copy by Tiffen (fig. 14.9)	Wellington Regional Office, Land Information New Zealand, H. S. Tiffen Field Book 28, p. 3, map marked "copy"	20 × 12	North	Manuscript; pencil on paper	English and Māori	Illustrates lakes, river, streams, and place-names
1843, unknown Māori; Chatham Island	1843, copy in Tiffen's field book (fig. 14.12)	Wellington Regional Office, Land Information New Zealand, H. S. Tiffen Field Book 28, p. 21	12 × 20	North	Manuscript; pencil on paper	English	Illustrates harbors, anchorages, lakes, and whaling station
1844, Rakiraki; Lakes Wakatipu, Wanaka, and Hawea and Clutha River, South Island	1844, copy by Barnicoat (fig. 14.27)	Hocken Library, University of Otago, Dunedin, Barnicoat, Journal 1841 to 1844, p. 41	6 × 7	North	Manuscript; ink on paper	English and Māori	Illustrates lakes, river, mountains, forest, and where "beavers" are
1844, Te Huruhuru; Lakes Wakatipu, Wanaka, and Hawea, South Island	1851, copy published by Shortland (fig. 14.24)	Shortland, *Southern Districts,* facing 205	17 × 12	North	Lithograph	English and Māori	Illustrates lakes, rivers, mountains, settlements, tracks
1845, Ngātai; Motutapu and Rangitoto Islands (fig. 14.36)		National Archives of New Zealand,	36 × 21	North	Manuscript; pencil on paper	Māori	Illustrates landownership, boundaries, and place-names

		Wellington, Half Caste Claim of the Children of Thomas Maxwell, Old Land Claims (OLC) File 1/332, Sep. 22					
1848, Te Ware Korari (place-names written by Mantell) (figs. 14.28–14.30); Waitaki River (South Island) and lakes at its source		Drawings and Prints Section, Alexander Turnbull Library, Wellington, E333, W. B. D. Mantell Sketch Book no. 2, pp. 36–38	page 14 × 24	Various	Manuscript; pencil and ink on paper	Māori	Illustrates rivers, lakes, caves, cliff, hills, spring, swamp, and *kāinga*
1859, unknown Māori; Lake Rotokakahi, North Island	1867, copied and published by Hochstetter (fig. 14.14)	Hochstetter, *Physical Geography*, 404	6 × 3	Roughly northeast	Printed	English	Illustrates lake
1861, Ropoama te One; disputed land at Waitara, North Island	1863, *AJHR*, E.23, tipped in between title page and p. 1 (fig. 14.38)	Cartographic Collection, Alexander Turnbull Library, Wellington, 832.2gbbd/1861/acc. no. 6677 (loose copy of map)	29 × 24	Roughly southeast	Lithograph	English and Māori	Illustrates landownership boundaries, river, coast, and *pā* sites
Ca. 1862, unknown Māori (place-names probably by European) (fig. 14.33); Rakaia and Ashburton (Hakatere) River headwaters and route to west coast, South Island		Cartographic Collection, Alexander Turnbull Library, Wellington, -834.44cdc/ca. 1860/acc. no. 3739	21 × 13	North	Manuscript; black ink on paper; backed	Māori	Illustrates rivers, lakes, mountains, pass, and place-names
1865, unknown Māori; Rakaia River headwaters, South Island	1952, redrawn by Taylor (fig. 14.35)	Taylor, *Lore and History*, facing 168	8 × 10	West	Printed	English and Māori	Illustrates rivers, lake, mountains, pass, and place-names

APPENDIX 14.1 (*continued*)

Date, Author of Original Map, and Area Covered	Derivative Versions	Where Held or Where First Published[1]	Size (cm) (h × w)	Orientation	Medium	Language	Description
1870, unknown Te Arawa Māori (fig. 14.15); Lakes Rotorua and Rotoiti, north to Bay of Plenty coast, North Island		Manuscripts Section, Alexander Turnbull Library, Wellington, MS. papers 0032–0217, Donald McLean, private correspondence with H. T. Clarke (1), 1861–70	23 × 19	Roughly north	Manuscript; black ink on paper	English and Māori	Routes of escape open to Te Kooti
1870, Ruka te Aratapu (fig. 14.16); Waihapu, roughly 32 km west of Tolaga Bay, North Island		National Archives of New Zealand, Wellington, AD1, 1870/3334	6 × 13	Cannot determine	Manuscript; black ink on paper	Māori	Showing site of ambush of Te Kooti
Ca. 1877–95, unknown Māori (fig. 14.39); Rotorua lakes north to seacoast, North Island		National Archives of New Zealand, Wellington, LS Misc. 2071	60 × 85	Roughly northeast	Black ink on paper; backed	Māori	Illustrates lakes, rivers, streams, seacoast, estuaries, tracks, landownership, boundary, and place-names

[1] *Appendix to the Journals of the House of Representatives of New Zealand*, E.23, 1863, and C.1, 1894; Ferdinand von Hochstetter, *New Zealand, Its Physical Geography, Geology and Natural History with Special Reference to the Results of Government Expeditions in the Provinces of Auckland and Nelson* (Stuttgart: J. G. Cotta, 1867); Edward Shortland, *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines* (London: Longman, Brown, Green and Longmans, 1851; reprinted Christchurch: Capper Press, 1974); William A. Taylor, *Lore and History of the South Island Maori* (Christchurch: Bascands, 1952).

15 · Concluding Remarks

David Woodward and G. Malcolm Lewis

Despite daunting problems of interpretation and approach, it seems there are many indigenous artifacts made by traditional African, American, Arctic, Australian, and Pacific societies that can be described within the definition of map cited in the preface to volume 1 of the *History of Cartography*.[1] Broadening the definition of map has attracted interest from scholars in other fields: anthropologists, archaeologists, historians, art historians, historians and sociologists of science, and students of literature have found insights into how other cultures represent their worlds.

The vast majority of evidence of traditional cartography comes from the encounters these societies had with the West, with inevitable acculturation. Nevertheless, our authors have often been able to glean clues to the extent and function of precontact graphic spatial representations, which may have occurred in a variety of formats. Even the broad definition of map offered in the preface to volume 1 of this *History* may have been stretched in the previous pages. As we have seen, the categories of cognitive, performance, and material cartographies are often fluid, and "mapness" depends largely on the social and functional context in which a performance or artifact is operating. Descriptions of "performance maps" and occasionally even "cognitive maps" in a history of cartography may, however, be justified on the grounds that they supply an essential context for understanding the graphic forms that societies employ to articulate, represent, display, claim, and codify spatial knowledge.

Given the caveats about the use of the terms "traditional" and "cartography" (pp. 1–2 above), it is nevertheless useful to reconstruct—from the maps discussed and illustrated in this book—some of the general ways traditional cartography in these cultures differs from the cartography covered in other volumes of the *History*. At the very least, we believe that bringing together primary and secondary literature from widely scattered and often obscure journals in archaeology, anthropology, ethnography, cultural geography, history, and many other fields constitutes a bibliographical contribution. Likewise, the juxtaposition in one book of so many images gleaned from many archives, archaeological sites, museum collections, and libraries around the world—often with great difficulty—will by itself stimulate individual discoveries and parallels.

Such generalizations often need to be rooted in the wider context of art, architecture, and other cultural expressions. These characteristics may not be ubiquitous and universal—the contrast between the complexity, for example, of the Mesoamerican and Melanesian societies is enormous—but they may be prevalent enough to warrant highlighting. In turn, we will discuss the following themes as they relate to spatial representations: the topological structure of the representations, the fusing of the secular and sacred, the centering of society or the self in the cosmos, the inseparability of the landscape from events that occur in it, and the closeness of the representations to the human lifeworld.

Topological Structure

Maps made in traditional cultures do not incorporate the abstract projective, coordinate geometries and measured space currently associated with international cartography. Yet traditional maps do share a common geometry: it consists of topology, in which concepts of linearity, center and periphery, contiguity, and connectedness are far more relevant than coordinate locations in an abstract infinite plane.

A high proportion of traditional maps from the cultures examined in this book are in the form of linear itineraries. Most traditional societies had a richness and density of names for physical and human features on the land far surpassing that of modern European societies, with proper names for all manner of unsettled as well as settled locations. A very high proportion of these were associated with linear features such as rivers: for example, the six map segments showing the Waitaki River (South Island, New Zealand) and its source lakes drawn by Te Ware Korari in the sketchbook of Walter Mantell, with

1. "Maps are graphic representations that facilitate a spatial understanding of things, concepts, conditions, processes, or events in the human world." "Preface," in *The History of Cartography*, ed. J. B. Harley and David Woodward (Chicago: University of Chicago Press, 1987–), 1:xv–xxi, esp. xvi.

place-names written along the sides of the maps by Mantell as told to him by the Māori.[2]

In maps made in traditional societies, the concept of using a systematic scale measured with the aid of standard units of distance was unlikely to serve the functions for which the maps were made. Since these maps were apt to stress the qualitative aspects of the landscape rather than quantitative measure, the whole issue of measurement becomes moot. The concept of distance was far more likely to be temporal, measured in terms of effort or in "so many days'" travel. Furthermore, the well known was understandably represented at a larger scale and placed at the center; the less well known was shown smaller and relegated to the periphery.

Secular and Sacred

It is impossible to separate secular from sacred in the maps of traditional societies. The decision to include sacred maps and cosmographies in the *History of Cartography* started with the decision to include *mappaemundi* in volume 1. Here was a genre of maps existing side by side with the portolan charts but made for a very different purpose and with a different structure. The cosmographical dimension is present everywhere in native representations of the world, where the landscape and universe are regarded not as a passive backdrop against which human events unfold, but as active participants in human life. The land owns the people, not people the land. It is here that the associations between mapmaking and religious practices become tightly knit. Here shamanic rather than topographic knowledge is the gateway, with its emphasis on initiation, special or mystical knowledge, and an overarching global scheme in which maps often include depictions of mythological personages and animals, as in Western astrology. Cartography becomes less of a gridded stage on which life takes place and more a model of how the spiritual world and physical world interact. Abstractions such as coordinate systems are rejected in favor of more concrete representations.

Perhaps because they apparently share so many worldwide prevalencies, cosmographic maps have long attracted the attention of students of comparative religion and worldviews. Although no universal model can be identified, it appears that at its base there is a convergence toward an identification of three tiers of the cosmos (physical, emotional, spiritual) with some subdivision of the tiers. These three tiers or planes are often linked metaphorically by a tree known as the Tree of Life. The branches reach to the heavens, the dwelling place of spiritual beings; the trunk represents the physical earthly plane, a conduit and support between the planes "above" and "below"; and the roots, representing the emotional Underworld, provide nurture and sustenance to the physical and spiritual elements.[3]

Physical rules of space and time do not always apply to the spatial arrangements in the "geography" of the heavenly tier. This realm is understood as a dream world, accessible through dreams, trance states, or the offices of shamans and priests. To understand and communicate with the spiritual beings who inhabit this tier, it is necessary to construct an analogous "map" of the physical world inhabited by humans. Often the two are viewed as synonymous, as with the Oglala Sioux: "Star map and earth map, they were really the same, because what's in the stars is on the earth, and what's on the earth is in the stars."[4]

It is for this reason that the maps of traditional African, American, Arctic, Australian, and Pacific peoples often have rich cosmographical meanings. Failure to recognize the power and ubiquity of these functions has led to severe errors of interpretation. One example, provided by Tim Maggs in the chapter on South African rock art, describes the different interpretations of the scene "fight and flight." Authors writing before about 1980 tended to read it as a straightforward depiction of a battle between two hunter-gatherer groups, with lines understood as paths or rivers, making it an "event map." Recent critics now point to a spiritual interpretation in which healing was regarded as a fight, often involving arrows, between the shaman in trance and evil spirits. The painting is now seen to represent elements of trance performance rather than an actual physical conflict in a geographical setting.[5]

Cosmos, Circle, and Center

Historians of religion, notably Mircea Eliade, have stressed the frequency and essentiality of the concept of the "center" as a sacred place linking the plane of the human physical world with the spiritual planes above (sky) and below (Underworld), centered on an *axis mundi.* Since the "center" is viewed as the location of a "hole" or point of breakthrough between the cosmic zones, it is of special significance to the shaman, the agent viewed as capable of channeling the healing forces moving between the zones.[6] Ong elaborates this in relation to orality:

> In a primary oral culture, where the word has its existence only in sound, with no reference whatsoever to any visually perceptible text, and no awareness of even

2. See pp. 520–23 and figs. 14.28–14.30.

3. See Mircea Eliade, *Shamanism: Archaic Techniques of Ecstasy,* trans. Willard R. Trask (New York: Bollingen Foundation, 1964), 259, 269–74.

4. Ronald Goodman, *Lakȯta Star Knowledge: Studies in Lakȯta Stellar Theology,* 2d ed. (Rosebud, S.D.: Siŋte Gleška University, 1992), 18.

5. See p. 14 and plate 1.

6. Mircea Eliade, *Patterns in Comparative Religion,* trans. Rosemary Sheed (New York: Sheed and Ward, 1958), 367–87, and idem, *Shamanism,* 259–87 (note 3).

the possibility of such a text, the phenomenology of sound enters deeply into human beings' feel for existence, as processed by the spoken word. For the way in which the word is experienced is always momentous in psychic life. The centering action of sound (the field of sound is not spread out before me but is all around me) affects man's sense of the cosmos. For oral cultures, the cosmos is an ongoing event with man at its center. Man is the *umbilicus mundi,* the navel of the world.[7]

The graphic manifestation of this concept is the circle, a basic geometric unit on maps described in this book at both the global scale (cosmos) and local scale (house and settlement). At the global scale, it represents the horizon of the world and the shape of the cosmos.[8] Its deep-rooted use also recalls the prevalence of the circle in Babylonian, ancient Greek, medieval Christian, and Islamic world maps. The concept's use as a calendrical motif underlines the inseparability of representations of time and space in these societies. It pervades the division of the horizon into the cardinal points, and its subdivision into compass points, transculturally in Pacific star compasses and European compass roses alike.[9]

Examples of the circular motif are so numerous in this book that citing only a few must suffice. For instance, in the day-to-day life of the Oglala Sioux of North America, the circle is employed for their tipi, their camp circle, and their ceremonial arrangements.[10] The circle motif also occurs at regional and local scales, perhaps reflecting a microcosm of the cosmographical usage. Circular cartographic histories and boundary maps were common across Mesoamerica; Mayan maps, for example, are described as *pepet dz'ibil* (circular paintings or writings). Two Mixtec maps made in the 1580s are circular, and an Aztec example is the Mapa circular de Cuauhquechollan.[11]

In Australian Aboriginal art, circles are one of the most common elements. In much Western Desert art, for example, "real spatial relations are . . . represented by symmetrically ordered roundels . . . [that] stand for sites, and the lines that join them are the Dreaming paths that connect the sites in myths."[12] Similarly, the Warlpiri in central Australia stylize the representations of sites joined by ancestral travels using combinations of circles and lines. Thus a line of three campsites would be shown as three circles joined by straight lines. In central Australia, painting is performed on media that are rarely rectangular: large, irregular surfaces such as rock walls, the human body, or ovate artifacts such as shields, dishes, sacred stones, ceremonial posts, and bull-roarers. It is only since the early 1970s that right angles have suddenly modified ancient design practices.

The common representation of traditional settlements by circles is in direct imitation of the form of such settlements. As in the case of some eighteenth-century Catawba representations in North America, it is possible to distinguish native from Western settlements by the use of circles or rectangles. For southern Africa, Maggs explains that the circle is the basis of agriculturist settlement patterns and that rectangular building forms were introduced only in colonial times.[13]

Landscape and Event

Representations of the spatial layout of the landscape are important to traditional groups, but any such depictions of the distribution of places cannot effectively be separated from the key events that happened there in a culture's past. In Australian Aboriginal Dreamings, the artists characteristically choose sections of country having many mythologies, whether related to their own families or to the group as a whole. Myths are incorporated, as with the origin of the large plain created by the thrashing about of two fighting snakes, the male from the north and the female from Pikilli.[14] Likewise, the Māori names for every conceivable feature of land, however small, frequently allude to persons or events and thus perpetuated their memory and preserved the history of the past. These elements of the landscape have been called "the survey pegs of memory."[15] In Mesoamerica too the itinerary is often blended into the map, as in the Mapa de Sigüenza, to represent both the events and places in the movement of the Aztecs from their traditional origins in Aztlan to the founding of Tenochtitlan in the Valley of Mexico. In the Codex Xolotl, the Acolhuas of Texcoco used a map to record the historic conquests and marriages of

7. Walter J. Ong, *Orality and Literacy: The Technologizing of the Word* (London: Methuen, 1982), 73.

8. The global prevalence of the "center" rooted in horizon astronomy and in cultural ethnocentricity is described in Paul Wheatley, *The Pivot of the Four Quarters: A Preliminary Enquiry into the Origins and Character of the Ancient Chinese City* (Chicago: Aldine, 1971), 428–36, and Yi-Fu Tuan, *Topophilia: A Study of Environmental Perception, Attitudes, and Values* (Englewood Cliffs, N.J.: Prentice-Hall, 1974), 37–44, 153–60.

9. See Charles O. Frake, "Dials: A Study in the Physical Representation of Cognitive Systems," in *The Ancient Mind: Elements of Cognitive Archaeology,* ed. Colin Renfrew and Ezra B. W. Zubrow (Cambridge: Cambridge University Press, 1994), 119–32.

10. J. R. Walker, "The Sun Dance and Other Ceremonies of the Oglala Division of the Teton Dakota," *Anthropological Papers of the American Museum of Natural History* 16 (1917): 51–221, esp. 160.

11. See pp. 210 and 212 and figs. 5.23 and 5.25.

12. See p. 381.

13. See p. 99 and plate 4 and p. 19.

14. *A̲ratjara, Art of the First Australians: Traditional and Contemporary Works by Aboriginal and Torres Strait Islander Artists,* exhibition catalog (Cologne: DuMont, 1993), 347 (no. 111).

15. Te Aue Davis, Tipene O'Regan, and John Wilson, *Ngā Tohu Pūmahara: The Survey Pegs of the Past* (Wellington: New Zealand Geographic Board, 1990), 5.

Xolotl and his family and thus expressed their rights to territory.[16]

Underlying this blending of time and space is a deep-rooted desire on the part of these societies, wherever possible, to attach *qualities* or attributes to places and events. The notion of studying space as an abstract plane—or time as an abstract philosophical concept—does not usually occur.

Closeness to the Human Lifeworld

In indigenous societies few representations and facts are viewed outside the context of human activities. These societies tend to be empathic and participatory rather than objectively distanced. The "objectivity" of oral performers is enforced by formulas, whereas writing "separates the knower from the known" and sets up conditions for personal distancing or disengagement.[17] This theme of participation is echoed by many of the authors in this book. In the context of Melanesia, Eric Silverman stresses that the context of production or creation is a part of the message (or map), not something the message tries to escape. In the performance cartography of such societies, the recipients of the message participate in its creation by their constant presence during the ritual, and they can transform it. Melanesian maps thus become political assertions about political rivalries, ancestral prominence, ritual power, cosmology, and gender; less objective and more contentious than in our society. Likewise for lowland South America, Neil Whitehead speaks of the "participatory universe" in which the interconnection between people and the cosmos is crucial to maintaining the cosmic order. This defines the "epistemological contrast between the participating individual and the possessing individual that defines the source of difference between indigenous and nonindigenous cartography of South America."[18]

The participatory nature of indigenous mapmaking is also evident in the process of encountering Western culture. Since almost all the maps discussed and reproduced in this book were made by indigenous peoples after contact with Western culture, it is important to identify their motivations for making them. In the history of colonial contact, they of course have served the purposes of the colonizers in a wide variety of economic or political contexts: exploration, trade, treaties, or other negotiations. Indigenous maps have also been commissioned by ethnographers studying cultural concepts of space and place, but here again they have accommodated the needs of Western scholars. In the virtual absence of truly indigenous artifacts, it is difficult to establish precisely how the extant examples might aid in reconstructing precontact maps that no longer survive. Yet this evidence, along with contemporary written descriptions, provides the only window on earlier practices.

It is only recently that the tables have been turned as modern indigenous peoples are engaged in what has been called a "cartographic resistance."[19] An example of this worldwide mapmaking movement is provided by the Biodiversity Support Program, a consortium formed by the World Wildlife Fund–U.S., the Nature Conservancy, and the World Resources Institute, commissioned in early 1994. In many instances the efforts have been dramatically successful in promoting local environmental issues; in other cases it is too early to assess the long-term success of these efforts. But the relation of these mapping techniques to the traditional indigenous cartographies described in this book remains to be elucidated, since many modern movements have largely arisen quite independent of traditional mapmaking techniques.[20]

The closeness to the lifeworld is also demonstrated by the tendency for oral cultures to use spatial concepts that are more concrete than abstract. For example, geometric figures are assigned the names of objects, such as "moon," rather than the abstract "circle."[21] Likewise the cardinal directions, a fundamental way of structuring the world image based on the diurnal movement of the sun, are far more than abstract concepts but have mythical realities of their own expressed in conventional colors or associated objects. The circle-cross symbol for the cosmos is common in a number of cultures, from North and South American Indians to the Dogon in north central Africa, where it represents the god's gesture at the end of

16. See pp. 205–7.

17. Ong, *Orality and Literacy,* 43–44 (note 7).

18. See p. 326.

19. David Turnbull, "Constructing Knowledge Spaces and Locating Sites of Resistance in the Modern Cartographic Transformation," in *Social Cartography: Mapping Ways of Seeing Social and Educational Change,* ed. Rolland G. Paulston (New York: Garland, 1996), 53–79, esp. 72–75.

20. This indigenous mapping movement is described by Peter Poole, "Land-Based Communities, Geomatics and Biodiversity Conservation: A Survey of Current Activities," *Cultural Survival Quarterly* 18, no. 4 (1995): 74–76. He lists some sixty projects in the Biodiversity Support Program found in Argentina, Bolivia, Brazil, Paraguay, Peru, Venezuela, Belize, Dominican Republic, Honduras, Nicaragua, Panama, Canada, United States, Ethiopia, Guinea-Bissau, Kenya, Senegal, Indonesia, Philippines, Thailand, Papua New Guinea, Nepal, and Bangladesh. This movement is also discussed in other articles in this special issue of *Cultural Survival Quarterly* and in some of the essays in Doug Aberley, ed., *Boundaries of Home: Mapping for Local Empowerment* (Gabriola Island, B.C.: New Society, 1993). A recent example of an atlas made for expressing the environmental concerns of forty-two Ke'kchi and Mopan Mayan communities in southern Belize, with color choices and symbology quite different from a conventional Western arlas, is found in Toledo Maya Cultural Council, *Maya Atlas: The Struggle to Preserve Maya Land in Southern Belize* (Berkeley, Calif.: North Atlantic Books, 1997).

21. Ong, *Orality and Literacy,* 51 (note 7).

the earth's creation. Similarly, the Kongo cosmos is "represented ideographically as a cross or diamond with circles attached at each end. The end points of the cross and diamond represent the four cardinal directions, and the circles illustrate the sun moving through its four phases: dawn, noon, sunset, and midnight."[22]

The media on which maps appear are less important to indigenous groups than the meanings of the concepts they embody. In the case of Aboriginal Australia, Peter Sutton stresses that a traditional image of a sacred water hole or a depiction of a certain Dreaming is usually transposable between media: "The same design may be painted, for example, on a boy's body during initiation, on the walls of a wet-season shelter, on a painting made for sale, on a bark or log coffin, on a biscuit box lid, on an aluminum dinghy, or on a pair of sneakers."[23] As a result of this deemphasis on the importance of the artifact, the loss of the objects, and hence also of their meanings, is characteristically high.

Indigenous map media also reflect the "closeness to the lifeworld" characteristic of such societies. The notion of "traditional" is sometimes associated with the idea of choices and constraints in a given society. Although constraints are present in all societies, the material culture of indigenous societies is particularly limited by the local availability of materials, the nature of the climate, and the socioeconomic facts of life.[24]

As the illustrations throughout this book strongly suggest, however, there is still a great richness and variability in the media of indigenous cartography that matches the diversity of the societies that produced it: rock paintings and engravings, stone arrangements, earth sculptures, bark paintings or drawings, decorated weapons such as clubs, shields, and spear-throwers, digging sticks and bowls, bull-roarers, colored sand, antlers, walrus tusks, palm fronds, shells, cotton or maguey cloth, indigenous paper, ceramic vessels, walls, bas-relief and three-dimensional sculpture made of stone or molded stucco, birchbark, ivory, and wooden boards.

The Way Ahead

The chapters in this book contribute to a pool of ideas, interpretations, and images from which, as future volumes of the *History of Cartography* are published, we can perhaps draw conclusions about what kinds of cultural and social conditions are necessary for societies to want or need to make maps.

Volume 2 of the *History* is the first full-length global attempt to describe and explain traditional cartographies. With the demise of traditional economies and lifestyles, it could be looked on as an attempt to review the topic before it ceases to exist. Alternatively, with the vigorous attempts being made by minority groups in most traditional societies to conserve and rediscover their cultural heritage, it may be seen as an exercise in the repatriation of ideas and materials.

There is clearly ample opportunity to build on what has been introduced in this book. Although we have attempted to cover the main traditional cultures, there are omissions and inconsistencies. There is still work to be done—even at the most preliminary stage—on the indigenous cartographies of the western part of New Guinea, Irian Jaya (now part of Indonesia), the Philippines, Madagascar, Argentina, Chile, and Uruguay. Analyses of cosmographical and celestial mapping are sorely needed for areas otherwise fully discussed. Rock art—notoriously difficult to interpret—has been tackled for some areas but by no means all. Modern indigenous mapping has been a primary source for some authors but is not referred to by others, and accounts of mapping written by Europeans and maps drawn for Europeans in colonial times have been discussed at length by several contributors but covered more thinly by others. The risks and consequences of multiple authorship have perhaps been at their greatest in this book: approaches have ranged through those of the cultural historian, the archaeologist, the geographer, the cultural anthropologist, the cartographer, and the librarian. But the contradictions and lacunae that have resulted can also be viewed as opportunities to further enrich the record from a number of disciplinary viewpoints.

Western cartography has much to learn from the maps in this book. Far from being denigrated, they can be regarded as sources of ideas that enrich modern mathematical cartography and geographic information systems. If cultural traditions of cartography are recaptured and incorporated into the new technologies, the maps of the future will not be crudely generic, cold, and static, but far richer, warmer, and more dynamic than any we have ever seen. Such maps would help us form hypotheses about the world at different scales of representation and also instill a love of the physical and cultural landscape.

22. See p. 27.
23. See p. 366.
24. Yi-Fu Tuan, "Traditional: What Does It Mean?" in *Dwellings, Settlements and Tradition: Cross-Cultural Perspectives,* ed. Jean-Paul Bourdier and Nezar Alsayyad (Lanham: University Press of America, 1989), 27–34, esp. 28.

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Abbadie, Antoine Thomas d'. *Catalogue raisonné de manuscrits éthiopiens appartenant à Antoine d'Abbadie.* Paris: Imprimerie Impériale, 1859. **29**

Aberley, Doug, ed. *Boundaries of Home: Mapping for Local Empowerment.* Gabriola Island, B.C.: New Society, 1993. **540**

Aboriginal Land Commissioner. *Nicholson River (Waanyi/Garawa) Land Claim.* Canberra: Australian Government Publishing Service, 1984. **405**

Acosta, José de. *Historia natural y moral de las Indias.* 2 vols. Madrid: Ramón Anglés, 1894. **258**

Acuña, René. See *Relaciones geográficas del siglo XVI.*

Adler, Bruno F. "Karty pervobytnykh narodov" (Maps of primitive peoples). *Izvestiya Imperatorskago Obshchestva Lyubiteley Yestestvoznaniya, Antropologii i Etnografii: Trudy Geograficheskago Otdeleniya* (Proceedings of the Imperial Society of the Devotees of National Sciences, Anthropology and Ethnography: Transactions of the Division of Geography) 119, no. 2 (1910). **8, 24, 37, 55, 257, 330, 339, 341, 448, 492**

Aea, Hezekiah. "The History of Ebon." In *Fifty-sixth Annual Report of the Hawaiian Historical Society,* 9–19. Honolulu: Hawaiian Historical Society, 1947. **476**

Aguilera García, María del Carmen. "Códice de Huamantla: Estudio iconográfico, cartográfico e histórico." In *Códice de Huamantla.* [Tlaxcala]: Instituto Tlaxcalteca de la Cultura, 1984. **204**

Ahmad, S. Maqbul. "Cartography of al-Sharīf al-Idrīsī." In *The History of Cartography,* ed. J. B. Harley and David Woodward , vol. 2.1 (1992), 156–74. Chicago: University of Chicago Press, 1987–. **24**

Akimichi, Tomoya. "Triggerfish and the Southern Cross: Cultural Associations of Fish with Stars in Micronesian Navigational Knowledge." *Man and Culture in Oceania* 3, special issue (1987): 279–98. **462, 463, 467, 470**

———. "Image and Reality at Sea: Fish and Cognitive Mapping in Carolinean Navigational Knowledge." In *Redefining Nature: Ecology, Culture and Domestication,* ed. Roy Ellen and Katsuyoshi Fukui, 493–514. Oxford: Berg, 1996. **462, 463**

Albó, Javier. "Dinámica en la estructura inter-comunitaria de Jesús de Machaca." *América Indígena* 32 (1972): 773–816. **262, 263**

Alès, Catherine, and Michel Pouyllau. "La conquête de l'inutile: Les géographies imaginaires de l'Eldorado." *L'Homme* 122–24 (1992): 271–308. **324**

Alkire, William H. "Systems of Measurement on Woleai Atoll, Caroline Islands." *Anthropos* 65 (1970): 1–73. **462, 463, 464, 465, 466, 467, 470**

Allen, Catherine J. "The Nasca Creatures: Some Problems of Iconography." *Anthropology* 5, no. 1 (1981): 43–70. **268**

Allen, Elphine. "Australian Aboriginal Dance." In *The Australian Aboriginal Heritage: An Introduction through the Arts,* ed. Ronald Murray Berndt and E. S. Phillips, 275–90. Sydney: Australian Society for Education through the Arts in association with Ure Smith, 1973. **359**

Allen, Gary L., et al. "Developmental Issues in Cognitive Mapping: The Selection and Utilization of Environmental Landmarks." *Child Development* 50 (1979): 1062–70. **443**

Allen, James de Vere, and Thomas H. Wilson. *Swahili Houses and Tombs of the Coast of Kenya.* London: Art and Archaeology Research Papers, 1979. **28**

Allen, Jim. "The Pre-Austronesian Settlement of Island Melanesia: Implications for Lapita Archaeology." In *Prehistoric Settlement of the Pacific,* ed. Ward Hunt Goodenough, 11–27. Philadelphia: American Philosophical Society, 1996. **419**

Allen, Jim, Jack Golson, and Rhys Jones, eds. *Sunda and Sahul: Prehistoric Studies in Southeast Asia, Melanesia and Australia.* London: Academic Press, 1977. **419**

Allen, Jim, Chris Gosden, and J. Peter White. "Human Pleistocene Adaptations in the Tropical Island Pacific: Recent Evidence from New Ireland, a Greater Australian Outlier." *Antiquity* 63 (1989): 548–61. **419**

Allen, Louis A. *Time before Morning: Art and Myth of the Australian Aborigines.* New York: Crowell, 1975. **358**

Alpers, Svetlana. "The Mapping Impulse in Dutch Art." In *Art and Cartography: Six Historical Essays,* ed. David Woodward, 51–96. Chicago: University of Chicago Press, 1987. **44**

Alva Ixtlilxochitl, Fernando de. *See* Ixtlilxochitl, Fernando de Alva.

Alvarado, Francisco de. *Vocabulario en lengua mixteca.* Facsimile of 1593 ed. Mexico City: Instituto Nacional Indigenista and Instituto Nacional de Antropología e Historia, 1962. **185, 187**

American State Papers: Documents, Legislative and Executive, of the Congress of the United States. Class 2, Indian Affairs, 1789–1827. 2 vols. Washington, D.C.: Gales and Seaton, 1832. **106**

Ammarell, Gene. "Bugis Navigation." Ph.D. diss., Yale University, 1995. **488**

———. "Navigation Practices of the Bugis of South Sulawesi, Indonesia." In *Seafaring in the Contemporary Pacific Islands: Studies in Continuity and Change,* ed. Richard Feinberg, 196–218. DeKalb: Northern Illinois University Press, 1995. **488**

Anawalt, Patricia Rieff. *Indian Clothing before Cortés: Mesoamerican Costumes from the Codices.* Norman: University of Oklahoma Press, 1981. **198**

1967. 119, 120, 122
Bagrow, Leo. *History of Cartography.* Rev. and enl. R. A. Skelton. Trans. D. L. Paisey. Cambridge: Harvard University Press; London: C. A. Watts, 1964. Reprinted and enl., Chicago: Precedent, 1985. 154, 330, 444
Baird, Ellen T. *The Drawings of Sahagún's "Primeros Memoriales": Structure and Style.* Norman: University of Oklahoma Press, 1993. 197
Ballara, Angela. "Te Horeta, ?–1853." In *The People of Many Peaks: The Maori Biographies from "The Dictionary of New Zealand Biography, Volume 1, 1769–1869,"* 173–75. Wellington: Bridget Williams Books, 1991. 500
Ballard, Chris. "The Centre Cannot Hold: Trade Networks and Sacred Geography in the Papua New Guinea Highlands." *Archaeology in Oceania* 29 (1994): 130–48. 430
Banks, Joseph. *The Endeavour Journal of Joseph Banks, 1768–1771.* 2 vols. Ed. J. C. Beaglehole. Sydney: Angus and Robertson, 1962. 448, 500
Barbour, Philip L., ed. *The Jamestown Voyages under the First Charter, 1606–1609.* 2 vols. Hakluyt Society Publications, ser. 2, nos. 136–37. Cambridge: Cambridge University Press, 1969. 68, 69, 71
Bardon, Geoffrey. *Papunya Tula: Art of the Western Desert.* Ringwood, Victoria: McPhee Gribble, 1991. 401
Barlow, Kathleen. "Women's Textile Arts and the Aesthetics of Domestic Life among the Murik of Papua New Guinea." Paper presented at the American Anthropological Association annual meeting, San Francisco, 1996. 440
Barlow, R. H. *The Extent of the Empire of the Culhua Mexica.* Ibero-Americana 28. Berkeley: University of California Press, 1949. 183
Barlow, R. H., and Michel Graulich. *Codex Azcatitlan/Códice Azcatitlan.* Paris: Bibliothèque Nationale de France/Société des Américanistes, 1995. 218
Barnes, Monica, and David Fleming. "Filtration-Gallery Irrigation in the Spanish New World." *Latin American Antiquity* 2 (1991): 48–68. 277
Barnes, Monica, and Daniel J. Sliva. "El puma de Cuzco: ¿Plano de la ciudad Ynga o noción europea?" *Revista Andina* 11 (1993): 79–102. 285
"Barnicoat, John Wallis (1814–1905)." In *A Dictionary of New Zealand Biography,* 2 vols., ed. Guy Hardy Scholefield, 1:41. Wellington: Department of Internal Affairs, 1940. 520
Barraclough, Geoffrey, ed. *The Times Atlas of World History.* 4th ed. Ed. Geoffrey Parker. Maplewood, N.J.: Hammond, 1993. 329
Barratt, Glynn. *Carolinean Contacts with the Islands of the Marianas: The European Record.* Saipan: Micronesian Archaeological Survey, 1988. 453
Barrow, John. *A Chronological History of Voyages into the Arctic Regions; Undertaken Chiefly for the Purpose of Discovering a North-east, North-west, or Polar Passage between the Atlantic and Pacific.* London: John Murray, 1818. 137
Barth, Heinrich. *Travels and Discoveries in North and Central Africa.* 3 vols. New York: Harper, 1857–59. 35
Bartlett, J. "Australian Anthropology." In *Cultural Exhibition of Queensland,* by J. Bartlett and M. Whitmore, 13–70. Saitama, Japan: Saitama Prefectural Museum, 1989. 377
Barton, Phillip Lionel. "Maori Geographical Knowledge and Maps of New Zealand." In *Papers from the 45th Conference [New Zealand Library Association], Hamilton, 6–10 February 1978,* comp. A. P. U. Millett, 181–89. Wellington: New Zealand Library Association, 1978. 494
———. "Maori Geographical Knowledge and Mapping: A Synopsis." *Turnbull Library Record* 13 (1980): 5–25. 494
Bassett, Thomas J. "Cartography and Empire Building in Nineteenth-Century West Africa." *Geographical Review* 84 (1994): 316–35. 24
———. "Influenze africane sulla cartografia europea dell'Africa nei secoli XIX e XX." Paper presented at La cultura dell'alterità: Il territorio africano e le sue rappresentazioni, Bergamo, 2–5 October 1997. 38
Bastien, Joseph William. *Mountain of the Condor: Metaphor and Ritual in an Andean Ayllu.* St. Paul, Minn.: West, 1978. 261, 269, 270
Bates, Daisy. *The Native Tribes of Western Australia.* Ed. Isobel White. Canberra: National Library of Australia, 1985. 355
Bauer, Brian S. "Ritual Pathways of the Inca: An Analysis of the Collasuyu *Ceques* in Cuzco." *Latin American Antiquity* 3 (1992): 183–205. 287
Bauer, Brian S., and David S. P. Dearborn. *Astronomy and Empire in the Ancient Andes: The Cultural Origins of Inca Sky Watching.* Austin: University of Texas Press, 1995. 287, 295
Beaglehole, J. C. *The Exploration of the Pacific.* London: A. and C. Black, 1934. 445
———. *See also* Cook, James; Banks, Joseph
Beattie, H. *Pioneer Recollections: Second Series, Dealing Chiefly with the Early Days of the Mataura Valley.* Gore, New Zealand: Gore Publishing, 1911. 504, 505
———. *Maori Place-Names of Otago.* Dunedin, 1944. 498, 521
———. *Maori Place-Names of Canterbury.* Dunedin, 1945. 521
———. *Maori Lore of Lake, Alp and Fiord: Folk Lore, Fairy Tales, Traditions and Place-Names of the Scenic Wonderland of the South Island.* Dunedin, 1945. Reprinted Christchurch: Cadsonbury, 1994. 518, 524
———. *Traditional Lifeways of the Southern Maori.* Ed. Atholl Anderson. Dunedin: University of Otago Press, 1994. 520
Beattie, Judith Hudson. "Indian Maps in the Hudson's Bay Company Archives." *Association of Canadian Map Libraries Bulletin* 55 (1985): 19–31. 143
———. "Indian Maps in the Hudson's Bay Company Archives: A Comparison of Five Area Maps Recorded by Peter Fidler, 1801–1802." *Archivaria* 21 (1985–86): 166–75. 132, 143
———. "The Indian Maps Recorded by Peter Fidler, 1801–1810." Unpublished paper presented at the Eleventh International Conference on the History of Cartography, Ottawa, July 1985. 132
Beechey, Frederick William. *Narrative of a Voyage to the Pacific and Beering's Strait.* London: H. Colburn and R. Bentley, 1831. 159
Beek, Walter E. A. van. "Dogon Restudied: A Field Evaluation of the Work of Marcel Griaule." *Current Anthropology* 32 (1991): 139–67. 26
Begay, Jimmie C. "The Relationship between People and the Land." *Akwesasne Notes* 11, no. 3 (1979): 28–29 and 13. 110
Beke, Charles T. "On the Nile and Its Tributaries." *Journal of the Royal Geographical Society* 17 (1847): 1–84. 35, 41
Bell, David. *Aboriginal Carved Trees of Southeastern Australia: A Research Report.* Sydney: National Parks and Wildlife Service, 1982. 355
Bellot, Joseph René. *Memoirs of Lieutenant Joseph René Bellot.* 2 vols. London: Hurst and Blackett, 1855. 157
Bellwood, Peter S. "The Colonization of the Pacific: Some Current Hypotheses." In *The Colonization of the Pacific: A Genetic Trail,* ed. Adrian V. S. Hill and Susan W. Serjeantson, 1–59. Oxford: Clarendon Press, 1989. 419
Belyea, Barbara. "Amerindian Maps: The Explorer as Translator." *Journal of Historical Geography* 18 (1992): 267–77. 56
———. "Inland Journeys, Native Maps," *Cartographica* 33, no. 2 (1996): 1–16. Also in *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 6. Chicago: University of Chicago Press, 1998. 52, 132

———. "Mapping the Marias." Forthcoming. 52

Benes, Peter. *New England Prospect: A Loan Exhibition of Maps at the Currier Gallery of Art, Manchester, New Hampshire.* Boston: Boston University for the Dublin Seminar for New England Folklife, 1981. 74

Benjamin, Joel. "The Naming of the Essequibo River." *Archaeology and Anthropology* 5 (1982): 29–66. 323

Bennett, Wendell C. "Engineering." In *Handbook of South American Indians,* 7 vols., ed. Julian Haynes Steward, 5:53–65. Washington, D.C.: United States Government Printing Office, 1949–59. 320

Benson, Elizabeth P. *The Mochica: A Culture of Peru.* New York: Praeger, 1972. 278

———, ed. *Mesoamerican Sites and World-Views.* Washington, D.C.: Dumbarton Oaks, 1981. 190

Berdan, Frances. "Glyphic Conventions of the *Codex Mendoza.*" In *The Codex Mendoza,* 4 vols., ed. Frances Berdan and Patricia Rieff Anawalt, 1:93–102. Berkeley: University of California Press, 1992. 199

Berdan, Frances, and Patricia Rieff Anawalt, eds. *The Codex Mendoza.* 4 vols. Berkeley: University of California Press, 1992. 193, 253

Berger, Uta. "The 'Map of Metlatoyuca'—A Mexican Manuscript in the Collection of the British Museum." *Cartographic Journal* 33 (1996): 39–49. 184

Berlin, Heinrich. "El glifo 'emblema' en las inscripciones mayas." *Journal de la Société des Américanistes,* n.s. 47 (1958): 111–19. 199

Berlo, Janet Catherine, ed. *Plains Indian Drawings, 1865–1935: Pages from a Visual History.* New York: Harry N. Abrams in association with the American Federation of Arts and the Drawing Center, 1996. 115, 118

Bernal-García, María Elena. "Carving Mountains in a Blue/Green Bowl: Mythological Urban Planning in Mesoamerica." 2 vols. Ph.D. diss., University of Texas, 1993. 190

Berndt, Ronald Murray. *Kunapipi: A Study of an Australian Aboriginal Religious Cult.* Melbourne: Cheshire, 1951. 411

———. *Djanggawul: An Aboriginal Religious Cult of North-eastern Arnhem Land.* Melbourne: Cheshire, 1952. 372, 411

———. "A Day in the Life of a Dieri Man before Alien Contact." *Anthropos* 48 (1953): 171–201. 383

———. "The Gove Dispute: The Question of Australian Aboriginal Land and the Preservation of Sacred Sites." *Anthropological Forum* 1 (1964): 258–95. 397, 398

———. *The Sacred Site: The Western Arnhem Land Example.* Canberra: Australian Institute of Aboriginal Studies, 1970. 390, 394, 397

———. "The Walmadjeri and Gugadja." In *Hunters and Gatherers Today: A Socioeconomic Study of Eleven Such Cultures in the Twentieth Century,* ed. M. G. Bicchieri, 177–216. New York: Holt, Rinehart and Winston, 1972. 395

———. *Australian Aboriginal Religion.* 4 fascs. Leiden: Brill, 1974. 354, 411

———. "Territoriality and the Problem of Demarcating Sociocultural Space." In *Tribes and Boundaries in Australia,* ed. Nicolas Peterson, 133–61. Canberra: Australian Institute of Aboriginal Studies, 1976. 395, 397

———. *Three Faces of Love: Traditional Aboriginal Song-Poetry.* Melbourne: Nelson, 1976. 410

Berndt, Ronald Murray, and Catherine Helen Berndt. "A Preliminary Report of Field Work in the Ooldea Region, Western South Australia." *Oceania* 12 (1941–42): 305–30; 13 (1942–43): 51–70, 143–69, 243–80, 362–75; 14 (1943–44): 30–66, 124–58, 220–49, 338–58; 15 (1944–45): 49–80, 154–65, 239–75. 393

———. "Aboriginal Art in Central-Western Northern Territory." *Meanjin* 9 (1950): 183–88. 395

———. *Arnhem Land: Its History and Its People.* Melbourne: F. W. Cheshire, 1954. 412, 413

———. *Man, Land and Myth in North Australia: The Gunwinggu People.* Sydney: Ure Smith, 1970. 395, 399, 401

———. *The World of the First Australians.* 4th rev. ed. Canberra: Aboriginal Studies Press, 1988. 359, 395

———. *The Speaking Land: Myth and Story in Aboriginal Australia.* 1st United States ed. Rochester, Vt.: Inner Traditions International, 1994. 369

Berndt, Ronald Murray, and Catherine Helen Berndt, with John E. Stanton. *Aboriginal Australian Art: A Visual Perspective.* Sydney: Methuen, 1982. 354, 358, 393, 395

Bernus, Edmond. *Les Illabakan (Niger): Une tribu touarègue sahélienne et son aire de nomadisation.* Atlas des Structures Agraires au Sud du Sahara 10. Paris: ORSTOM, 1974. 40

———. "Points cardinaux: Les critères de désignation chez les nomades touaregs et maures." *Bulletin des Etudes Africaines de l'INALCO* 1, no. 2 (1981): 101–6. 39, 40

———. "La représentation de l'espace chez des Touaregs du Sahel." *Mappemonde* 1988, no. 3, 1–5. 39

———. "Perception du temps et de l'espace par les Touaregs nomades sahéliens." In *Ethnogéographies,* ed. Paul Claval and Singaravélou, 41–50. Paris: Harmattan, 1995. 39, 40

Berrin, Kathleen, ed. *Feathered Serpents and Flowering Trees: Reconstructing the Murals of Teotihuacan.* San Francisco: Fine Arts Museums of San Francisco, 1988. 256

Berrin, Kathleen, and Esther Pasztory, eds. *Teotihuacan: Art from the City of the Gods.* Exhibition catalog. New York: Thames and Hudson, 1993. 256

Best, Elsdon. "The Maori System of Measurement." *New Zealand Journal of Science and Technology* 1 (1918): 26–32. 496

———. *The Astronomical Knowledge of the Maori.* Wellington: Government Printer, 1922. Reprinted 1978. 497

———. *The Maori as He Was: A Brief Account of Maori Life as It Was in Pre-European Days.* 1924; Wellington: Government Printer, 1974. 497

———. *Fishing Methods and Devices of the Maori.* 1929; New York: AMS Press, 1979. 496, 497

———. *Forest Lore of the Maori.* Ed. Johannes Carl Andersen. 1942. Reprinted Wellington: Government Printer, 1977. 530

Betanzos, Juan de. *Narrative of the Incas.* Trans. and ed. Roland Hamilton and Dana Buchanan. Austin: University of Texas Press, 1996. 285, 286, 289, 290

Biggar, Henry Percival, ed. *The Works of Samuel de Champlain.* 6 vols. Toronto: Champlain Society, 1922–36. 67, 68, 69, 72

Billon, Frederic L., comp. *Annals of St. Louis in Its Early Days under the French and Spanish Dominations.* St. Louis, 1886. 90

Binnema, Theodore. "Old Swan, Big Man, and the Siksika Bands, 1794–1815." *Canadian Historical Review* 77 (1966): 1–32. 132

Binney, Judith. "Te Kooti Arikirangi te Turuku, ?–1893." In *The People of Many Peaks: The Maori Biographies from "The Dictionary of New Zealand Biography, Volume 1, 1769–1869,"* 194–201. Wellington: Bridget Williams Books, 1991. 512

———. *Redemption Songs: A Life of Te Kooti Arikirangi te Turuki.* Auckland: Auckland University Press, 1995. 513

Bird, Junius Bouton. "Pre-ceramic Art from Huaca Prieta, Chicama Valley." *Ñawpa Pacha* 1 (1963): 29–34. 262

Bittmann Simons, Bente. "The Codex of Cholula: A Preliminary Study." *Tlalocan* 5 (1965–68): 267–339. 191

———. *Los mapas de Cuauhtinchan y la Historia tolteca-chichimeca.* Mexico City: Instituto Nacional de Antropología e Historia, 1968. 191, 219

Black, Lydia T. "Peoples of the Amur and Maritime Regions." In *Crossroads of Continents: Cultures of Siberia and Alaska,* ed.

William W. Fitzhugh and Aron Crowell, 24–31. Washington, D.C.: Smithsonian Institution Press, 1988. 344

Blakemore, Michael. "From Way-Finding to Map-Making: The Spatial Information Fields of Aboriginal Peoples." *Progress in Human Geography* 5 (1981): 1–24. 3, 55, 444

Blessing, Fred K. "Birchbark Mide Scrolls from Minnesota." *Minnesota Archaeologist* 25 (1963): 90–142. 181

Blier, Suzanne Preston. *The Anatomy of Architecture: Ontology and Metaphor in Batammaliba Architectural Expression.* Cambridge: Cambridge University Press, 1987. 27

Blodgett, Jean. *North Baffin Drawings.* [Toronto]: Art Gallery of Ontario, 1986. 170

Blust, Robert. "The Austronesian Homeland: A Linguistic Perspective." *Asian Perspectives* 26, no. 1 (1984–85): 45–67. 421

———. "Austronesian Culture History: The Window of Language." In *Prehistoric Settlement of the Pacific,* ed. Ward Hunt Goodenough, 28–35. Philadelphia: American Philosophical Society, 1996. 487

Boas, Franz. "The Central Eskimo." In *Sixth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, 1884–'85,* 409–669. Washington, D.C.: United States Government Printing Office, 1888. 155, 170

———. "America and the Old World." In *Congrès International des Américanistes: Compte-Rendu de la XXI^e Session, deuxième partie tenue a Göteborg en 1924,* 21–28. Göteborg: Göteborg Museum, 1925. 171

———. "Relationships between North-west America and North-east Asia." In *The American Aborigines: Their Origin and Antiquity,* ed. Diamond Jenness, 357–70. 1933. Reprinted New York: Russell and Russell, 1972. 171

Bockstoce, John, ed. *The Journal of Rochfort Maguire, 1852–1854.* 2 vols. Hakluyt Society Publications, ser. 2, nos. 169–70. London: Hakluyt Society, 1988. 157, 158

Bogoraz, V. G. "Ocherk material'nago byta olennykh Chukchey" (An outline of daily life of the reindeer Chukchi). *Sbornik Muzeya po Antropologii i Etnografii pri Imperatorskoy Akademii Nauk* (Publications of the Museum of Anthropology and Ethnography of the Imperial Academy of Sciences) 2 (1901). 341, 347

Boigu: Our History and Culture. Canberra: Aboriginal Studies Press, 1991. 428

Bolton, Herbert Eugene, ed. *Fray Juan Crespi: Missionary Explorer on the Pacific Coast, 1769–1774.* Berkeley: University of California Press, 1927. Reprinted New York: AMS Press, 1971. 113

Bonnemaison, Joël. *The Tree and the Canoe: History and Ethnogeography of Tanna.* Trans. and adapted Josée Pénot-Demetry. Honolulu: University of Hawai'i Press, 1994. 427

Boone, Elizabeth Hill. "Templo Mayor Research, 1521–1978." In *The Aztec Templo Mayor,* ed. Elizabeth Hill Boone, 5–69. Washington, D.C.: Dumbarton Oaks, 1987. 225

———. "Migration Histories as Ritual Performance." In *To Change Place: Aztec Ceremonial Landscapes,* ed. Davíd Carrasco, 121–51. Niwot: University Press of Colorado, 1991. 218

———. "The Aztec Pictorial History of the *Codex Mendoza.*" In *The Codex Mendoza,* 4 vols., ed. Frances Berdan and Patricia Rieff Anawalt, 1:35–54. Berkeley: University of California Press, 1992. 193, 194

———. "Glorious Imperium: Understanding Land and Community in Moctezuma's Mexico." In *Moctezuma's Mexico: Visions of the Aztec World,* by Davíd Carrasco and Eduardo Matos Moctezuma, 159–73. Niwot: University Press of Colorado, 1992. 193

———. "Manuscript Painting in Service of Imperial Ideology." In *Aztec Imperial Strategies,* by Frances Berdan et al., 181–206. Washington, D.C.: Dumbarton Oaks, 1993. 204

———. "Introduction: Writing and Recording Knowledge." In *Writing without Words: Alternative Literacies in Mesoamerica and the Andes,* ed. Elizabeth Hill Boone and Walter Mignolo, 3–26. Durham: Duke University Press, 1994. 183, 198

Boorstin, Daniel J. *The Image: A Guide to Pseudo-Events in America.* 25th anniversary ed. New York: Atheneum, 1987. 10

Bourne, Edward Gaylord, ed. *Narratives of the Career of Hernando de Soto.* 2 vols. Trans. Buckingham Smith. New York: A. S. Barnes, 1904. 95

Bouysse-Cassagne, Thérèse. "Urco and Uma: Aymara Concepts of Space." In *Anthropological History of Andean Polities,* ed. John V. Murra, Nathan Wachtel, and Jacques Revel, 201–27. Cambridge: Cambridge University Press, 1986. 280, 281

Brabant, Herbert William. "Report on the State of the Native Population in the Bay of Plenty and Lake Districts to the Under Secretary, Native Department, 31 May 1879." In *Appendix to the Journals of the House of Representatives of New Zealand,* G.1, 1879, session 1, 18. 529

Bradley, James H. "Arrapooash." *Contributions to the Historical Society of Montana* 9 (1923): 299–307. 53

Brailsford, Barry. *Greenstone Trails: The Maori Search for Pounamu.* Wellington: A. H. and A. W. Reed, 1984. 2d ed., *Greenstone Trails: The Maori and Pounamu.* Hamilton: Stoneprint Press, 1996. 499, 513, 524, 525

Brandt, John C. "Pictographs and Petroglyphs of the Southwest Indians." In *Astronomy of the Ancients,* ed. Kenneth Brecher and Michael Feirtag, 25–38. Cambridge: MIT Press, 1979. 65

Brasseaux, Carl A., ed., trans., and annotator. *A Comparative View of French Louisiana, 1699 and 1762: The Journals of Pierre Le Moyne d'Iberville and Jean-Jacques-Blaise d'Abbadie.* Lafayette: Center for Louisiana Studies, University of Southwestern Louisiana, 1979. 105

Bravo, Michael T. "Science and Discovery in the British Search for a North-west Passage, 1815–1825." Ph.D. diss., Cambridge University, 1992. 160

———. *The Accuracy of Ethnoscience: A Study of Inuit Cartography and Cross-Cultural Commensurability.* Manchester Papers in Social Anthropology, no. 2. Manchester: University of Manchester Department of Social Anthropology, 1996. 56, 160

Bray, Warwick. *The Gold of El Dorado.* Exhibition catalog. London: Times Newspapers, 1978. 324

Bray, William. "Observations on the Indian Method of Picture-Writing." *Archaeologia* 6 (1782): 159–62. 88

Breton, A. "The Wall Paintings at Chichen Itza." In *Congrès International de Américanistes, XV^e session,* 2 vols., 2:165–69. Quebec, 1907. 256

———. "The Ancient Frescos at Chichen Itza." In *Proceedings of the British Association for the Advancement of Science,* section H. Portsmouth, 1911. 256

Breuil, Henri. *The White Lady of Brandberg.* Rev. ed. Vol. 1 of *The Rock Paintings of Southern Africa.* Paris: Trianon Press, 1966. 14

Britt, Claude. "Early Navajo Astronomical Pictographs in Canyon De Chelly, Northeastern Arizona." In *Archaeoastronomy in Pre-Columbian America,* ed. Anthony F. Aveni, 89–197. Austin: University of Texas Press, 1975. 66

Broda, Johanna. "The Provenience of the Offerings: Tribute and *Cosmovisión.*" In *The Aztec Templo Mayor,* ed. Elizabeth Hill Boone, 211–56. Washington, D.C.: Dumbarton Oaks, 1987. 190

———. "Templo Mayor as Ritual Space." In *The Great Temple of Tenochtitlan: Center and Periphery in the Aztec World,* by Johanna Broda, Davíd Carrasco, and Eduardo Matos Moctezuma, 61–123. Berkeley: University of California Press, 1987. 190

Brodersen, Kai. *Terra Cognita: Studien zur romischen Raumerfassung.* Hildersheim: Georg Olms, 1995. 53

Brody, Hugh. *Maps and Dreams: Indians and the British Columbia*

Frontier. London: Jill Norman and Hobhouse, 1981. **56, 139**
Brosset, D. "La rose des vents chez les nomades sahariens." *Bulletin du Comité d'Études Historiques et Scientifiques de l'Afrique Occidentale Française* 11 (1928): 666–84. **39**
Brotherston, Gordon. *Image of the New World: The American Continent Portrayed in Native Texts.* London: Thames and Hudson, 1979. **109**
Browne, David M., Helaine Silverman, and Rubén Garcia. "A Cache of Forty-eight Nasca Trophy Heads from Cerro Carapo, Peru." *Latin American Antiquity* 4 (1993): 274–94. **278**
Brum, Raymond de (as told to Cynthia R. Olson). "Marshallese Navigation." *Micronesian Reporter* 10, no. 3 (May–June 1962): 18–23 and 27. **479, 482**
Brumbaugh, Robert. "'Afek Sang': The Old Woman's Legacy to the Mountain-Ok." In *Children of Afek: Tradition and Change among the Mountain-Ok of Central New Guinea,* ed. Barry Craig and David C. Hyndman, 54–87. Sydney: University of Sydney, 1990. **427**
Brun, Christian. "Dobbs and the Passage." *Beaver,* outfit 289 (autumn 1958): 26–29. **144**
Bruner, Jerome S. "On Cognitive Growth." In *Studies in Cognitive Growth: A Collaboration at the Center for Cognitive Studies,* ed. Jerome S. Bruner et al., 1–29. New York: John Wiley, 1966. **6**
Bryusov, A. Ya. *Istoriya drevney Karelii* (The history of ancient Karelia). Moscow, 1940. **331**
Budge, E. A. Wallis, trans. *The Queen of Sheba and Her Only Son Menyelek (I).* 2d ed. London: Oxford University Press, 1932. **30**
Bunge, William. *Theoretical Geography.* 2d ed. Lund, Sweden: Gleerup, 1966. **443**
Burger, Richard L. "Unity and Heterogeneity within the Chavín Horizon." In *Peruvian Prehistory: An Overview of Pre-Inca and Inca Society,* ed. Richard W. Keatinge, 99–144. Cambridge: Cambridge University Press, 1988. **273**
———. *Chavín and the Origins of Andean Civilization.* London: Thames and Hudson, 1992. **257, 271, 272, 273**
Burland, C. A. "The Map as a Vehicle of Mexican History." *Imago Mundi* 15 (1960): 11–18. **191, 193**
Burton, W. F. P. *Luba Religion and Magic in Custom and Belief.* Tervuren, Belg.: Musée Royal de l'Afrique Centrale, 1961. **32**
Bushnell, David I. "The Account of Lamhatty." *American Anthropologist,* n.s. 10 (1908): 568–74. **96**
Byland, Bruce E. "Political and Economic Evolution in the Tamazulapan Valley, Mixteca Alta, Oaxaca, Mexico: A Regional Approach." Ph.D. diss., Pennsylvania State University, 1980 **204.**
Byland, Bruce E., and John M. D. Pohl. *In the Realm of 8 Deer: The Archaeology of the Mixtec Codices.* Norman: University of Oklahoma Press, 1994. **191, 215**

Calnek, Edward E. "The Localization of the Sixteenth-Century Map Called the Maguey Plan." *American Antiquity* 38 (1973): 190–95. **224**
Cambage, R. H., and Henry Selkirk. "Early Drawings of an Aboriginal Ceremonial Ground." *Journal and Proceedings of the Royal Society of New South Wales* 54 (1920): 74–78. **355**
Campana, Cristóbal. *La cultura mochica.* Lima: Consejo Nacional de Ciencia y Tecnología, 1994. **279**
Campbell, R. Joe. *A Morphological Dictionary of Classical Nahuatl.* Madison: Hispanic Seminary of Medieval Studies, 1985. **187**
Campbell, Shirley F. "Attaining Rank: A Classification of Kula Shell Valuables." In *The Kula: New Perspectives on Massim Exchange,* ed. Jerry W. Leach and Edmund L. Leach, 229–48. Cambridge: Cambridge University Press, 1983. **431**
Campbell, T. D., and P. S. Hossfeld. "Australian Aboriginal Stone Arrangements in North-west South Australia." *Transactions of the Royal Society of South Australia* 90 (1966): 171–78. **356**
Campbell, T. D., and Charles Pearcy Mountford. "Aboriginal Arrangements of Stones in Central Australia." *Transactions of the Royal Society of South Australia* 63 (1939): 17–21. **356, 411**
Cantova, Juan Antonio. "Lettre du P. Jean Antoine Cantova, missionnaire . . . au R. P. Guillaume Daubenton . . . 20 de mars 1722." In *Lettres édifiantes et curieuses, écrites des missions étrangères, par quelques missionnaires de la Compagnie de Jésus,* 34 vols., 18:188–247. Paris, 1702–76. **453, 454**
Carlson, John B. "Lodestone Compass: Chinese or Olmec Primacy?" *Science* 189 (1975): 753–60. **201**
Carrasco, Davíd. *Quetzalcoatl and the Irony of Empire: Myths and Prophecies in the Aztec Tradition.* Chicago: University of Chicago Press, 1982. **189**
———. *Religions of Mesoamerica: Cosmovision and Ceremonial Centers.* New York: Harper and Row, 1990. **189**
Carrier, James G., and Achsah H. Carrier. "Every Picture Tells a Story: Visual Alternatives to Oral Tradition in Ponam Society." *Oral Tradition* 5 (1990): 354–75. **429**
Carrión Cachot de Girard, Rebeca. *El culto al agua en el antiguo Perú: La Paccha elemento cultural pan-andino.* Lima: Museo Nacional de Antropología y Arqueología, 1955. **288**
Caruana, Wally. *Aboriginal Art.* London: Thames and Hudson, 1993. **354, 400, 405**
Carver, Jonathan. *Travels through the Interior Parts of North-America, in the Years 1766, 1767, and 1768.* London, 1778. **145**
———. *Travels through the Interior Parts of North America in the Years 1766, 1767 and 1768.* 3d ed. London: C. Dilly, 1781. **88**
Casas, Bartolomé de las. *Historia de las Indias.* 3 vols. Hollywood, Fla.: Ediciones del Continente, 1985. **320**
Caso, Alfonso. "El Mapa de Teozacoalco." *Cuadernos Americanos* 47, no. 5 (año 8) (1949): 145–81. **190, 210, 249**
———. "Vida y aventuras de 4 Viento 'Serpiente de Fuego.'" In *Miscelánea de estudios dedicados a Fernando Ortíz,* 3 vols., 1:289–98. Havana, 1955–57. **208**
———. *Los lienzos mixtecos de Ihuitlan y Antonio de León.* Mexico City: Instituto Nacional de Antropología e Historia, 1961. **251**
———. *Reyes y reinos de la Mixteca.* 2 vols. Mexico City: Fondo de Cultura Económica, 1977–79. **190, 199, 208, 215, 251**
Castillo F., Victor M. "Unidades nahuas de medida." *Estudios de Cultura Náhuatl* 10 (1972): 195–223. **203**
Certeau, Michel de. *The Practice of Everyday Life.* Trans. Steven F. Rendall. Berkeley: University of California Press, 1984. **4**
Chaloupka, George. *Journey in Time: The World's Longest Continuing Art Tradition.* Chatswood: Reed, 1993. **357, 374**
Chamberlain, Von Del. *When Stars Came down to Earth: Cosmology of the Skidi Pawnee Indians of North America.* Los Altos, Calif.: Ballena Press, 1982. **125**
———. "Navajo Constellations in Literature, Art, Artifact and a New Mexico Rock Art Site." *Archaeoastronomy* 6 (1983): 48–58. **65, 67**
———. "Navajo Indian Star Ceilings." In *World Archaeoastronomy,* ed. Anthony F. Aveni, 331–40. Cambridge: Cambridge University Press, 1989. **65, 66**
———. "The Chief and His Council: Unity and Authority from the Stars." In *Earth and Sky: Visions of the Cosmos in Native American Folklore,* 221–35. Albuquerque: University of New Mexico Press, 1992. **53, 125**
Champlain, Samuel de. *Des Savvages; ov, Voyage de Samvel Champlain de Brovage, fait en la France nouuelle, l'an mil six cens trois.* Paris: Claude de Monstr'oeil, 1603. **70**
Chandless, William. "Ascent of the River Purûs." *Journal of the Royal Geographical Society* 36 (1866): 86–118. **320**
Chang, Kwang-chih, and Ward Hunt Goodenough. "Archaeology of Southeastern Coastal China and Its Bearing on the Austronesian

Homeland." In *Prehistoric Settlement of the Pacific,* ed. Ward Hunt Goodenough, 36–56. Philadelphia: American Philosophical Society, 1996. **421**

Chatwin, Bruce. *The Songlines.* New York: Viking, 1987. **361**

Chaussonnet, Valérie, and Bernadette Driscoll. "The Bleeding Coat: The Art of North Pacific Ritual Clothing." In *Anthropology of the North Pacific Rim,* ed. William W. Fitzhugh and Valérie Chaussonnet, 109–31. Washington, D.C.: Smithsonian Institution Press, 1994. **334, 336**

Chevallier, Raymond. "The Greco-Roman Conception of the North from Pytheas to Tacitus." In *Unveiling the Arctic,* ed. Louis Rey, 341–46. Fairbanks: University of Alaska Press for the Arctic Institute of North America, 1984. **330**

Chewings, Charles. "A Journey from Barrow Creek to Victoria River." *Geographical Journal* 76 (1930): 316–38. **407**

Cieza de León, Pedro de. *The Incas of Pedro de Cieza de León.* Trans. Harriet de Onis. Ed. Victor Wolfgang von Hagen. Norman: University of Oklahoma Press, 1959. **284, 289, 290**

[Clapperton, Hugh]. "Captain Clapperton's Narrative." In *Narrative of Travels and Discoveries in Northern and Central Africa, in the Years 1822, 1823, and 1824,* by Dixon Denham, Hugh Clapperton, and Walter Oudney, 1–138 (2d pagination). London: John Murray, 1826. **34, 35**

———. "Translation of an Arabic MS. Brought by Captain Clapperton." In *Narrative of Travels and Discoveries in Northern and Central Africa, in the Years 1822, 1823, and 1824,* by Dixon Denham, Hugh Clapperton, and Walter Oudney, app. 12 (pp. 158–67, 2d pagination). London: John Murray, 1826. **35**

Clark, Kenneth. *Landscape into Art.* Mitcham, Victoria: Penguin Books, 1949. **363**

Clarkson, Persis Banvard. "The Archaeology of the Nazca Pampa: Environmental and Cultural Parameters." In *The Lines of Nazca,* ed. Anthony F. Aveni, 115–72. Philadelphia: American Philosophical Society, 1990. **6, 276**

Classen, Constance. *Inca Cosmology and the Human Body.* Salt Lake City: University of Utah Press, 1993. **268**

Clastres, Hélène. *The Land-without-Evil: Tupí-Guaraní Prophetism.* Trans. Jacqueline Grenez Brovender. Urbana: University of Illinois Press, 1995. **313**

Clay, Brenda Johnson. *Pinikindu: Maternal Nurture, Paternal Substance.* Chicago: University of Chicago Press, 1975. **442**

Clendinnen, Inga. *Aztecs: An Interpretation.* Cambridge: Cambridge University Press, 1991. **232**

Clifford, James. "Power and Dialogue in Ethnography: Marcel Griaule's Initiation." In *Observers Observed: Essays on Ethnographic Fieldwork,* ed. George W. Stocking, 121–56. Madison: University of Wisconsin Press, 1983. **26**

Cline, Howard Francis. "Colonial Mazatec Lienzos and Communities." In *Ancient Oaxaca: Discoveries in Mexican Archeology and History,* ed. John Paddock, 270–97. Stanford: Stanford University Press, 1966. **245**

———. "The Oztoticpac Lands Map of Texcoco, 1540." *Quarterly Journal of the Library of Congress,* 1966, 77–115. Reprinted in *A la Carte: Selected Papers on Maps and Atlases,* comp. Walter W. Ristow, 5–33. Washington, D.C.: Library of Congress, 1972. **203, 253**

Cobo, Bernabé. *History of the Inca Empire: An Account of the Indians' Customs and Their Origin, Together with a Treatise on Inca Legends, History, and Social Institutions.* Trans. and ed. Roland Hamilton. Austin: University of Texas Press, 1979. **263, 281, 284, 289, 290**

———. *Inca Religion and Customs.* Trans. and ed. Roland Hamilton. Austin: University of Texas Press, 1990. **263, 268, 281, 284**

Codex Borgia: Biblioteca Apostolica Vaticana (Messicano Riserva 28). Graz: Akademische Druck- u. Verlagsanstalt, 1976. **200, 253**

Codex Borgia. See also Seler, Eduard

Codex Fejérváry-Mayer: M 12014 City of Liverpool Museums. Graz: Akademische Druck- u. Verlagsanstalt, 1971. **253**

Codex Fejérváry-Mayer. See also Seler, Eduard

Codex Ixtlan. Facsimile ed. Maya Society Publications 3. Baltimore: Johns Hopkins University Press, 1931. **251**

Codex Meixuero. Facsimile ed. Maya Society Publications 4. Baltimore: Johns Hopkins University Press, 1931. **251**

Codex Mendoza. See Berdan, Frances, and Patricia Rieff Anawalt, eds.

Codex Tro-Cortesianus (Codex Madrid). Graz: Akademische Druck- u. Verlagsanstalt, 1967. **255**

Códice Kingsborough. See Paso y Troncoso, Francisco del, ed.

Códice Xolotl. See Dibble, Charles E., ed.

Coe, Michael D. "The Funerary Temple among the Classic Maya." *Southwestern Journal of Anthropology* 12 (1956): 387–94. **234**

———. *Breaking the Maya Code.* New York: Thames and Hudson, 1992. **198**

Cohodas, Marvin. *The Great Ball Court at Chichen Itza, Yucatan, Mexico.* New York: Garland, 1978. **256**

Collins, David. *An Account of the English Colony in New South Wales.* 2 vols. Ed. Brian H. Fletcher. 1798–1802; Sydney: A. H. and A. W. Reed, 1975. **494, 508**

Collinson, Richard. *Journal of H.M.S. "Enterprise," on the Expedition in Search of Sir John Franklin's Ships by Behring Strait, 1850–55.* Ed. T. B. Collinson. London: S. Low, Marston, Searle, and Rivington, 1889. **157**

Colson, Audrey Butt, and Cesáreo de Armellada. "The Pleiades, Hyades and Orion (Tamökan) in the Conceptual and Ritual System of Kapon and Pemon Groups in the Guiana Highlands." *Scripta Ethnologica: Supplementa* 9 (1989): 153–200. **305**

Comeau, Napoleon A. *Life and Sport on the North Shore of the Lower St. Lawrence and Gulf.* 3d ed. Quebec: Telegraph Printing, 1954. **139, 141**

Conklin, William J. "The Information System of Middle Horizon Quipus." In *Ethnoastronomy and Archaeoastronomy in the American Tropics,* ed. Anthony F. Aveni and Gary Urton, 261–81. New York: New York Academy of Sciences, 1982. **290**

Conti Rossini, Carlo. "Geographica." *Rassegna di Studi Etiopici* 3 (1943): 167–99. **28, 47**

Cook, Anita Gwynn. *Wari y Tiwanaku: Entre el estilo y la imagen.* Lima: Pontificia Universidad Católica del Peru, Fondo Editorial, 1994. **284**

Cook, James. *The Journals of Captain James Cook on His Voyages of Discovery.* 4 vols. Ed. J. C. Beaglehole. Hakluyt Society, extra ser. nos. 34–37. London: Hakluyt Society, 1955–74. **445, 446, 447, 448, 450, 451**

———. *The Journals of Captain James Cook on His Voyages of Discovery: Charts and Views Drawn by Cook and His Officers and Reproduced from the Original Manuscripts.* Ed. R. A. Skelton. Cambridge: Cambridge University Press, 1955. **447**

Cooke, Peter, and Jon Altman, eds. *Aboriginal Art at the Top: A Regional Exhibition.* Maningrida: Maningrida Arts and Crafts, 1982. **358**

Cooley, William Desborough. *Inner Africa Laid Open.* 1852. Reprinted New York: Negro Universities Press, 1969. **38**

Cooper, Carol. "Art of Temperate Southeast Australia." In *Aboriginal Australia,* by Carol Cooper et al., 29–40. Sydney: Australian Gallery Directors Council, 1981. **355, 356**

———. *Aboriginal and Torres Strait Islander Collections in Overseas Museums.* Canberra: Aboriginal Studies Press, 1989. **359**

———. "Traditional Visual Culture in South-east Australia." In *Aboriginal Artists of the Nineteenth Century,* by Andrew Sayers, 91–109. Melbourne: Oxford University Press in association with

the National Gallery of Australia, 1994. **355, 356**
Cooper, John M. "Northern Algonkian Scrying and Scapulimancy." In *Festschrift, publication d'hommage offerte au P. W. Schmidt,* ed. William Koppers, 205–17. Vienna: Mechitharisten- Congregations-Buchdruckerei, 1928. **142**
———. "Scapulimancy." In *Essays in Anthropology Presented to A. L. Kroeber in Celebration of His Sixtieth Birthday, June 11, 1936,* ed. Robert H. Lowie, 29–43. Berkeley: University of California Press, 1936. Reprinted, 1968. **139**
Copway, George. *The Traditional History and Characteristic Sketches of the Ojibway Nation.* London: Charles Gilpin, 1850. **82**
Copy of the Robinson Treaty Made in the Year 1850 with the Ojibewa Indians of Lake Huron Conveying Certain Lands to the Crown. 1939. Reprinted Ottawa: Queen's Printer, 1964. **79**
Córdoba, Juan de. *Vocabulario castellano-zapoteco.* Ed. Wigberto Jiménez Moreno. Fascimile of 1578 ed. Mexico City: Instituto Nacional de Antropología e Historia, 1942. **185, 187**
Corney, Bolton Glanvill, ed. and trans. *The Quest and Occupation of Tahiti by Emissaries of Spain during the Years 1772–1776.* 3 vols. Hakluyt Society Publications, ser. 2, nos. 32, 36, 43. London: Hakluyt Society, 1913–18. **497**
Cortés, Hernán. *Letters from Mexico.* Rev. ed. Trans. and ed. Anthony Pagden. New Haven: Yale University Press, 1986. **187, 228, 229**
Couclelis, Helen. "Verbal Directions for Way-Finding: Space, Cognition, and Language." In *The Construction of Cognitive Maps,* ed. Juval Portugali, 133–53. Dordrecht: Kluwer Academic, 1996. **4**
Council Fire: A Resource Guide. Brantford, Ont.: Woodland Culture Centre, 1989. **81, 89, 90**
Cowan, James. "Maori Place-Names: With Special Reference to the Great Lakes and Mountains of the South Island." *Transactions and Proceedings of the New Zealand Institute* 38 (1905): 113–20. **506**
Cowan, Thaddeus M. "Effigy Mounds and Stellar Representation: A Comparison of Old World and New World Alignment Schemes." In *Archaeoastronomy in Pre-Columbian America,* ed. Anthony F. Aveni, 217–35. Austin: University of Texas Press, 1975. **95**
Craib, John L. "Micronesian Prehistory: An Archeological Overview," *Science* 219 (1983): 922–27. **421**
Crozet, Julien Marie. *Nouveau voyage à la Mer du Sud.* Ed. Alexis Marie de Rochon. Paris: Barrois, 1783. **445**
Cumming, William Patterson, R. A. Skelton, and David B. Quinn. *The Discovery of North America.* New York: American Heritage Press, 1971. **70**
Cummins, Tom. "Representation in the Sixteenth Century and the Colonial Image." In *Writing without Words: Alternative Literacies in Mesoamerica and the Andes,* ed. Elizabeth Hill Boone and Walter D. Mignolo, 188–219. Durham: Duke University Press, 1994. **258, 294, 295**

Dahlgren de Jordán, Barbro. *La Mixteca: Su cultura e historia prehispánicas.* Mexico City: Imprenta Universitaria, 1954. **253**
D'Altroy, Terence N., and Timothy K. Earle. "Staple Finance, Wealth Finance, and Storage in the Inka Political Economy." In *Inka Storage Systems,* ed. Terry Y. LeVine, 31–61. Norman: University of Oklahoma Press, 1992. **257**
Da Matta, Roberto. *A Divided World: Apinayé Social Structure.* Trans. Alan Campbell Cambridge: Harvard University Press, 1982. **311, 317**
Damon, Frederick H. *From Muyuw to the Trobriands: Transformations along the Northern Side of the Kula Ring.* Tucson: University of Arizona Press, 1990. **427, 435**
Davenport, William. "Marshall Islands Navigational Charts." *Imago Mundi* 15 (1960): 19–26. **476, 478, 479, 485**
David, Andrew, ed. *The Charts & Coastal Views of Captain Cook's Voyages.* Vol. 1, *The Voyage of the Endeavour, 1768–1771.* London: Hakluyt Society in association with the Australian Academy of the Humanities, 1988. **501**
Davidson, Daniel Sutherland. *A Preliminary Consideration of Aboriginal Australian Decorative Art.* Phildelphia: American Philosophical Society, 1937. **381**
Davidson, George. "Explanation of an Indian Map." *Mazama* 2 (1900–1905): 75–82. **115**
Davidson, Janet. *The Prehistory of New Zealand.* Auckland: Longman Paul, 1984. **493**
Davies, John. *A Tahitian and English Dictionary.* Tahiti: London Missionary Society's Press, 1851. **450**
Davies, Nigel. *The Aztecs: A History.* London: Macmillan, 1973. Reprinted Norman: University of Oklahoma Press, 1980. **205**
Davis, Te Aue, Tipene O'Regan, and John Wilson. *Ngā Tohu Pūmahara: The Survey Pegs of the Past.* Wellington: New Zealand Geographic Board, 1990. **498, 539**
Davis, Whitney. "Representation and Knowledge in the Prehistoric Rock Art of Africa." *African Archaeological Review* 2 (1984): 7–35. **26**
———. "The Study of Rock Art in Africa." In *A History of African Archaeology,* ed. Peter Robertshaw, 271–95. London: James Currey, 1990. **26**
Day, Cyrus Lawrence. *Quipus and Witches' Knots: The Role of the Knot in Primitive and Ancient Cultures.* Lawrence: University of Kansas Press, 1967. **289**
Deacon, Janette. "'My Place is the Bitterpits': The Home Territory of Bleek and Lloyd's /Xam San Informants." *African Studies* 45 (1986): 135–55. **23**
Delanglez, Jean, trans. and ed. *The Journal of Jean Cavelier: The Account of a Survivor of La Salle's Texas Expedition, 1684–1688.* Chicago: Institute of Jesuit History, 1938. **95**
Delano Smith, Catherine. "Cartography in the Prehistoric Period in the Old World: Europe, the Middle East, and North Africa." In *The History of Cartography,* ed. J. B. Harley and David Woodward, 1:54–101. Chicago: University of Chicago Press, 1987–. **19, 57, 274, 331**
———. "Prehistoric Cartography in Asia." In *The History of Cartography,* ed. J. B. Harley and David Woodward, vol. 2.2 (1994), 1–22. Chicago: University of Chicago Press, 1987–. **19, 331**
DeMallie, Raymond J. "Touching the Pen: Plains Indian Treaty Councils in Ethnohistorical Perspective." In *Ethnicity on the Great Plains,* ed. Frederick C. Luebke, 38–53. Lincoln: University of Nebraska Press, 1980. **53**
Denevan, William M. "Aboriginal Drained-Field Cultivation in the Americas." *Science* 169 (1970): 647–54. **257**
———. "Terrace Abandonment in the Colca Valley, Peru." In *Pre-Hispanic Agricultural Fields in the Andean Region: Proceedings, 45 Congreso Internacional de Américanistas, International Congress of Americanists, Bogotá, Colombia, 1985.* 2 vols., ed. William M. Denevan, Kent Mathewson, and Gregory Knapp, 1:1–43. Oxford: BAR, 1987. **257**
———, ed. *The Native Population of the Americas in 1492.* 2d ed. Madison: University of Wisconsin Press, 1992. **257**
Denevan, William M., Kent Mathewson, and Gregory Knapp, eds. *Pre-Hispanic Agricultural Fields in the Andean Region: Proceedings, 45 Congreso Internacional de Américanistas, International Congress of Americanists, Bogotá, Colombia, 1985.* 2 vols. Oxford: BAR, 1987. **257**
Dening, Greg M. "The Geographical Knowledge of the Polynesians and the Nature of Inter-island Contact." In *Polynesian Navigation: A Symposium on Andrew Sharp's Theory of Accidental Voyages,* ed. Jack Golson, rev. ed., 102–53. Wellington: Polynesian Society, 1963. **449**

Densmore, Frances. *Chippewa Customs.* Bulletin of the Smithsonian Institution Bureau of American Ethnology 86. Washington, D.C.: United States Government Printing Office, 1929. **142**

Descola, Philippe. *In the Society of Nature: A Native Ecology in Amazonia.* Trans. Nora Scott. Cambridge: Cambridge University Press, 1994. **303**

De Vorsey, Louis. *The Indian Boundary in the Southern Colonies, 1763–1775.* Chapel Hill: University of North Carolina Press, 1966. **105**

———. "Amerindian Contributions to the Mapping of North America: A Preliminary View." *Imago Mundi* 30 (1978): 71–78. **55**

———. "La Salle's Cartography of the Lower Mississippi: Product of Error or Deception?" In *The American South,* ed. Richard L. Nostrand and Sam B. Hilliard, 5–23. Geoscience and Man 25. Baton Rouge: Department of Geography and Anthropology, Louisiana State University, 1988. **103**

———. "Native American Maps and World Views in the Age of Encounter." *Map Collector* 58 (1992): 24–29. **55**

———. "Silent Witnesses: Native American Maps." *Georgia Review* 46 (1992): 709–26. **55, 95**

Dewdney, Selwyn. *The Sacred Scrolls of the Southern Ojibway.* Toronto: University of Toronto Press, 1975. **82, 83, 84, 181**

Díaz del Castillo, Bernal. *The True History of the Conquest of New Spain.* 5 vols. Ed. Genaro García. Trans. Alfred Percival Maudslay. Hakluyt Society Publications, ser. 2, nos. 23, 24, 25, 30, and 40. London: Hakluyt Society, 1908–16. **187, 229, 253**

Díaz de Salas, Marcelo, and Luís Reyes García. "Testimonio de la fundación de Santo Tomás Ajusco." *Tlalocan* 6 (1970): 193–212. **220**

Dibble, Charles E. "Writing in Central Mexico." In *Handbook of Middle American Indians,* vol. 10, ed. Gordon F. Ekholm and Ignacio Bernal, 322–32. Austin: University of Texas Press, 1971. **198, 199**

———. "The Syllabic-Alphabetic Trend in Mexican Codices." In *Atti del XL Congresso Internazionale degli Americanisti (1972),* 4 vols., 1:373–78. Genoa: Tilgher, 1973–76. **199**

———, ed. *Códice Xolotl.* 2d ed. 2 vols. Mexico City: Instituto de Investigaciones Históricas, Universidad Nacional Autónoma de Mexico, 1980. **205, 249**

Diccionario de motul. Manuscript in the John Carter Brown Library, Providence, Rhode Island. Photostat, 6 vols., in the New York Public Library. **185**

Dieffenbach, Ernst. "An Account of the Chatham Islands." *Journal of the Royal Geographical Society of London* 11 (1841): 195–215. **503, 504**

———. *Travels in New Zealand: With Contributions to the Geography, Geology, Botany and Natural History of That Country.* 2 vols. London: John Murray, 1843. Reprinted Christchurch: Capper Press, 1974. **496**

Dilke, O. A. W. "Geographical Perceptions of the North in Pomponius Mela and Ptolemy." In *Unveiling the Arctic,* ed. Louis Rey, 347–51. Fairbanks: University of Alaska Press for the Arctic Institute of North America, 1984. **330**

———. "Cartography in the Ancient World: A Conclusion." In *The History of Cartography,* ed. J. B. Harley and David Woodward, 1:276–79. Chicago: University of Chicago Press, 1987–. **37**

———. "The Culmination of Greek Cartography in Ptolemy." In *The History of Cartography,* ed. J. B. Harley and David Woodward, 1:177–200. Chicago: University of Chicago Press, 1987–. **37**

Dobbs, Arthur. *An Account of the Countries Adjoining to Hudson's Bay.* London: J. Robinson, 1744. **145**

Dodge, Richard Irving. *The Plains of the Great West and Their Inhabitants.* New York: G. P. Putnam's Sons, 1877. **129**

Donkin, R. A. *Agricultural Terracing in the Aboriginal New World.* Tucson: University of Arizona Press, 1989. **257**

Donnan, Christopher B. *Moche Art of Peru: Pre-Columbian Symbolic Communication.* Rev. ed. Los Angeles: Museum of Cultural History, University of California, Los Angeles, 1978. **278, 279**

Downs, Roger M., and David Stea, eds. *Image and Environment: Cognitive Mapping and Spatial Behavior.* Chicago: Aldine, 1973. **3**

Dowson, Thomas A. "New Light on the 'Thin Red Line': Neuropsychology and Ethnography." B.Sc. honors thesis, University of Witwatersrand, 1988. **16**

Dowson, Thomas A., and David Lewis-Williams. "Diversity in Southern African Rock Art Research." In *Contested Images: Diversity in Southern African Rock Art Research,* ed. Thomas A. Dowson and David Lewis-Williams, 1–8. Johannesburg: Witwatersrand University Press, 1994. **26**

Drechsel, Emanuel J. "A Preliminary Sociolinguistic Comparison of Four Indigenous Pidgin Languages of North America." *Anthropological Linguistics* 23 (1981): 93–112. **99**

Drewal, Henry John. "Art and Divination among the Yoruba: Design and Myth." *Africana Journal* 14 (1987): 139–56. **28**

Dröber, Wolfgang. *Kartographie bei den Naturvölkern.* 1903. Reprinted Amsterdam: Meridian, 1964. **37, 55, 492**

———. "Kartographie bei den Naturvölkern." *Deutsche Geographische Blätter* 27 (1904): 29–46. **55**

Dubelaar, C. N. *South American and Caribbean Petroglyphs.* Caribbean Series 3. Dordrecht: Foris, 1986. **309**

Duff, Roger. *The Moa-Hunter Period of Maori Culture.* 3d ed. Wellington: Government Printer, 1977. **497**

Dugast, Idellette, and Mervyn David Waldegrave Jeffreys. *L'écriture des Bamum: Sa naissance, son évolution, sa valeur phonétique, son utilisation.* Mémoires de l'Institut Français d'Afrique Noire (Centre du Cameroun), Populations, no. 4 (1950). **41, 42, 43**

Dumont d'Urville, Jules Sébastien César. *Voyage de la corvette "l'Astrolabe" . . . pendant les années 1826–1827–1828–1829.* 5 vols. Paris: J. Tastu, 1830–33. **419**

Dundes, Alan. "A Psychoanalytic Study of the Bullroarer." *Man,* n.s. 11 (1976): 220–38. **441**

Dupuis, Joseph. *Journal of a Residence in Ashantee.* London: H. Colburn, 1824. **38, 39**

Durán, Diego. *"Book of the Gods and Rites" and "The Ancient Calendar."* Ed. and trans. Fernando Horcasitas and Doris Heyden. Norman: University of Oklahoma Press, 1971. **232**

Duryea, Chester B. "Au sujet de la calebasse sacrée des Iles Hawai." *Bulletin de la Société d'Études Océaniennes* 7 (1947): 289–910 (letter by Chester B. Duryea and response by Peter H. Buck). **486**

Duveyrier, Henri. *Exploration du Sahara: Les Touareg du Nord.* Paris: Challamel Ainé, 1864. **38**

Dzeniskevich, Galina I. "American-Asian Ties as Reflected in Athapaskan Material Culture." In *Anthropology of the North Pacific Rim,* ed. William W. Fitzhugh and Valérie Chaussonnet, 53–62. Washington, D.C.: Smithsonian Institution Press, 1994. **171**

Earls, John, and Irene Marsha Silverblatt. "La realidad física y social en la cosmología andina." In vol. 4 of *Actes du XLII*[e] *Congrès International des Américanistes (1976),* 299–325. Paris: Société des Américanistes, 1978. **295**

Edney, Matthew H. "Cartography without 'Progress': Reinterpreting the Nature and Historical Development of Mapmaking." *Cartographica* 30, nos. 2–3 (1993): 54–68. **2**

Eliade, Mircea. *Patterns in Comparative Religion.* Trans. Rosemary Sheed. New York: Sheed and Ward, 1958. **538**

———. *Shamanism: Archaic Techniques of Ecstasy.* Trans. Willard R. Trask. New York: Bollingen Foundation, 1964. **538**

Elkin, A. P. "Cult-Totemism and Mythology in Northern South Aus-

tralia." *Oceania* 5 (1934–35): 171–92. **383, 384**
Elmberg, John-Erik. *Balance and Circulation: Aspects of Tradition and Change among the Mejprat of Irian Barat.* Stockholm: Ethnographical Museum, 1968. **435**
Elsasser, Albert B., ed. *The Alonso de Santa Cruz Map of Mexico City and Environs, Dating from 1550.* Berkeley, Calif.: Lowie Museum of Anthropology, 1974. **244**
Emory, Kenneth Pike, and Yosihiko H. Sinoto. "Eastern Polynesian Burials at Maupiti." *Journal of the Polynesian Society* 73 (1964): 143–60. **497**
Enright, W. J. "Notes on the Aborigines of the North Coast of New South Wales." *Mankind* 2 (1936–40): 88–91. **355**
Erhardt, James [Jakob]. "Reports respecting Central Africa, as Collected in Mambara and on the East Coast, with a New Map of the Country." *Proceedings of the Royal Geographical Society* 1 (1855–57): 8–10. **41**
Erwin, Richard P. "Indian Rock Writing in Idaho." In *Twelfth Biennial Report of the Board of Trustees of the State Historical Society of Idaho for the Years 1929–30,* 35–111. Boise, 1930. **62**
Escalante Moscoso, Javier F. *Arquitectura prehispánica en los Andes bolivianos.* La Paz, Bolivia: CIMA, 1993. **283**
Etheridge, Robert. *The Dendroglyphs, or "Carved Trees" of New South Wales.* Sydney: W. A. Gullick, 1918. **355**
Evison, Harry C. "Mackay, James, 1831–1912." In *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869,* 252–53. Wellington: Allen and Unwin, 1990. **525**
———. *Te Wai Pounamu, the Greenstone Island: A History of the Southern Maori during the European Colonization of New Zealand.* Christchurch: Aoraki Press, 1993. **495**
Ezra, Kate. *Art of the Dogon: Selections from the Lester Wunderman Collection.* New York: Metropolitan Museum of Art, 1988. **27**

Fabian, Michael. *Space-Time of the Bororo of Brazil.* Gainesville: University Press of Florida, 1992. **305**
Farriss, Nancy M. *Maya Society under Colonial Rule: The Collective Enterprise of Survival.* Princeton: Princeton University Press, 1984. **228**
Fell, Barry. *Saga America.* New York: Times Books, 1980. **62**
Fernández-Armesto, Felipe, ed. *The Times Atlas of World Exploration: 3,000 Years of Exploring, Explorers, and Mapmaking.* New York: HarperCollins, 1991. **330**
Ferrand, Gabriel. *Le K'ouen-louen et les anciennes navigations interocéaniques dans les Mers du Sud.* Paris: Imprimerie Nationale, 1919. **488**
Fewkes, Jesse Walter. "The Aborigines of Porto Rico and Neighboring Islands," in the *Twenty-fifth Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1903–04* (Washington, D.C.: United States Printing Office, 1907), 3–220. **318**
Finnegan, Ruth H. *Oral Traditions and the Verbal Arts: A Guide to Research Practices.* London: Routledge, 1992. **2**
Finney, Ben R. "Voyaging Canoes and the Settlement of Polynesia." *Science* 196 (1977): 1277–85. **444, 461**
———. *Hokule'a: The Way to Tahiti.* New York: Dodd, Mead, 1979. **460, 474**
———. "James Cook and the European Discovery of Polynesia." In *From Maps to Metaphors: The Pacific World of George Vancouver,* ed. Robin Fisher and Hugh Johnston, 19–34. Vancouver: University of British Columbia Press, 1993. **443**
———. "Rediscovering Polynesian Navigation through Experimental Voyaging." *Journal of Navigation* 46 (1993): 383–94. **444**
———. "Voyaging and Isolation in Rapa Nui Prehistory." *Rapa Nui Journal* 7 (1993): 1–6. **461**
———. *Voyage of Rediscovery: A Cultural Odyssey through Polynesia.* Berkeley: University of California Press, 1994. **421, 444, 451, 455**
———. "Colonizing an Island World." In *Prehistoric Settlement of the Pacific,* ed. Ward Hunt Goodenough, 71–116. Philadelphia: American Philosophical Society, 1996. **418, 420, 444, 451**
Finney, Ben R., et al. "Re-learning a Vanishing Art." *Journal of the Polynesian Society* 95 (1986): 41–90. **461**
Fisher, Raymond H. "The Early Cartography of the Bering Strait Region." In *Unveiling the Arctic,* ed. Louis Rey, 574–89. Fairbanks: University of Alaska Press for the Arctic Institute of North America, 1984. **330**
Fitzhugh, William W. "Comparative Art of the North Pacific Rim." In *Crossroads of Continents: Cultures of Siberia and Alaska,* ed. William W. Fitzhugh and Aron Crowell, 294–312. Washington, D.C.: Smithsonian Institution Press, 1988. **347, 348**
———. "Eskimos: Hunters of the Frozen Coasts." In *Crossroads of Continents: Cultures of Siberia and Alaska,* ed. William W. Fitzhugh and Aron Crowell, 42–51. Washington, D.C.: Smithsonian Institution Press, 1988. **345**
———. "Crossroads of Continents: Review and Prospect." In *Anthropology of the North Pacific Rim,* ed. William W. Fitzhugh and Valérie Chaussonnet, 27–51. Washington, D.C.: Smithsonian Institution Press, 1994. **170, 171**
Fitzhugh, William W., and Aron Crowell, eds. *Crossroads of Continents: Cultures of Siberia and Alaska.* Washington, D.C.: Smithsonian Institution Press, 1988. **329** *See also entries under individual authors.*
Fitzpatrick, John C., ed. *The Diaries of George Washington, 1748–1799.* 4 vols. Boston: Houghton Mifflin, 1925. **68**
Flaherty, Robert Joseph. "The Belcher Islands of Hudson Bay: Their Discovery and Exploration." *Geographical Review* 5 (1918): 433–58. **165**
———. *My Eskimo Friends: "Nanook of the North."* London: Heinemann, 1924. **165**
Flegel, E. Robert. "Städtebilder aus West- und Central-Afrika." *Mittheilungen der Geographischen Gesellschaft in Hamburg, 1878–79,* 300–327. **41**
Fleming, Charles Alexander. "Hochstetter, Christian Gottlieb Ferdinand von, 1829–1884." In *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869,* 199–200. Wellington: Allen and Unwin, 1990. **510**
Flood, Josephine. *Archaeology of the Dreamtime.* Sydney: Collins, 1983. **354**
Förstemann, Ernst Wilhelm. *Commentar zur Madrider Mayahandschrift (Codex Tro-Cortesianus).* Danzig: L. Saunier, 1902. **232**
Forster, Johann Reinhold. *Observations Made during a Voyage Round the World.* London: Robinson, 1778. **447, 449**
———. *History of the Voyages and Discoveries Made in the North.* London: G. G. J. and J. Robinson, 1786. **136**
Frake, Charles O. "Dials: A Study in the Physical Representation of Cognitive Systems." In *The Ancient Mind: Elements of Cognitive Archaeology,* ed. Colin Renfrew and Ezra B. W. Zubrow, 119–32. Cambridge: Cambridge University Press, 1994. **539**
———. "A Reinterpretation of the Micronesian 'Star Compass.'" *Journal of the Polynesian Society* 104 (1995): 147–58. **465**
Frame, Mary. "Structure, Image, and Abstraction: Paracas Necrópolis Headbands as System Templates." In *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul, 110–71. Iowa City: University of Iowa Press, 1991. **273**
Frankel, Stephen. *The Huli Response to Illness.* Cambridge: Cambridge University Press, 1986. **430**
Franklin, John. *Narrative of a Journey to the Shores of the Polar Sea.* 3d ed. 2 vols. London: John Murray, 1824. **144**
Frauenstein, Georg M. "Primitive Map-Making." *Popular Science Monthly* 23 (1883): 682–87 (translated from *Das Ausland*). **55**

Frazer, Roger. "Chalmers, Nathanael, 1830–1910." In *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869,* 76–77. Wellington: Allen and Unwin, 1990. 504

Fredlund, Glen, Linea Sundstrom, and Rebecca Armstrong. "Crazy Mule's Maps of the Upper Missouri, 1877–1880." *Plains Anthropologist* 41, no. 155 (1996): 5–27. 117

Freeman, Milton M. R., ed. *Inuit Land Use and Occupancy Project.* 3 vols. Ottawa: Minister of Supply and Services Canada, 1976. 170

Freidel, David A., Linda Schele, and Joy Parker. *Maya Cosmos: Three Thousand Years on the Shaman's Path.* New York: William Morrow, 1993. 203, 234, 235, 237, 238

Frémont, John C. *Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in the Years 1843–'44.* Washington, D.C.: Blair and Rives, 1845. 113

Friederici, Georg. *Die Schiffahrt der Indianer.* Stuttgart: Strecker und Schröder, 1907. 55

———. *Der Charakter der Entdeckung und Eroberung Amerikas durch die Europäer.* 3 vols. Stuttgart-Gotha: F. A. Perthes, 1925–36. 55

Frobenius, Leo. *Madsimu Dsangara: Südafrikanische Felsbilderchronik.* 2 vols. 1931. Reprinted with new material, Graz: Akademische Druck- u. Verlagsanstalt, 1962. 17

Fry, H. K. "Dieri Legends." *Folk-lore* 48 (1937): 187–206, 269–87. 383

Fuentes y Guzmán, Francisco Antonio de. *Recordación Florida.* 3 vols. Biblioteca "Goathemala" de la Sociedad de Geografía e Historia, vols. 6–8. Guatemala City, 1932–33. 208

Fu-Kiau, Kimbwandáende Kia Bunseki. "Ntangu-Tandu-Kolo: The Bantu-Kongo Concept of Time." In *Time in the Black Experience,* ed. Joseph K. Adjaye, 17–34. Westport, Conn.: Greenwood Press, 1994. 27

Furst, Jill Leslie. "The Tree Birth Tradition in the Mixteca, Mexico." *Journal of Latin American Lore* 3 (1977): 183–226. 215

———. *Codex Vindobonensis Mexicanus I: A Commentary.* Albany: Institute for Mesoamerican Studies, State University of New York, 1978. 216

Further Papers relative to the Recent Arctic Expeditions in Search of Sir John Franklin and the Crews of H.M.S. "Erebus" and "Terror." London: G. E. Eyre and W. Spottiswoode, 1855. 158

Fuson, Robert H. "The Orientation of Mayan Ceremonial Centers." *Annals of the Association of American Geographers* 59 (1969): 494–511. 201

Gade, Daniel W., and Mario Escobar. "Village Settlement and the Colonial Legacy in Southern Peru." *Geographical Review* 72 (1982): 430–49. 262

Galarza, Joaquín. *Lienzos de Chiepetlan: Manuscrits pictographiques et manuscrits en caractères latins de San Miquel Chiepetlan, Guerrero, Mexique.* Mexico City: Mission Archéologique et Ethnologique Française au Mexique, 1972. 246

———. *Estudios de escritura indígena tradicional (azteca-náhuatl).* Mexico City: Archivo General de la Nación, 1979. 198, 199

Gale, Fay. "Art as a Cartographic Form." *Globe: Journal of the Australian Map Circle* 26 (1986): 32–41. 364

Galloway, Patricia. "Debriefing Explorers: Amerindian Information in the Delisles' Mapping of the Southeast." In *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 10. Chicago: University of Chicago Press, 1998. 103

Gamio, Manuel. *La población del valle de Teotihuacán.* 2 vols. in 3. Mexico City: Dirección de Talleres Gráficos, 1922. 256

García Zambrano, Angel J. "El poblamiento de México en la época del contacto, 1520–1540." *Mesoamérica* 24 (1992): 239–96. 197

Garlake, Peter S. *The Hunter's Vision: The Prehistoric Art of Zimbabwe.* Seattle: University of Washington Press, 1995. 17

Garrison, Tom. *Oceanography: An Invitation to Marine Science.* Belmont, Calif.: Wadsworth, 1993. 478, 479

Gartner, William Gustav. "Pawnee Cartography." Unpublished typescript. Department of Geography, University of Wisconsin–Madison, 1992. 54, 125

Geary, Christraud M. *Images from Bamum: German Colonial Photography at the Court of King Njoya, Cameroon, West Africa, 1902–1915.* Washington, D.C.: National Museum of African Art by the Smithsonian Institution Press, 1988. 45

Geary, Christraud M., and Adamou Ndam Njoya. *Mandou Yénou: Photographies du pays Bamoum, royaume ouest-africain, 1902–1915.* Munich: Trickster, 1985. 45

Gebauer, Paul. *Art of Cameroon.* Portland: Portland Art Museum, 1979. 46

Geertz, Clifford. *The Interpretation of Cultures.* New York: Basic Books, 1973. 442

———. *Local Knowledge: Further Essays in Interpretive Anthropology.* New York: Basic Books, 1983. 9

Gehring, Charles T., and William A. Starna, trans. and eds. *A Journey into Mohawk and Oneida Country, 1634–1635: The Journal of Harmen Meyndertsz van den Bogaert.* Syracuse: Syracuse University Press, 1988. 68

Gell, Alfred. "How to Read a Map: Remarks on the Practical Logic of Navigation," *Man,* n.s. 20 (1985): 271–86. 363

———. "The Language of the Forest: Landscape and Phonological Iconism in Umeda." In *The Anthropology of Landscape: Perspectives on Place and Space,* ed. Eric Hirsch and Michael O'Hanlon, 232–54. Oxford: Clarendon Press, 1995. 434

Gendrop, Paul. "Las representaciones arquitectónicas en las pinturas mayas." In *Las representaciones de arquitectura en la arqueología de América,* ed. Daniel Schávelzon, 1:191–210. Mexico City: Universidad Nacional Autónoma de México, 1982–. 256

Gentner, Dedre, and Albert L. Stevens, eds. *Mental Models.* Hillsdale, N.J.: Lawrence Erlbaum, 1983. 443

Gerasimov, Innokenty, ed. *A Short History of Geographical Science in the Soviet Union.* Trans. John Williams. Moscow: Progress, 1976. 340

Gerhard, Peter. *A Guide to the Historical Geography of New Spain.* Rev. ed. Norman: University of Oklahoma Press, 1993. 183, 240, 241

Gewertz, Deborah B. *Sepik River Societies: A Historical Ethnography of the Chambri and Their Neighbors.* New Haven: Yale University Press, 1983. 436, 438, 440, 441

Gibson, Charles. *The Aztecs under Spanish Rule: A History of the Indians of the Valley of Mexico, 1519–1810.* Stanford: Stanford University Press, 1964. 204, 213, 245

———. "A Survey of Middle American Prose Manuscripts in the Native Historical Tradition." In *Handbook of Middle American Indians,* vol. 15, ed. Howard Francis Cline, 311–21. Austin: University of Texas Press, 1975. 190

Gibson, Charles, and John B. Glass. "A Census of Middle American Prose Manuscripts in the Native Historical Tradition." In *Handbook of Middle American Indians,* vol. 15, ed. Howard Francis Cline, 322–400. Austin: University of Texas Press, 1975. 190

Gill, William Wyatt. *Myths and Songs from the South Pacific.* London: King, 1876. 459

Gillespie, Susan D. "Power, Pathways, and Appropriations in Mesoamerican Art." In *Imagery and Creativity: Ethnoaesthetics and Art Worlds in the Americas,* ed. Dorothea S. Whitten and Norman E. Whitten, 67–107. Tucson: University of Arizona Press, 1993. 234

Gladwin, Thomas. *East Is a Big Bird: Navigation and Logic on Pu-*

luwat Atoll. Cambridge: Harvard University Press, 1970. **443, 444, 462, 469, 471, 475**

Glass, John B. *Catálogo de la colección de códices.* Mexico City: Museo Nacional de Antropología and Instituto Nacional de Antropología e Historia, 1964. **249**

———. "Annotated References." In *Handbook of Middle American Indians,* vol. 15, ed. Howard Francis Cline, 537–724. Austin: University of Texas Press, 1975. **194**

———. "A Survey of Native Middle American Pictorial Manuscripts." In *Handbook of Middle American Indians,* vol. 14, ed. Howard Francis Cline, 3–80. Austin: University of Texas Press, 1975. **183, 194, 195, 204, 253**

Glass, John B., with Donald Robertson. "A Census of Native Middle American Pictorial Manuscripts." In *Handbook of Middle American Indians,* vol. 14, ed. Howard Francis Cline, 81–252. Austin: University of Texas Press, 1975. **194, 196, 204, 210, 212, 219, 225, 251, 253**

Glass, Patrick. "Trobriand Symbolic Geography." *Man,* n.s. 23 (1988): 56–76. **431, 432, 433**

Glowczewski, Barbara, ed. *Yapa: Peintres aborigènes de Balgo et Lajamanu.* Paris: Baudoin Lebon, 1991. **363**

Goddard, Cliff. *A Basic Pitjantjatjara/Yankunytjatjara to English Dictionary.* Alice Springs: Institute for Aboriginal Development, 1987. **387**

Godelier, Maurice, and Marilyn Strathern, eds. *Big Men and Great Men: Personifications of Power in Melanesia.* Cambridge: Cambridge University Press, 1991. **424**

Goetz, Delia, and Sylvanus Griswold Morley, trans. *Popol Vuh: The Sacred Book of the Ancient Quiché Maya.* Norman: University of Oklahoma Press, 1950. **237**

Goetzfridt, Nicholas J., comp. *Indigenous Navigation and Voyaging in the Pacific: A Reference Guide.* New York: Greenwood Press, 1992. **444**

Goetzmann, William H. *New Lands, New Men: America and the Second Great Age of Discovery.* New York: Viking, 1986. **445**

———. "A 'Capacity for Wonder': The Meanings of Exploration." In *North American Exploration.* Ed. John Logan Allen. Vol. 3, *A Continent Comprehended,* 71–126. Lincoln: University of Nebraska Press, 1997. **100**

Goetzmann, William H., and Glyndwr Williams. *The Atlas of North American Exploration: From the Norse Voyages to the Race to the Pole.* New York: Prentice-Hall, 1992. **108, 172**

Goldstein, Paul. "Tiwanaku Temples and State Expansion: A Tiwanaku Sunken Court Temple in Moquegua, Peru." *Latin American Antiquity* 4 (1993): 22–47. **282**

Golledge, Reginald G., and R. J. Stimson. *Spatial Behavior: A Geographic Perspective.* New York: Guilford Press, 1997. **3**

Golovnin, V. M. *Sokrashchennye zapiski flota kapitana Golovnina o plavanii ego na shlyupe "Diana" dlya opisi Kuril'skikh ostrovov v 1811 g.* (Brief memoirs written by the fleet captain Golovnin about his sailing on the bark "Diana" for an inventory of the Kuril Islands, 1811). St. Petersburg, 1819. **339**

Golson, Jack. ed. *Polynesian Navigation: A Symposium on Andrew Sharp's Theory of Accidental Voyages.* Rev. ed. Wellington: Polynesian Society, 1963. **444**

Goodall, Elizabeth. "Rock Paintings of Mashonaland." In *Prehistoric Rock Art of the Federation of Rhodesia and Nyasaland,* ed. Roger Summers, 3–111. Salisbury, Southern Rhodesia: National Publications Trust, 1959. **16, 17**

Goodenough, Ward Hunt. *Native Astronomy in the Central Carolines.* Philadelphia: University Museum, University of Pennsylvania, 1953. **444, 462, 463, 464, 465**

Goodenough, Ward Hunt, and S. D. Thomas. "Traditional Navigation in the Western Pacific." *Expedition* 29, no. 3 (1987): 3–14. **466, 467, 468, 469**

Goodman, Ronald. *Lak̇ot̄a Star Knowledge: Studies in Lak̇ot̄a Stellar Theology,* 2d ed. Rosebud, S.D.: Siŋt̄e Gleṡk̄a University, 1992. **55, 121, 125, 538**

Goody, Jack. *The Domestication of the Savage Mind.* Cambridge: Cambridge University Press, 1977. **6, 425**

Gorges, Ferdinando. *A Briefe Narration of the Originall Undertakings of the Advancement of Plantations into the Parts of America.* London: E. Brudenell for N. Brook, 1658. **90**

Gortner, Willis A. "Evidence for a Prehistoric Petroglyph Trail Map in the Sierra Nevada." *North American Archaeologist* 9 (1988): 147–54. **61**

Gosling, L. A. Peter. "Contemporary Malay Traders in the Gulf of Thailand." In *Economic Exchange and Social Interaction in Southeast Asia: Perspectives from Prehistory, History, and Ethnography,* ed. Karl L. Hutterer, 73–95. Ann Arbor: Center for South and Southeast Asian Studies, University of Michigan, 1977. **488**

Gould, Peter, and Rodney White. *Mental Maps,* 2d ed. Boston: Allen and Unwin, 1986. **4, 443**

Graham, Ian. "Looters Rob Graves and History." *National Geographic* 169 (1986): 452–60. **234, 255**

Grant, Campbell. *Canyon de Chelly: Its People and Rock Art.* Tucson: University of Arizona Press, 1978. **66**

Green, Roger C. "Near and Remote Oceania—Disestablishing 'Melanesia' in Culture History." In *Man and a Half: Essays in Pacific Anthropology and Ethnobiology in Honour of Ralph Bulmer,* ed. Andrew Pawley, 491–502. Auckland: Polynesian Society, 1991. **419**

Greenberg, Joseph H. *Language in the Americas.* Stanford: Stanford University Press, 1987. **98**

Gregor, Thomas. *Mehinaku: The Drama of Daily Life in a Brazilian Indian Village.* Chicago: University of Chicago Press, 1977. **305, 311, 321**

Griaule, Marcel. "L'image du monde au Soudan." *Journal de la Société des Africanistes* 19 (1949): 81–87. **26**

———. *Conversations with Ogotemmêli: An Introduction to Dogon Religious Ideas.* Oxford: Oxford University Press, 1965. **26**

Griaule, Marcel, and Germaine Dieterlen. *Signes graphiques soudanais.* L'Homme, Cahiers d'Ethnologie, de Géographie et de Linguistique 3. Paris: Hermann, 1951. **26, 27, 28**

———. "The Dogon." In *African Worlds: Studies in the Cosmological Ideas and Social Values of African Peoples,* ed. Cyril Daryll Ford, 83–110. London: Oxford University Press, 1954. **26**

Gribanovskiy, N. N. "Svedeniya o pisanitsakh Yakutii" (Information about Yakut petroglyphs). *Sovetskaya Arkheologiya* (Soviet archaeology) 8 (1946): 281–84. **343**

Grieder, Terence. *Origins of Pre-Columbian Art.* Austin: University of Texas Press, 1982. **63, 94, 98, 176, 181**

Griffin-Pierce, Trudy. *Earth Is My Mother, Sky Is My Father: Space, Time, and Astronomy in Navajo Sandpainting.* Albuquerque: University of New Mexico Press, 1992. **109, 110**

———. "The *Hooghan* and the Stars." In *Earth and Sky: Visions of the Cosmos in Native American Folklore,* 110–30. Albuquerque: University of New Mexico Press, 1992. **53**

Grimble, Arthur. "Gilbertese Astronomy and Astronomical Observances." *Journal of the Polynesian Society* 40 (1931): 197–224. **485**

Gruzinski, Serge. "Colonial Indian Maps in Sixteenth-Century Mexico." *Res* 13 (1987): 46–61. **245**

Guamán Poma de Ayala, Felipe. *Nueva crónica y buen gobierno.* 3 vols. Ed. John V. Murra, Rolena Adorno, and Jorge L. Urioste. Madrid: Historia 16, 1987. **285, 288, 289, 290, 294, 295**

Guchte, Maarten van de. "El ciclo mítico andino de la Piedra Cansada." *Revista Andina* 2 (1984): 539–56. **288**

———. "'Carving the World': Inca Monumental Sculpture and Landscape." Ph.D. diss., University of Illinois at Urbana-Champaign, 1990. **288**

Guidoni, Enrico, and Roberto Magni. *The Andes.* New York: Grosset and Dunlap, 1977. 288

Guillet, David. *Covering Ground: Communal Water Management and the State in the Peruvian Highlands.* Ann Arbor: University of Michigan Press, 1992. 262

Gulick, L. H. "Micronesia—of the Pacific Ocean." *Nautical Magazine and Naval Chronicle* 31 (1862): 169–82, 237–45, 298–308, 358–63, 408–17. 476

Gunn, R. G. *Aboriginal Rock Art in the Grampians.* Ed. P. J. F. Coutts. Melbourne: Victoria Archaeological Survey, 1983. 355

Gurina, N. N. "Kamennyye labirinty Belomor'ya" (Stone labyrinths of Belomor'ye). *Sovetskaya Arkheologiya* (Soviet archaeology) 10 (1948): 125–42. 332

———. *Mir glazami drevnego khudozhnika Karelii* (The world through the eyes of an ancient Karelian artist). Leningrad, 1967. 331

Guss, David M. *To Weave and Sing: Art, Symbol, and Narrative in the South American Rain Forest.* Berkeley: University of California Press, 1989. 318

Guzmán, Eulalia. "The Art of Map-Making among the Ancient Mexicans." *Imago Mundi* 3 (1939): 1–6. 184, 191, 249

Haast, Julius von. *Report of a Topographical and Geological Exploration of the Western Districts of the Nelson Province, New Zealand.* Nelson: Printed by C. and J. Elliott, 1861. 505

Haddon, Alfred C., ed. *Reports of the Cambridge Anthropological Expedition to Torres Straits.* Vol. 5. Cambridge: Cambridge University Press, 1904. 399

Hadingham, Evan. *Lines to the Mountain Gods: Nazca and the Mysteries of Peru.* New York: Random House, 1988. 275

Haines, Aubrey L., ed. *Osborne Russell's Journal of a Trapper.* Portland: Champoeg Press for Oregon Historical Society, 1955. 114

Hakluyt, Richard. *The Principal Navigations Voyages Traffiques and Discoveries of the English Nation.* 12 vols. Glasgow: James MacLehose, 1903–5. 67, 68, 108

Hale, Herbert M., and Norman B. Tindale. "Aborigines of Princess Charlotte Bay, North Queensland." *Records of the South Australian Museum* 5 (1933–36): 63–172. 357

Hale, Horatio. *Ethnography and Philology: United States Exploring Expedition, 1838–42.* Philadelphia: Lea and Blanchard, 1846. 450

Hale, Ken. "Remarks on Creativity in Aboriginal Verse." In *Problems and Solutions: Occasional Essays in Musicology Presented to Alice M. Moyle,* ed. Jamie C. Kassler and Jill Stubington, 254–62. Sydney: Hale and Iremonger, 1984. 365

Haley, Harold B., et al. "Los lienzos de Metlatoyuca e Itzquintepec: Su procedencia e interrelaciones." In *Códices y documentos sobre México: Primer simposio,* ed. Constanza Vega Sosa, 145–59. Mexico City: Instituto Nacional de Antropología e Historia, 1994. 185

Hall, Charles Francis. *Life with the Esquimaux: A Narrative of Arctic Experience in Search of Survivors of Sir John Franklin's Expedition.* London: Sampson Low, Son, and Marston, 1865. 155

Hallett, Robin. *The Penetration of Africa: European Enterprise and Exploration Principally in Northern and Western Africa up to 1830.* Vol. 1. London: Routledge and Kegan Paul, 1965. 38

Hall-Jones, John. *Mr. Surveyor Thomson: Early Days in Otago and Southland.* Wellington: A. H. and A. W. Reed, 1971. 505

———. "Thomson, John Turnbull, 1821–1884." In *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869,* 537–38. Wellington: Allen and Unwin, 1990. 505

Halpern, Michael. "Sidereal Compasses: A Case for Carolinian-Arab Links." *Journal of the Polynesian Society* 95 (1986): 441–59. 489

Halswell, Edmund Storr. "Report of E. Halswell, Esq., on the Numbers and Condition of the Native Population." *New Zealand Journal,* 14 May 1842, 111–13. 513

Hambruch, Paul. "Die Schiffahrt auf den Karolinen- und Marshallinseln." *Meereskunde* 6 (1912): 1–40. 462, 478, 479

Hamilton, J. W. "The Best Route to the West Coast." *Lyttelton Times,* 7 March 1865, 5, col. F. 523

Hammer [Hammer-Purgstall], Joseph von, trans. "Extracts from the Mohit." *Journal of the Asiatic Society of Bengal* 3 (1834): 545–53 and 7 (1838): 767–74. 488

Hammond, George Peter, and Agapito Rey, eds. and trans. *Narratives of the Coronado Expedition, 1540–1542.* Albuquerque: University of New Mexico Press, 1940. 108

———, eds. and trans. *Don Juan de Oñate: Colonizer of New Mexico, 1595–1628.* 2 pts. Albuquerque: University of New Mexico Press, 1953. 108, 126

Hammond-Tooke, W. D. "In Search of the Lineage: The Cape Nguni Case." *Man,* n.s. 19 (1984): 77–93. 21

Harding, Thomas G. *Voyagers of the Vitiaz Strait: A Study of a New Guinea Trade System.* Seattle: University of Washington Press, 1967. 428

———. *Kunai Men: Horticultural Systems of a Papua New Guinea Society.* Berkeley: University of California Press, 1985. 428

Harley, J. B. "The Map and the Development of the History of Cartography." In *The History of Cartography,* ed. J. B. Harley and David Woodward, 1:1–42. Chicago: University of Chicago Press, 1987–. 3

———. "Maps, Knowledge, and Power." In *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments,* ed. Denis Cosgrove and Stephen Daniels, 277–312. Cambridge: Cambridge University Press, 1988. 1, 44

———. "Deconstructing the Map." *Cartographica* 26, no. 2 (1989): 1–20. 26, 35

———. *Maps and the Columbian Encounter: An Interpretive Guide to the Travelling Exhibition.* Milwaukee: Golda Meir Library, 1990. 295

———. "Deconstructing the Map." In *Writing Worlds: Discourse, Text and Metaphor in the Representation of Landscape,* ed. Trevor J. Barnes and James S. Duncan, 231–47. London: Routledge, 1992. 1

Harley, J. B., and David Woodward. "Preface." In *The History of Cartography,* ed. J. B. Harley and David Woodward, 1:xv–xxi. Chicago: University of Chicago Press, 1987–. 1, 9, 54, 537

Harley, J. B., and Kees Zandvliet. "Art, Science, and Power in Sixteenth-Century Dutch Cartography." *Cartographica* 29, no. 2 (1992): 10–19. 43

Harley, J. B., and David Woodward, eds. *The History of Cartography. See entries under individual authors.*

Harrell, James A., and V. Max Brown. "The World's Oldest Surviving Geological Map: The 1150 B.C. Turin Papyrus from Egypt," *Journal of Geology* 100 (1992): 3–18. 24

Harrington, J. T. "Aboriginal Map of the Shoshone Habitat." Undated three-page typescript. 62

Harrison, Simon. "Magical and Material Polities in Melanesia." *Man,* n.s. 24 (1989): 1–20. 423, 424

Harvey, H. R. "Aspects of Land Tenure in Ancient Mexico." In *Explorations in Ethnohistory: Indians of Central Mexico in the Sixteenth Century,* ed. H. R. Harvey and Hanns J. Prem, 83–102. Albuquerque: University of New Mexico Press, 1984. 224

———. "The Oztoticpac Lands Map: A Reexamination." In *Land and Politics in the Valley of Mexico: A Two Thousand Year Perspective,* ed. H. R. Harvey, 163–86. Albuquerque: University of New Mexico Press, 1991. 203

Harvey, P. D. A. *The History of Topographical Maps: Symbols, Pictures and Surveys.* London: Thames and Hudson, 1980. 193

Harwood, Frances. "Myth, Memory, and the Oral Tradition: Cicero in the Trobriands." *American Anthropologist* 78 (1976): 783–96. 427

Hassig, Ross. *Aztec Warfare: Imperial Expansion and Political Control.* Norman: University of Oklahoma Press, 1988. **226**

Hau'ofa, Epeli. *Mekeo: Inequality and Ambivalence in a Village Society.* Canberra: Australian National University Press, 1981. **441**

Hawkesworth, John. *An Account of the Voyages Undertaken by Order of His Present Majesty for Making Discoveries in the Southern Hemisphere.* 3 vols. London: Printed for W. Strahan and T. Cadell, 1773. **500**

Hayakawa, S. I. *Language in Thought and Action.* 3d ed. New York: Harcourt Brace Jovanovich, 1972. **10**

Hays, Terence E. "'Myths of Matriarchy' and the Sacred Flute Complex of the Papua New Guinea Highlands." In *Myths of Matriarchy Reconsidered,* ed. Deborah B. Gewertz, 98–120. Sydney: University of Sydney Press, 1988. **441**

Healey, Christopher. *Maring Hunters and Traders: Production and Exchange in the Papua New Guinea Highlands.* Berkeley: University of California Press, 1990. **430**

Heaphy, Charles. "Sketches of the Past Generation of Maoris." *Chapman's New Zealand Monthly Magazine: Literary, Scientific and Miscellaneous* 1 (August 1862): 4–7. **500**

———. "Account of an Exploring Expedition to the South-west of Nelson." In *Early Travellers in New Zealand,* ed. Nancy M. Taylor, 188–203. Oxford: Clarendon Press, 1959. **496**

Heckewelder, John Gottlieb Ernestus. *An Account of the History, Manners, and Customs, of the Indian Nations, Who Once Inhabited Pennsylvania and the Neighbouring States.* Transactions of the Historical and Literary Committee of the American Philosophical Society, vol. 1. Philadelphia: Abraham Small, 1819. **91, 93**

Heeschen, Volker. "Some Systems of Spatial Deixis in Papuan Languages." In *Here and There: Cross-Linguistic Studies on Deixis and Demonstration,* ed. Jürgen Weissenborn and Wolfgang Klein, 81–109. Amsterdam: John Benjamins, 1982. **434**

Heizer, Robert Fleming. "Aboriginal California and Great Basin Cartography." *Report of the California Archaeological Survey* 41 (1958): 1–9. **55**

Heizer, Robert Fleming, and Martin A. Baumhoff. *Prehistoric Rock Art of Nevada and Eastern California.* Berkeley: University of California Press, 1962. **61**

Heizer, Robert Fleming, and Thomas R. Hester. "Two Petroglyph Sites in Lincoln County, Nevada." In *Four Rock Art Studies,* ed. C. William Clewlow, 1–44. Socorro, N.Mex.: Ballena Press, 1978. **61, 62**

Helm, June. "Matonabbee's Map." *Arctic Anthropology* 26, no. 2 (1989): 28–47. **146**

Hemming, John. *The Conquest of the Incas.* New York: Harcourt Brace Jovanovich, 1970. **285**

———. *The Search for El Dorado.* London: Joseph, 1978. **322**

Hemming, John, and Edward Ranney. *Monuments of the Incas.* Boston: Little, Brown, 1982. **288**

Hennepin, Louis. *A New Discovery of a Vast Country in America.* 2 pts. London: M. Bentley and others, 1698. **95, 99**

Henriksen, Georg. *Hunters in the Barrens: The Naskapi on the Edge of the White Man's World.* St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland, 1973. **142**

Henry, John Joseph. "Campaign against Quebec." Reprinted in *March to Quebec: Journals of the Members of Arnold's Expedition,* comp. and annotated Kenneth Roberts, 295–430. New York: Doubleday, Doran, 1938. **84, 180**

Hercus, L. A. "Just One Toa." *Records of the South Australian Museum* 20 (1987): 59–69. **383**

Heuglin, Hofrath von. "Ueber eine altäthiopische Karte von Tigreh mit Facsimile." *Zeitschrift der Deutschen Morgenländischen Gesellschaft* 17 (1863): 379–80. **30**

Hezel, Francis X. *The First Taint of Civilization: A History of the Caroline and Marshall Islands in Pre-colonial Days, 1521–1885.* Honolulu: University of Hawai'i Press, 1983. **453**

Hildebrand, Hans. "De lägre naturfolkens knost." In *Studier och forskningar föranledda af mina resor i höga Norden,* by A. E. Nordenskiöld. Stockholm: F. och G. Beijer, 1883. Translated as "Beiträge zur Kenntniss der Kunst der niedern Naturvölker." In *Studien und Forschungen,* ed. A. E. Nordenskiöld, 289–386. Leipzig: F. A. Brockhaus, 1885. **347**

Hill, Jonathan David. *Keepers of the Sacred Chants: The Poetics of Ritual Power in an Amazonian Society.* Tucson: University of Arizona Press, 1993. **317**

Hind, Henry Youle. *North-west Territory: Reports of Progress.* Toronto: Lovell, 1859. **129**

———. *Explorations in the Interior of the Labrador Peninsula, the Country of the Montagnais and Nasquapee Indians.* 2 vols. London: Longman, Green, Longman, Roberts, and Green, 1863. **136**

Hirsch, Eric. "Landscape: Between Place and Space." In *The Anthropology of Landscape: Perspectives on Place and Space,* ed. Eric Hirsch and Michael O'Hanlon, 1–30. Oxford: Clarendon Press, 1995. **363**

Hirschfelder, Arlene B., and Paulette Fairbanks Molin. *The Encyclopedia of Native American Religions: An Introduction.* New York: Facts on File, 1992. **91**

"Historia de los Mexicanos por sus pinturas." In *Nueva colección de documentos para la historia de México,* ed. Joaquín García Icazbalceta, 3:228–63. Mexico City, 1891. **230**

Historical Atlas of Canada. 3 vols. Toronto: University of Toronto Press, 1987–93. **69, 151, 171**

Hochstetter, Ferdinand von. *Neu-Seeland.* Stuttgart: Cotta, 1863. English edition, *New Zealand, Its Physical Geography, Geology and Natural History with Special Reference to the Results of Government Expeditions in the Provinces of Auckland and Nelson.* Trans. Edward Sauter. Stuttgart: J. G. Cotta, 1867. **512, 535**

Hoepen, Egbert Cornelis Nicolaas van. "A Pre-European Bantu Culture in the Lydenburg District." *Argeologiese Navorsing van die Nasionale Museum* 2 (1939): 47–74. **19**

Hoff, Jennifer. *Tiwi Graveposts.* Melbourne: National Gallery of Victoria, 1988. **358**

Hoffman, Walter James. "The Graphic Art of the Eskimos." In *Annual Report of the Board of Regents of the Smithsonian Institution . . . for the Year Ending June 30, 1895,* including the Report of the U.S. National Museum, 739–968. Washington, D.C.: United States Government Printing Office, 1897. **346, 348**

Hofmann, Catherine, et al. *Le globe et son image.* Paris: Bibliothèque Nationale, 1995. **45**

Hogan, Helen M., ed. and trans. *Renata's Journey: Ko te Haerenga o Renata.* Christchurch: Canterbury University Press, 1994. **503**

Holm, Gustav Frederik. *Den Østgrønlandske Expedition, udført i Aarene, 1883–85,* Meddelelser om Grønland, 10 Copenhagen, 1888. **167, 168**

———. "Ethnological Sketch of the Angmagsalik Eskimo." In *The Ammassalik Eskimo: Contributions to the Ethnology of the East Greenland Natives,* 2 vols., ed. William Carl Thalbitzer, Meddelelser om Grønland, 39–40, 1:1–148. Copenhagen, 1914. **167, 168**

Holub, Emil. *Seven Years in South Africa: Travels, Researches, and Hunting Adventures, between the Diamond-Fields and the Zambesi (1872–79).* 2 vols. Trans. Ellen E. Frewer. Boston: Houghton Mifflin, 1881. **35**

Hooper, W. *The Month among the Tents of Chukchi.* London, 1853. **346**

Horne, George, and G. Aiston. *Savage Life in Central Australia.* London: Macmillan, 1924. **384**

Houston, Stephen. "Classic Maya Depictions of the Built Environment." Paper presented at Dumbarton Oaks, 9 October 1994. **225**

Lehmann, Walter. "Las cinco mujeres del oeste muertas en el parto y los cinco dioses del sur en la mitología mexicana." *Traducciones Mesoamericanistas* 1 (1966): 147–75. **253**

Leibsohn, Dana. "The Historia Tolteca-Chichimeca: Recollecting Identity in a Nahua Manuscript." Ph.D. diss., University of California, Los Angeles, 1993. **205, 215**

Lejean, Guillaume. "Note sur le royaume de Koullo au sud du Kafa (Notes verbales fournies par deux indigènes)." *Bulletin de la Société de Géographie de Paris,* ser. 5, 8 (1864): 388–91. **38**

Lenz, Hans. "Las fibras y las plantas del papel indígena mexicano." *Cuadernos Americanos* 45, no. 3 (año 8) (1949): 157–69. **196, 224**

León-Portilla, Miguel. *Aztec Thought and Culture: A Study of the Ancient Nahuatl Mind.* Trans. Jack E. Davis. Norman: University of Oklahoma Press, 1963. **193**

———. *Tonalámatl de los pochtecas (Códice mesoamericano "Fejérváry-Mayer").* Mexico City: Celanese Mexicana, 1985. **229**

———. "The Ethnohistorical Record for the Huey Teocalli of Tenochtitlan." In *The Aztec Templo Mayor,* ed. Elizabeth Hill Boone, 71–95. Washington, D.C.: Dumbarton Oaks, 1987. **225**

Lévi-Strauss, Claude. *Le cru et le cuit.* Paris: Plon, 1964. **305**

———. *Du miel aux cendres.* Paris: Plon, 1966. **305**

———. *Totemism.* Trans. Rodney Needham. Harmondsworth, Eng.: Penguin, 1969. **361**

Lewis, D., and Deborah Bird Rose. *The Shape of the Dreaming: The Cultural Significance of Victoria River Rock Art.* Canberra: Aboriginal Studies Press, 1988. **357**

Lewis, David. "Ara Moana: Stars of the Sea Road." *Journal of the Institute of Navigation* 17 (1964): 278–88. **444**

———. "Stars of the Sea Road." *Journal of the Polynesian Society* 75 (1966): 85–94. **460**

———. "Observations on Route Finding and Spatial Orientation among the Aboriginal Peoples of the Western Desert Region of Central Australia." *Oceania* 46 (1975–76): 249–82. **380, 381**

———. "Mau Piailug's Navigation of Hokule'a from Hawaii to Tahiti." *Topics in Cultural Learning* 5 (1977): 1–23. **474**

———. "Navigational Techniques of the Prahu Captains of Indonesia." Unpublished manuscript, 1980. **488**

———. *We, the Navigators: The Ancient Art of Landfinding in the Pacific.* 1972. 2d ed. Ed. Derek Oulton. Honolulu: University of Hawai'i Press, 1994. **428, 444, 455, 460, 462, 471, 477, 478, 485, 497**

Lewis, G. Malcolm. "The Indigenous Maps and Mapping of North American Indians." *Map Collector* 9 (1979): 25–32. **55**

———. "Amerindian Antecedents of American Academic Geography." In *The Origins of Academic Geography in the United States,* ed. Brian W. Blouet, 19–35. Hamden, Conn.: Archon Books, 1981. **82**

———. "Indicators of Unacknowledged Assimilations from Amerindian *Maps* on Euro-American Maps of North America: Some General Principles Arising from a Study of La Vérendrye's Composite Map, 1728–29." *Imago Mundi* 38 (1986): 9–34. **52**

———. "Indian Maps: Their Place in the History of Plains Cartography." In *Mapping the North American Plains: Essays in the History of Cartography,* ed. Frederick C. Luebke, Frances W. Kaye, and Gary E. Moulton, 63–80. Norman: University of Oklahoma Press, 1987. **52, 54, 117, 126**

———. "Misinterpretation of Amerindian Information as a Source of Error on Euro-American Maps." *Annals of the Association of American Geographers* 77 (1987): 542–63. **52, 71, 145**

———. "La Grande Rivière et Fleuve de l'Ouest/The Realities and Reasons behind a Major Mistake in the 18th-Century Geography of North America." *Cartographica* 28, no. 1 (1991): 54–87. **52, 71, 145, 146**

———. "Metrics, Geometries, Signs, and Language: Sources of Cartographic Miscommunication between Native and Euro-American Cultures in North America." In *Introducing Cultural and Social Cartography,* comp. and ed. Robert A. Rundstrom, Monograph 44, *Cartographica* 30, no. 1 (1993): 98–106. Translated as "Communiquer l'espace: Malentendus dans la transmission d'information cartographique en Amérique du Nord." In *Transferts culturels et métissages Amérique/Europe, XVI*^{e}*–XX*^{e} *siècle,* ed. Laurier Turgeon, Denys Delâge, and Réal Ouellet, 357–75. Sainte-Foy, Quebec: Presses de l'Université Laval, 1996. **52, 178**

———. "Travelling in Uncharted Territory." In *Tales from the Map Room: Fact and Fiction about Maps and Their Makers,* by Peter Barber and Christopher Board, 40–41. London: BBC Books, 1993. **99**

———. "An Early Map on Skin of the Area Later to Become Indiana and Illinois." *British Library Journal* 12 (1996): 66–87. **90**

———. "Maps and Mapmaking in Native North America." In *Encyclopaedia of the History of Science, Technology, and Medicine in the Non-Western World,* ed. Helaine Selin, 592–94. Dordrecht: Klewer Academic, 1997. **55**

———. "Native North Americans' Cosmological Ideas and Geographical Awareness: Their Representation and Influence on Early European Exploration and Geographical Knowledge." In *North American Exploration,* ed. John Logan Allen, vol. 1, *A New World Disclosed,* 71–126. Lincoln: University of Nebraska Press, 1997. **100**

———. "Encounters in Government Bureaus, Archives, Museums, and Libraries: 1782–1911." In *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 2. Chicago: University of Chicago Press, 1998. **55**

———. "Frontier Encounters in the Field: 1511–1925." In *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 1. Chicago: University of Chicago Press, 1998. **55**

———. "Hiatus Leading to a Renewed Encounter." In *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 3. Chicago: University of Chicago Press, 1998. **55**

———. "Recent and Current Encounters." In *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 4. Chicago: University of Chicago Press, 1998. **55**

———, ed. *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use.* Chicago: University of Chicago Press, 1998. **56, 57** *See also entries under individual authors.*

Lewis-Williams, J. David. *Believing and Seeing: Symbolic Meanings in Southern San Rock Paintings.* London: Academic Press, 1981. **13**

———. *The World of Man and the World of Spirit: An Interpretation of the Linton Rock Paintings.* Cape Town: South African Museum, 1988. **15, 16**

Lewis-Williams, J. David, and Thomas A. Dowson. "Through the Veil: San Rock Paintings and the Rock Face." *South African Archaeological Bulletin* 45 (1990): 5–16. **15**

Lewthwaite, Gordon R. "Geographical Knowledge of the Pacific Peoples." In *The Pacific Basin: A History of Its Geographical Exploration,* ed. Herman Ralph Friis, 57–86. New York: American Geographical Society, 1967. **444**

———. "The Puzzle of Tupaia's Map." *New Zealand Geographer* 26 (1970): 1–19. **449**

Liljeblad, Sven. "Oral Tradition: Content and Style of Verbal Arts." In *Handbook of North American Indians,* ed. William C. Sturtevant, 11:641–59. Washington, D.C.: Smithsonian Institution, 1978–. **109**

Linevskiy, A. M. *Petroglify Karelii* (The petroglyphs of Karelia). Petrozavodsk, 1939. **331**

Linné, Sigvald. *El Valle y la Ciudad de México en 1550.* Stockholm:

Tribes." Adelaide University Field Anthropology, Central Australia, no. 10. *Transactions and Proceedings of the Royal Society of South Australia* 56 (1932): 19–26. **369**

Magaña, Edmundo. *Orión y la mujer Pléyades: Simbolismo astronómico de los indios kaliña de Surinam.* Amsterdam: Centre for Latin American Research and Documentation, 1988. **304, 305**

Maggs, T. M. O'C. [Tim]. *Iron Age Communities of the Southern Highveld.* Pietermaritzburg: Council of the Natal Museum, 1976. **18**

———. "Neglected Rock Art: The Rock Engravings of Agriculturist Communities in South Africa." *South African Archaeological Bulletin* 50 (1995): 132–42. **18, 19, 20, 21, 22, 23**

Maggs, T. M. O'C., and Val Ward. "Rock Engravings by Agriculturist Communities in Savanna Areas of the Thukela Basin." *Natal Museum Journal of Humanities* 7 (1995): 17–40. **18, 20, 22**

Maggs, T. M. O'C., et al., "Spatial Parameters of Late Iron Age Settlements in the Upper Thukela Valley." *Annals of the Natal Museum* 27 (1985–86): 455–79. **21**

Malan, B. D. "Old and New Rock Engravings in Natal, South Africa: A Zulu Game." *Antiquity* 31 (1957): 153–54. **17**

Maling, Peter Bromley. *Early Charts of New Zealand, 1542–1851.* Wellington: A. H. and A. W. Reed, 1969. **494**

———. "Haast, Johann Franz Julius von, 1822–1887." In *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869,* 167–69. Wellington: Allen and Unwin, 1990. **523**

———. *Historic Charts and Maps of New Zealand: 1642–1875.* Birkenhead, Auckland: Reed Books, 1996. **494**

Malinowski, Bronislaw. *Argonauts of the Western Pacific: An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea.* London: Routledge and Kegan Paul, 1922. **430**

Mallery, Garrick. "Pictographs of the North American Indians: A Preliminary Paper." In *Fourth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, 1882–'83,* 4–256. Washington, D.C.: United States Government Printing Office, 1886. **52, 113**

———. "Picture-Writing of the American Indians." In *Tenth Annual Report of the Bureau of Ethnology to the Secretary of the Smithsonian Institution, 1888–'89,* 1–822. Washington, D.C.: United States Government Printing Office, 1893. **53, 84, 133, 173, 290**

Manker, Ernst. *Die lappische Zaubertrommel.* 2 vols. Stockholm, 1938–50. **335, 337**

———. *Samefolkets konst.* Stockholm: Askild and Karnekull, 1971. **335**

Marcus, Joyce. *Emblem and State in the Classic Maya Lowlands: An Epigraphic Approach to Territorial Organization.* Washington, D.C.: Dumbarton Oaks, 1976. **199**

———. "Zapotec Writing." *Scientific American* 242, no. 2 (1980): 50–64. **199**

———. *Mesoamerican Writing Systems: Propaganda, Myth, and History in Four Ancient Civilizations.* Princeton: Princeton University Press, 1992. **198, 199, 207, 215**

Marshall, James A. "An Atlas of American Indian Geometry." *Ohio Archaeologist* 37 (1987): 36–48. **95**

Martyn, Katharine. *J. B. Tyrrell, Explorer and Adventurer: The Geological Survey Years, 1881–1898.* Exhibition catalog. Toronto: University of Toronto Library, 1993. **56**

Maschio, Thomas. *To Remember the Faces of the Dead: The Plenitude of Memory in Southwestern New Britain.* Madison: University of Wisconsin Press, 1994. **427**

Mason, Revil J. *Origins of Black People of Johannesburg and the Southern Western Central Transvaal, AD 350–1880.* Johannesburg: R. J. Mason, 1986. **18, 21**

Masuda, Yoshio Shozo, Izumi Shimada, and Craig Morris, eds. *Andean Ecology and Civilization: An Interdisciplinary Perspective on Andean Ecological Complementarity.* Tokyo: University of Tokyo Press, 1985. **260**

Mathes, W. Michael. "A Cartographic Pictograph Site in Baja California Sur." *Masterkey for Indian Lore and History* 51 (1977): 23–28. **61**

Mathiassen, Therkel. *Material Culture of the Iglulik Eskimos.* Report of the Fifth Thule Expedition 1921–24, vol. 6, no. 1. Copenhagen: Glydendalske Boghandel, 1928. **155**

———. *Contributions to the Physiography of Southampton Island.* Report of the Fifth Thule Expedition 1921–24, vol. 1, no. 2. Copenhagen: Glydendalske Boghandel, 1931. **155**

———. *Contributions to the Geography of Baffin Land and Melville Peninsula.* Report of the Fifth Thule Expedition 1921–24, vol. 1, no. 3. Copenhagen: Glydendalske Boghandel, 1933. **155**

Matienzo, Juan de. *Gobierno del Perú.* Ed. Guillermo Lohmann Villena. Paris: Institut Français d'Études Andines, 1967. **266, 290, 291**

Matos Moctezuma, Eduardo. "Symbolism of the Templo Mayor." In *The Aztec Templo Mayor,* ed. Elizabeth Hill Boone, 185–209. Washington, D.C.: Dumbarton Oaks, 1987. **190**

Mauss, Marcel. *The Gift: The Form and Reason for Exchange in Archaic Societies.* Trans. W. D. Halls. New York: W. W. Norton, 1990. Original French edition, *Essai sur le don,* 1925. **423**

May, Philip Ross. *The West Coast Gold Rushes.* 2d rev. ed. Christchurch: Pegasus, 1967. **523**

Mazel, Aron David. "Distribution of Painting Themes in the Natal Drakensberg." *Annals of the Natal Museum* 25 (1982): 67–82. **15**

Meggitt, Mervyn J. *Desert People: A Study of the Walbiri Aborigines of Central Australia.* Sydney: Angus and Robertson, 1962. **376**

Mejía Xesspe, Toribio. *See* Tello, Julio C.

Melgarejo Vivanco, José Luis. *Los lienzos de Tuxpan.* Mexico City: Editorial la Estampa Mexicana, 1970. **204**

Mello Moraes, Alexandre José de. *Corographia historica, chronographica, genealogica, nobiliaria, e politica do Imperio do Brasil.* 4 vols. Rio de Janeiro, 1858–63. **320**

Meredith, Mrs. Charles. *Notes and Sketches of New South Wales, during a Residence in That Colony from 1839 to 1844.* London: Murray, 1844. **354**

Merlan, Francesca. "Catfish and Alligator: Totemic Songs of the Western Roper River, Northern Territory." In *Songs of Aboriginal Australia,* ed. Margaret Clunies Ross, Tamsin Donaldson, and Stephen A. Wild, 142–67. Sydney: University of Sydney, 1987. **361**

———. "The Interpretive Framework of Wardaman Rock Art: A Preliminary Report." *Australian Aboriginal Studies,* 1989, no. 2, 14–24. **357**

Mertz, Henriette. *Pale Ink: Two Ancient Records of Chinese Exploration in America.* 2d rev. ed. Chicago: Swallow Press, 1972. **62**

Michaels, Eric. "Constraints on Knowledge in an Economy of Oral Information." *Current Anthropology* 26 (1985): 505–10. **368, 388**

Miertsching, F. A. "From Okkak." *Periodical Accounts of the Work of the Moravian Missions,* 1846, 338. **159**

Miertsching, Johann August. *Frozen Ships: The Arctic Diary of Johann Miertsching, 1850–1854.* Trans. and ed. Leslie H. Neatby. New York: St. Martin's Press, 1967. **157**

Mignolo, Walter D. "Colonial Situations, Geographical Discourses and Territorial Representations: Toward a Diatopical Understanding of Colonial Semiosis." *Dispositio* 14 (1989): 93–140. **245**

Milbrath, Susan. "A Seasonal Calendar with Venus Periods in Codex Borgia." In *The Imagination of Matter: Religion and Ecology in Mesoamerican Traditions,* ed. Davíd Carrasco, 103–27. Oxford: British Archaeological Reports, 1989. **239, 240**

Miller, Arthur G. *The Mural Painting of Teotihuacán.* Washington, D.C.: Dumbarton Oaks, 1973. **256**

Australian Museum 13 (1960): 505–8. **355**

———. "Sacred Objects of the Pitjandjara Tribe, Western Central Australia." *Records of the South Australian Museum* 14 (1961–64): 397–411. **359**

———. *Nomads of the Australian Desert.* Adelaide: Rigby, 1976. **391, 392, 393, 411**

Mountford, Charles Pearcy, and Robert Edwards. "Rock Engravings of Panaramitee Station, North-eastern South Australia." *Transactions of the Royal Society of South Australia* 86 (1963): 131–46. **374**

Mowaljarlai, David, and Jutta Malnic. *Yorro Yorro: Everything Standing up Alive: Spirit of the Kimberley.* Broome, Western Australia: Magabala Books, 1993. **361, 413, 415**

Moyle, Richard M., with Slippery Morton. *Alyawarra Music: Songs and Society in a Central Australian Community.* Canberra: Australian Institute of Aboriginal Studies, 1986. **361**

Mundy, Barbara E. "The Maps of the Relaciones Geográficas, 1579–c. 1584: Native Mapping in the Conquered Land." Ph.D. diss., Yale University, 1993. **213**

———. *The Mapping of New Spain: Indigenous Cartography and the Maps of the Relaciones Geográficas.* Chicago: University of Chicago Press, 1996. **210, 213, 241, 245, 249**

———. "Mapping the Aztec Capital: The 1524 Nuremberg Map of Tenochtitlan, Its Sources and Meanings." *Imago Mundi* 50 (1998): 1–22. **194, 228**

Munn, Nancy D. "Totemic Designs and Group Continuity in Walbiri Cosmology." In *Aborigines Now: New Perspective in the Study of Aboriginal Communities,* ed. Marie Reay, 83–100. Sydney: Angus and Robertson, 1964. **365, 401**

———. "The Transformation of Subjects into Objects in Walbiri and Pitjantjatjara Myth." In *Australian Aboriginal Anthropology: Modern Studies in the Social Anthropology of the Australian Aborigines,* ed. Ronald Murray Berndt, 141–63. Nedlands: University of Western Australia Press for the Australian Institute of Aboriginal Studies, 1970. **365, 387**

———. "The Spatial Presentation of Cosmic Order in Walbiri Iconography." In *Primitive Art and Society,* ed. Anthony Forge, 193–220. London: Oxford University Press, 1973. **359, 365, 401, 412**

———. *Walbiri Iconography: Graphic Representation and Cultural Symbolism in a Central Australian Society.* Ithaca: Cornell University Press, 1973. Reprinted with new afterword, Chicago: University of Chicago Press, 1986. **354, 359, 365, 381, 401, 408**

———. "Gawan Kula: Spatiotemporal Control and the Symbolism of Influence." In *The Kula: New Perspectives on Massim Exchange,* ed. Jerry W. Leach and Edmund L. Leach, 277–308. Cambridge: Cambridge University Press, 1983. **427, 431**

———. *The Fame of Gawa: A Symbolic Study of Value Transformation in a Massim (Papua New Guinea) Society.* Cambridge: Cambridge University Press, 1986. **429**

Munro-Hay, Stuart. *Aksum: An African Civilisation of Late Antiquity.* Edinburgh: Edinburgh University Press, 1991. **28, 30**

Murdock, George Peter. "The Cross-Cultural Survey." *American Sociological Review* 5 (1940): 361–70. **9**

Murie, James R. *Ceremonies of the Pawnee.* 2 pts. Ed. Douglas R. Parks. Smithsonian Contributions to Anthropology, no. 27. Washington, D.C.: Smithsonian Institution Press, 1981. **124, 125**

Murra, John V. "El 'control vertical' de un máximo de pisos ecológicos en la economía de las sociedades andinas." In *Visita de la provincia de León de Huánuco en 1562: Iñigo Ortiz de Zúñiga, visitador,* 2 vols., ed. John V. Murra, 2:427–76. Huánuco, Peru: Universidad Nacional Hermilio Valdizán, 1967–72. **259**

———. "An Aymara Kingdom in 1567." *Ethnohistory* 15 (1968): 115–51. **259–60, 280**

———. *Formaciones económicas y políticas del mundo andino.* Lima: Instituto de Estudios Peruanos, 1975. **293**

Myers, Fred R. "Burning the Truck and Holding the Country: Property, Time, and the Negotiation of Identity among Pintupi Aborigines." In *Hunters and Gatherers,* 2 vols., ed. Tim Ingold, David Riches, and James Woodburn, vol. 1, *Property, Power and Ideology,* 52–74. New York: Berg, 1987–88. **366**

———. "Truth, Beauty, and Pintupi Painting." *Visual Anthropology* 2 (1989): 163–95. **383**

Nabokov, Peter. "Native Views of History." In *The Cambridge History of the Native Peoples of the Americas,* vol. 1, *North America,* 2 pts., ed. Bruce G. Trigger and Wilcomb E. Washburn, pt. 1, 1–59. Cambridge: Cambridge University Press, 1996. **8**

———. "Orientations from Their Side: Dimensions of Native American Cartographic Discourse." In *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 11. Chicago: University of Chicago Press, 1998. **53**

Nakuina, Moses K. *The Wind Gourd of La'amaomao.* Trans. Esther T. Mookini and Sarah Nākoa. Honolulu: Kalamakū Press, 1990. **487**

Napora, Joe, trans. *The Walam Olum.* Greenfield Center, N.Y.: Greenfield Review Press, 1992. **8**

Nash, David. "Notes toward a Draft Ethnocartographic Primer (for Central Australia)." In preparation. **387**

Nasr, Seyyed Hossein. *An Introduction to Islamic Cosmological Doctrines.* Rev. ed. Albany: State University of New York Press, 1993. **29**

Navamuel, Ercilia. *Atlas histórico de Salta: Conocimiento geográfico indígena e hispano.* Salta, Argentina: Aráoz Anzoátegui Impresores, 1986. **271**

Neich, Roger. *Painted Histories: Early Maori Figurative Painting.* Auckland: Auckland University Press, 1993. **531**

Netherly, Patricia J. "The Management of Late Andean Irrigation Systems on the North Coast of Peru." *American Antiquity* 49 (1984): 227–54. **261, 262**

Neugebauer, Otto. "A Greek World Map." In *Le monde grec: Pensée, littérature, histoire, documents. Hommages à Claire Préaux,* ed. Jean Bingen, Guy Cambier, and Georges Nachtergael, 312–17. Brussels: Editions de l'Université de Bruxelles, 1975. **28**

———. *Ethiopic Astronomy and Computus.* Vienna: Verlag der Österreichischen Akademie der Wissenschaften, 1979. **28, 29**

Newcomb, Franc J., and Gladys A. Reichard. *Sandpaintings of the Navajo Shooting Chant.* New York: J. J. Augustin, 1937. Reprinted New York: Dover, 1975. **110**

Newcomb, William W. *The Indians of Texas, from Prehistoric to Modern Times.* Austin: University of Texas Press, 1961. **128**

Newcomb, William W., and T. N. Campbell. "Southern Plains Ethnohistory: A Re-examination of the Escanjaques, Ahijados, and Cuitoas." In *Pathways to Plains Prehistory: Anthropological Perspectives of Plains Natives and Their Pasts.* Ed. Don G. Wyckoff and Jack L. Hofman, 29–43. Duncan, Okla.: Cross Timbers Press, 1982. **126**

Neyt, François. "Tabwa Sculpture and the Great Traditions of East-Central Africa." Trans. Samuel G. Ferraro. In *Tabwa: The Rising of a New Moon: A Century of Tabwa Art,* ed. Evan M. Maurer and Allen F. Roberts, 65–89. Ann Arbor: University of Michigan Museum of Art, 1985. **33**

Nicholas, John Liddiard. *Narrative of a Voyage to New Zealand.* 2 vols. London: J. Black, 1817. **501**

Nicholson, H. B. "Religion in Pre-Hispanic Central Mexico." In *Handbook of Middle American Indians,* vol. 10, ed. Gordon F. Ekholm and Ignacio Bernal, 395–446. Austin: University of Texas Press, 1971. **229, 234**

———. "Phoneticism in the Late Pre-Hispanic Central Mexican

Writing System." In *Mesoamerican Writing Systems,* ed. Elizabeth P. Benson, 1–46 Washington, D.C.: Dumbarton Oaks, 1973. 199

Nicollet, Joseph N. *The Journals of Joseph N. Nicollet: A Scientist on the Mississippi Headwaters, with Notes on Indian Life, 1836–37.* Trans. André Fertey. Ed. Martha Coleman Bray. St. Paul: Minnesota Historical Society, 1970. **86**

Nielsen, Karl. "Remarques sur les noms grecs et latins des vents et des régions du ciel." *Classica et Mediaevalia* 7 (1945): 1–113. **29**

Niles, Susan A. *Callachaca: Style and Status in an Inca Community.* Iowa City: University of Iowa Press, 1987. **287**

Nobbs, C. W. "The Legend of the Muramura Darana." Typescript (photocopy). Adelaide, South Australian Museum, [ca. 1985]. 384

Nobbs, Margaret. "Rock Art in Olary Province, South Australia." *Rock Art Research* 1 (1984): 91–118. **374**

Nooter, Mary H. [Mary Nooter Roberts]. "Luba Art and Polity: Creating Power in a Central African Kingdom." Ph.D. diss., University of Michigan, 1991. **31, 32, 33**

———. "Fragments of Forsaken Glory: Luba Royal Culture Invented and Represented (1883–1992) (Zaire)." In *Kings of Africa: Art and Authority in Central Africa,* ed. Erna Beumers and Hans-Joachim Koloss, 79–89. Utrecht: Foundation Kings of Africa, [1993]. **32**

Noppen, J. G. "A Unique Chukhi Drawing." *Burlington Magazine for Connoisseurs* 70 (1937): 34. **347**

Nordenskiöld, Erland. "Calculations with the Years and Months in the Peruvian Quipus." In *The Secret of the Peruvian Quipus.* Comparative Ethnographical Studies, vol. 6, pt. 2. 1925. Reprinted New York: AMS Press, 1979. **291**

———. "The Secret of the Peruvian Quipus." In *The Secret of the Peruvian Quipus.* Comparative Ethnographical Studies, vol. 6, pt. 1. 1925. Reprinted New York: AMS Press, 1979. **290**

Norman, V. Garth. *Izapa Sculpture.* 2 pts. Papers of the New World Archaeological Foundation 30. Provo: New World Archaeological Foundation, 1973–76. **234, 255**

Norona, Delf. "Maps Drawn by Indians in the Virginias." *West Virginia Archeologist* 2 (1950): 12–19. **55**

———. "Maps Drawn by North American Indians." *Bulletin of the Eastern States Archeological Federation* 10 (1951): 6. **55**

Northern Cheyenne Language and Culture Center Title VII ESEA Bilingual Education Program. *English-Cheyenne Student Dictionary.* Lame Deer, Mont., 1976. **52**

Norwich, [Oscar] I. *Norwich's Maps of Africa: An Illustrated and Annotated Carto-bibliography.* Bibliographical descriptions by Pam Kolbe. 2d ed. Rev. and ed. Jeffrey C. Stone. Norwich, Vt.: Terra Nova Press, 1997. **24**

Norwood, Henry. "A Voyage to Virginia." In *A Collection of Voyages and Travels,* 3d ed., 6 vols., comp. Awnsham Churchill and John Churchill, 6:161–86. London, 1744–46. **68**

Nosilov, K. *U vogulov* (Among the Voguls). St. Petersburg, 1904. **342**

Nowotny, Karl Anton. "Die Hieroglyphen des Codex Mendoza: Der Bau einer mittelamerikanischen Wortschrift." *Mitteilungen aus dem Museum für Völkerkunde in Hamburg* 25 (1959): 97–113. **198, 199**

Núñez Jiménez, Antonio. *Petroglifos del Perú: Panorama mundial del arte rupestre.* 2d ed. 4 vols. Havana: Editorial Científico-Técnica, 1986. **270, 271**

Nuttall, Zelia, ed. *The Codex Nuttall: A Picture Manuscript from Ancient Mexico.* New York: Dover, 1975. **215, 249**

Oestreicher, David M. "Unmasking the *Walam Olum:* A 19th-Century Hoax." *Bulletin of the Archaeological Society of New Jersey* 49 (1994): 1–44. **8, 82**

———. "The Anatomy of the Walam Olum: The Dissection of a Nineteenth-Century Anthropological Hoax." Ph.D diss., Rutgers University, 1995. **8**

Oettinger, Marion. *Lienzos coloniales: Una exposición de pinturas de terrenos comunales de México (siglos XVII–XIX).* Mexico City: Universidad Nacional Autónoma de México, Instituto de Investigaciones Antropológicas, 1983. **245**

Oettinger, Marion, and Fernando Horcasitas. *The Lienzo of Petlacala: A Pictorial Document from Guerrero, Mexico.* Transactions of the American Philosophical Society, n.s. 72, pt. 7. Philadelphia: American Philosophical Society, 1982. **246**

O'Ferrall, Michael A. *Keepers of the Secrets: Aboriginal Art from Arnhemland in the Collection of the Art Gallery of Western Australia.* Perth: Art Gallery of Western Australia, 1990. **358, 405**

Offner, Jerome A. *Law and Politics in Aztec Texcoco.* Cambridge: Cambridge University Press, 1983. **225**

O'Hanlon, Michael. *Paradise: Portraying the New Guinea Highlands.* London: British Museum Press, 1993. **434**

Okladnikova, Ye. A. [Elena]. *Model' vselennoy v sisteme obrazov naskal'nogo iskusstva Tikhookeanskogo poberezh'ya Severnoy Ameriki: Problema etnokul'turnykh kontaktov aborigenov Sibiri i korennogo naseleniya Severnoy Ameriki* (Model of the universe in the system of images of rock engravings of North America's Pacific shore: The problem of ethnocultural contacts of the populations of Siberia and North America). St. Petersburg: MAE RAN, 1995. **329, 331**

Ollone, Henri Marie Gustave d'. *Mission Hostains-D'Ollone, 1898–1900: De la Côte d'Ivoire au Soudan et a la Guinée.* Paris: Hachette, 1901. **36**

The Olmec World: Ritual and Rulership. Princeton: Art Museum, Princeton University, 1995. **234**

Olton, David S. "Mazes, Maps, and Memory." *American Psychologist* 34 (1979): 583–96. **443**

Ong, Walter J. *Orality and Literacy: The Technologizing of the Word.* London: Methuen, 1982. **2, 425, 539, 540**

Orbell, Margaret Rose. *The Illustrated Encyclopedia of Māori Myth and Legend.* Christchurch: Canterbury University Press, 1995. **523**

O'Regan, Tipene. "Old Myths and New Politics: Some Contemporary Uses of Traditional History." *New Zealand Journal of History* 26 (1992): 5–27. **8**

Orlova, Ye. N. "Naselenye po r.r. Keti i Tymu, yego sostav, khozyaystvo i byt" (The population of the river basins of Ket' and Tym, its composition, economy, and daily life). *Raboty Nauchno-Promyslovoy Ekspeditsii po Izucheniyu Reki Obi i Yeye Basseyna* (Transactions of the scientific and economic expedition for exploration of the river Ob' and its basin) (Krasnoyarsk) 1, no. 4 (1928). **342**

Orlove, Benjamin S. "Irresoluciun suprema y autonomía campesina: Los totorales del Lago Titicaca." *Allpanchis,* no. 37 (1991): 203–68. **263**

———. "Mapping Reeds and Reading Maps: The Politics of Representation in Lake Titicaca." *American Ethnologist* 18 (1991): 3–38. **263, 264**

———. "The Ethnography of Maps: The Cultural and Social Contexts of Cartographic Representation in Peru." *Cartographica* 30, no. 1 (1993): 29–46. **263, 265**

Orozco y Berra, Manuel. *Materiales para una cartografía mexicana.* Mexico City: Imprenta del Gobierno, 1871. **190**

———. "Códice Mendocino: Ensayo de descifración geroglífica." *Anales del Museo Nacional de México,* época 1, vol. 1 (1877): 120–86, 242–70, 289–339; vol. 2 (1882): 47–82, 127–30, 205–32. **190**

———. "El cuauhxicalli de Tizoc." *Anales del Museo Nacional de México* 1 (1877): 3–38. **238**

Ortloff, Charles R. "Surveying and Hydraulic Engineering of the Pre-Columbian Chimú State: AD 900–1450." *Cambridge Archaeological Journal* 5 (1995): 55–74. **283, 284, 291**

Ortloff, Charles R., Michael E. Moseley, and Robert A. Feldman. "Hydraulic Engineering Aspects of the Chimu Chicama-Moche Intervalley Canal." *American Antiquity* 47 (1982): 572–95. **284**

Osborne, Douglas. *The Archaeology of the Palau Islands.* Bernice P. Bishop Museum Bulletin, no. 230. Honolulu: Bishop Museum Press, 1966. **489**

Osmers, Peter. "Inuit Perspective in Drawings." Unpublished paper, Carleton University, 1992. **170**

Ostrovskikh, P. Ye. *Poyezdka na Ozero Yesei* (Journey to Yesei Lake). *Izvestiya Krasnoyarskogo podotdela Vostochno-Sibirskogo otdela Imperatorskogo Geograficheskogo Obshchestva* (Annals of Krasnoyarsk subdivision of the east Siberian division of the department of the Imperial Geographical Society) 1, no. 6 (1904): 21–32. **340, 344**

Pager, Harald L. *Ndedema: A Documentation of the Rock Paintings of the Ndedema Gorge.* Graz: Akademische Druck- u. Verlagsanstalt, 1971. **14**

———. "The Magico-religious Importance of Bees and Honey for the Rock Painters and Bushmen of Southern Africa." *South African Bee Journal* 46 (1974): 6–9. **15**

Pané, Ramón. *An Account of the Antiquities of the Indians.* Ed. José Juan Arrom. Trans. Susan Griswold. Durham: Duke University Press, forthcoming. **317**

Pankhurst, Alula. "An Early Ethiopian Manuscript Map of Tegré." In *Proceedings of the Eighth International Conference of Ethiopian Studies, University of Addis Ababa, 1984,* 2 vols., ed. Taddese Beyene, 2:73–88. Addis Ababa: Institute of Ethiopian Studies, 1988–89. **28**

Parks, Douglas R. "Interpreting Pawnee Star Lore: Science or Myth?" *American Indian Culture and Research Journal* 9, no. 1 (1985): 53–65. **54, 125**

Parks, Douglas R., and Waldo R. Wedel. "Pawnee Geography: Historical and Sacred." *Great Plains Quarterly* 5 (1985): 143–76. **54**

Parmenter, Ross. *Four Lienzos of the Coixtlahuaca Valley.* Studies in Pre-Columbian Art and Archaeology 26. Washington, D.C.: Dumbarton Oaks, 1982. **191, 207, 219, 251**

Parroni, Piergiorgio. "Surviving Sources of the Classical Geographers through Late Antiquity and the Medieval Period." In *Unveiling the Arctic,* ed. Louis Rey, 352–58. Fairbanks: University of Alaska Press for the Arctic Institute of North America, 1984. **330**

Parry, William Edward. *Journal of a Second Voyage for the Discovery of a North-west Passage from the Atlantic to the Pacific.* London: John Murray, 1824. **155, 157, 159**

———. *Journals of the First, Second, and Third Voyages for the Discovery of a North-west Passage from the Atlantic to the Pacific.* 6 vols. London: J. Murray, 1828–29. **157**

Parsons, Jeffrey R. "An Archaeological Evaluation of the Codice Xolotl." *American Antiquity* 35 (1970): 431–40. **205**

Pärssinen, Martti. *Tawantinsuyu: The Inca State and Its Political Organization.* Helsinki: SHS, 1992. **293, 294**

Paso y Troncoso, Francisco del, ed., *Códice Kingsborough: Memorial de los Indios de Tepetlaoztoc. . . .* Facsimile ed. Madrid: Fototipia de Hauser y Menet, 1912. **244, 251**

Pasztory, Esther. *The Murals of Tepantitla, Teotihuacan.* New York: Garland, 1976. **256**

———. *Aztec Art.* New York: Harry N. Abrams, 1983. **195, 205, 255**

Paul, Anne. "Paracas Necrópolis Bundle 89." In *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul, 172–221. Iowa City: University of Iowa Press, 1991. **273**

———. "Paracas Necrópolis Textiles: Symbolic Visions of Coastal Peru." In *The Ancient Americas: Art from Sacred Landscapes,* ed. Richard F. Townsend, 278–89. Chicago: Art Institute of Chicago, 1992. **273**

Pearce, Margaret W. "Native Mapping in Southern New England Indian Deeds." In *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 7. Chicago: University of Chicago Press, 1998. **74**

Pekarskiy, E. K., and V. P. Tsvetkov. "Ocherki byta priayanskikh Tungusov" (An outline of daily life of the Tungus in the Ayan area). *Sbornik Muzeya po Antropologii i Etnografii pri Imperatorskoy Akademii Nauk* (Publications of the Museum of Anthropology and Ethnography of the Imperial Academy of Sciences), vol. 2, no. 1 (1913). **340**

Pentikäinen, Juha. "Northern Ethnography—Exploring the Fourth World." *Universitas Helsingiensis: The Quarterly of the University of Helsinki,* no. 1 (1993): 20–29. **329, 330**

Peñafiel, Antonio. *Nombres geográficos de México.* Mexico City: Oficina Tipográfica de la Secretaria de Fomento, 1885. **191, 198**

———. *Nomenclatura geográfica de México: Etimologías de los nombres de lugar.* Mexico City: Oficina Tipográfica de la Secretaria de Fomento, 1897. **191, 198**

Pentland, David H. "Cartographic Concepts of the Northern Algonquians." *Canadian Cartographer* 12 (1975): 149–60. **55**

———. *Cree Maps from Moose Factory.* Regina: Privately printed preliminary edition, 1978. **143**

Pereyra Sánchez, Hugo. "La yupana, complemento operacional del quipu." In *Quipu y yupana: Colección de escritos,* ed. Carol Mackey et al., 235–55. Lima: Consejo Nacional de Ciencia y Tecnología, 1990. **291**

Péron, François. *A Voyage of Discovery to the Southern Hemisphere, Performed by Order of the Emperor Napoleon, during the Years 1801, 1802, 1803, and 1804.* London: R. Phillips, 1809. **354**

Peschel, Oscar. *O. Peschel's Geschichte der Erdkunde bis auf Alexander von Humboldt und Carl Ritter.* Ed. Sophus Ruge. Munich: R. Oldenbourg, 1877. **55**

Peters, Ann H. "Ecology and Society in Embroidered Images from the Paracas Necrópolis." In *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul, 240–314. Iowa City: University of Iowa Press, 1991. **273, 277**

Petersen, Karen Daniels. *Howling Wolf: A Cheyenne Warrior's Graphic Interpretation of His People.* Palo Alto, Calif.: American West, 1968. **118**

———. *Plains Indian Art from Fort Marion.* Norman: University of Oklahoma Press, 1971. **118**

Peterson, Nicolas. "Totemism Yesterday: Sentiment and Local Organisation among the Australian Aborigines." *Man,* n.s. 7 (1972): 12–32. **364**

Petrie, Constance Campbell. *Tom Petrie's Reminiscences of Early Queensland.* Brisbane: Watson, Ferguson, 1904. **355**

Phillips, Philip, and James A. Brown, *Pre-Columbian Shell Engravings from the Craig Mound at Spiro, Oklahoma.* 6 vols. Cambridge, Mass.: Peabody Museum Press, 1975–82. **103**

Pinxten, Rik. *Towards a Navajo Indian Geometry.* Ghent, Belgium: Communication and Cognition, 1987. **176**

Playdon, George W. "The Significance of Marshallese Stick Charts." *Journal of the Institute of Navigation* 20 (1967): 155–66. **484**

Poata, Tamati Rihara. *The Maori as a Fisherman and His Methods.* Opotiki: W. B. Scott and Sons, 1919. Reprinted Papakura: Southern Reprints, ca. 1992. **497**

Podgorbunskiy, V. I. "Dve karty Tungusa s reki Mai" (Two maps belonging to a Tungus from the Maia River). *Izvestiya Vostochno-Sibirskogo otdeleniya Russkogo Geograficheskogo Obshchestva* (Annals of the Eastern Siberian chapter of the Russian Geographic Society), 1924, 138–48. **340**

Pognon, Edmond. "Cosmology and Cartography." In *Unveiling the Arctic,* ed. Louis Rey, 334–40. Fairbanks: University of Alaska Press for the Arctic Institute of North America, 1984. 330

Pohl, John M. D. *The Politics of Symbolism in the Mixtec Codices.* Nashville: Vanderbilt University, 1994. **213, 215**

Pohl, John M. D., and Bruce E. Byland. "Mixtec Landscape Perception and Archaeological Settlement Patterns." *Ancient Mesoamerica* 1 (1990): 113–31. **191, 218**

Polack, J. S. *Manners and Customs of the New Zealanders, with Notes Corroborative of Their Habits, Usages, Etc.* 2 vols. 1840. Reprinted Christchurch: Capper Press, 1976. 493

Polevoy, B. P. "O tochnom tekste dvukh otpisok Semena Dezhneva 1655 g." (On the accurate text of two of Semyen Dezhnev's reports dated by 1655). *Izvestiya Akademii Nauk SSSR: Seriia geograficheskaia* (Annals of the USSR Academy of Sciences: Geography series) 6 (1965): 101–11. 340

———. "Podrobnyy otchet G. I. Nevel'skogo o yego istoricheskoy ekspeditsii 1849 g. k ostrovu Sakhalin i ust'yu Amura" (A detailed report by G. I. Nevel'skoy about his historic expedition of 1849 to the island of Sakhalin and the mouth of the Amur). *Strany i narody Vostoka* (Countries and peoples of the East), vol. 8, bk. 2 (1972): 114–49. 339

Polo de Ondegardo, Juan. *El mundo de los Incas.* Ed. Laura González and Alicia Alonso. Madrid: Historia 16, 1990. **263, 266, 284,** 290

Ponce Sanginés, Carlos. *Descripción sumaria del templete semisubterráneo de Tiwanaku.* 5th rev. ed. La Paz: Librería y Editorial "Juventud," 1981. 280

———. *Tiwanaku: Espacio, tiempo y cultura.* 4th ed. La Paz: Editorial "Los Amigos del Libro," 1981. 282

Poole, Peter. *Indigenous Peoples, Mapping and Biodiversity Conservation: An Analysis of Current Activities and Opportunities for Applying Geomatics Technologies.* Landover, Md.: Biodiversity Support Group, 1995. 173

———. "Land-Based Communities, Geomatics and Biodiversity Conservation: A Survey of Current Activities." *Cultural Survival Quarterly* 18, no. 4 (1995): 74–76. 540

Posey, Darrell A. "Pyka-tó-ti: Kayapó mostra aldeia de origem," *Revista de Atualiade Indígena* 15 (1979): 50–57. 317

Posnansky, Arthur. *Tihuanacu: The Cradle of American Man.* 2 vols. Trans. James F. Shearer. New York: J. J. Augustin, 1945. **281, 283**

Postnikov, A. V. "Kartografiya v tvorchestve P. A. Kropotkina" (Cartography in P. A. Kropotkin's studies). In *P. A. Kropotkin i sovremennost* (P. A. Kropotkin and modernity), 80–92. Moscow, 1993. 340

Prem, Hanns J. "Aztec Hieroglyphic Writing System—Possibilities and Limits." In *Verhandlungen des XXXVIII. Internationalen Amerikanistenkongresses (1968),* 4 vols., 2:159–65. Munich: Klaus Renner, 1969–72. 199

———. "Aztec Writing." In *Handbook of Middle American Indians,* suppl. vol. 5, ed. Victoria Reifler Bricker, 53–69. Austin: University of Texas Press, 1992. **198, 200**

———, ed. *Matrícula de Huexotzinco.* Graz: Akademische Druck- u. Verlagsanstalt, 1974. 224

Price, Richard. *First-Time: The Historical Vision of an Afro-American People.* Baltimore: Johns Hopkins University Press, 1983. 306

Prins, Frans E., and Sian Hall. "Expressions of Fertility in the Rock Art of Bantu-Speaking Agriculturists." *African Archaeological Review* 12 (1994): 171–203. 14

Prinsep, James. "Note on the Nautical Instruments of the Arabs." *Journal of the Asiatic Society of Bengal* 5 (1836): 784–94. 488

———. "Note on the Above Chapter ['Extracts from the Mohit']." *Journal of the Asiatic Society of Bengal* 7 (1838): 774–80. 488

"Proceedings of the Wernerian Natural History Society." *Edinburgh Philosophical Journal* 4 (1821): 194–96. 166

Prokof'eva, Ye. D. "Kostyum sel'kupskogo (ostyako-samoedskogo) shamana" (Costume of Sel'kup shaman). *Sbornik Muzeya Antropologii i Etnografii (Leningrad–St. Petersburg)* (Yearbook of the Museum of Anthropology and Ethnography, Leningrad–St. Petersburg) 11 (1949): 335–75. 334

Prussin, Labelle. *African Nomadic Architecture: Space, Place, and Gender.* Washington, D.C.: Smithsonian Institution Press, 1995. 24, 39

Purce, Jill. *The Mystic Spiral: Journey of the Soul.* New York: Avon, 1974. 331

Purchas, Samuel. *Purchas His Pilgrimes.* 4 vols. London, 1625. 68

Quinn, David B., ed. *New American World: A Documentary History of North America to 1612.* 5 vols. New York: Arno Press, 1979. 67, 70

Quirós [Queirós], Pedro Fernández de. *The Voyages of Pedro Fernandez de Quiros, 1595 to 1606.* 2 vols. Trans. and ed. Clements R. Markham. Hakluyt Society, ser. 2, nos. 14–15. London: Hakluyt Society, 1904. 445

Radicati di Primeglio, Carlos. "Tableros de escaques en el antiguo Perú." In *Quipu y yupana: Colección de escritos,* ed. Carol Mackey et al., 219–34. Lima: Consejo Nacional de Ciencia y Tecnología, 1990. 291

Raisz, Erwin. *General Cartography.* 2d ed. New York: McGraw-Hill, 1948. 38

Ralegh, Walter. *The Discoverie of the Large, Rich and Bewtiful Empyre of Guiana.* Ed. Neil L. Whitehead. Manchester: Manchester University Press; Norman: University of Oklahoma Press, 1997. 319, 322, 324

Rasmussen, Knud J. V. *Iglulik and Caribou Eskimo Texts.* Report of the Fifth Thule Expedition 1921–24, vol. 7, no. 3. Copenhagen: Glydendalske Boghandel, 1930. 155

———. *The Netsilik Eskimos: Social Life and Spiritual Culture.* Report of the Fifth Thule Expedition 1921–24, vol. 8, nos. 1 and 2. Copenhagen: Glydendalske Boghandel, 1931. 155

———. *Intellectual Culture of the Copper Eskimo.* Report of the Fifth Thule Expedition 1921–24, vol. 9. Copenhagen: Glydendalske Boghandel, 1932. 155

Ravdonikas, V. I. "Elementy kosmicheskikh predstavleniy v obrazakh naskal'nykh izobrazheniy" (Elements of the notions of cosmos in the images of rock engravings). *Sovetskaya Arkheologiya* (Soviet archeology), no. 4 (1937): 11–32. 331

Ray, Dorothy Jean. *Eskimo Art: Tradition and Innovation in North Alaska.* Seattle: University of Washington Press, 1977. 167

Read, Georgia Willis, and Ruth Gaines, eds. *Gold Rush: The Journals, Drawings, and Other Papers of J. Goldsborough Bruff.* 2 vols. New York: Columbia University Press, 1944. 113

Reclus, Elisée. *Nouvelle géographie universelle: La terre et les hommes.* Vol. 12, *L'Afrique occidentale.* Paris: Hachette, 1887. 35

Records of the Colony of New Plymouth in New England. Vol. 12, *Deeds, &c., 1620–1651. Book of Indian Records for Their Lands.* Boston: W. White, 1861. 74

Reed, A. W. *Place Names of New Zealand.* Wellington: A. H. and A. W. Reed, 1975. 493

Reefe, Thomas Q. "Lukasa: A Luba Memory Device." *African Arts* 10, no. 4 (1977): 48–50. 32

Reents-Budet, Dorie. *Painting the Maya Universe: Royal Ceramics of the Classic Period.* Durham: Duke University Press, 1994. 233

Reichard, Gladys A., *Navajo Medicine Man: Sandpaintings and Legends of Miguelito.* New York: J. J. Augustin, 1939. Reprinted New York: Dover, 1977. 110

Richard Miller, van Fraassen/Sigman, and Churchland." In *Realism and Representation: Essays on the Problem of Realism in relation to Science, Literature, and Culture,* ed. George Lewis Levine, 125–33. Madison: University of Wisconsin Press, 1993. 2

Rose, Frederick G. G. *The Wind of Change in Central Australia: The Aborigines at Angas Downs, 1962.* Berlin: Akadamie-Verlag, 1965. 408

Ross, John. *Narrative of a Second Voyage in Search of a North-west Passage.* 2 vols. London: A. W. Webster, 1835. **155, 159**

Ross, Kay Napaljarri. "Traditional Landscape around Yuendumu." In *Kuruwarri: Yuendumu Doors,* by Warlukurlangu Artists, 4–5. Canberra: Australian Institute of Aboriginal Studies, 1987. **362**

Ross, Margaret Clunies, and L. R. Hiatt. "Sand Sculptures at a Gidjingali Burial Rite." In *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe,* ed. Peter J. Ucko, 131–46. Canberra: Australian Institute of Aboriginal Studies, 1977. **357, 412**

Roth, Walter Edmund. *Ethnological Studies among the North-West-Central Queensland Aborigines.* Brisbane: E. Gregory, Government Printer, 1897. **384**

———. "North Queensland Ethnography, Bulletin No. 11." *Records of the Australian Museum* 7 (1908–10): 74–107. **384**

Rowe, John Howland. "Inca Culture at the Time of the Spanish Conquest." In *Handbook of South American Indians,* 7 vols., ed. Julian H. Steward, 2:183–330. Washington, D.C.: Bureau of American Ethnology, 1946–59. 291

———. *Chavín Art: An Inquiry into Its Form and Meaning.* New York: Museum of Primitive Art, 1962. 273

———. "Form and Meaning in Chavín Art." In *Peruvian Archaeology: Selected Readings,* ed. John Howland Rowe and Dorothy Menzel, 72–103. Palo Alto, Calif.: Peek, 1967. **273**

———. "What Kind of Settlement Was Inca Cuzco?" *Ñawpa Pacha* 5 (1967): 59–76. 285

———. "El arte de Chavín; estudio de su forma y su significando." *Historia y Cultura* 6 (1973): 249–76. 272

———. "An Account of the Shrines of Ancient Cuzco." *Ñawpa Pacha* 17 (1979): 1–80. **286, 288, 289, 295**

Roxburgh, Irvine. *Jacksons Bay: A Centennial History.* Wellington: A. H. and A. W. Reed, 1976. **518**

Roys, Ralph Loveland. *The Titles of Ebtun.* Washington, D.C.: Carnegie Institution, 1939. 210

———. *The Indian Background of Colonial Yucatan.* Washington, D.C.: Carnegie Institution, 1943. **185, 197, 209, 220, 241, 249**

———, trans. *The Book of Chilam Balam of Chumayel.* Washington, D.C.: Carnegie Institution, 1933. **210**

Ruggles, C. L. N. "A Statistical Examination of the Radial Line Azimuths at Nazca." In *The Lines of Nazca,* ed. Anthony F. Aveni, 247–69. Philadelphia: American Philosophical Society, 1990. **276**

Ruggles, Richard I. *A Country So Interesting: The Hudson's Bay Company and Two Centuries of Mapping, 1670–1870.* Montreal: McGill-Queen's University Press, 1991. **56, 143, 146, 152**

Ruhe, E. L. "Poetry in the Older Australian Landscape." In *Mapped but Not Known: The Australian Landscape of the Imagination,* ed. P. R. Eaden and F. H. Mares, 20–49. Netley, South Australia: Wakefield Press, 1986. 354

Ruiz Naufal, Víctor M., et al. *El territorio mexicano.* 2 vols. and plates. Mexico City: Instituto Mexicano del Seguro Social, 1982. 249

Rundstrom, Robert A. "A Cultural Interpretation of Inuit Map Accuracy." *Geographical Review* 80 (1990): 155–68. **6, 154**

———. "Expectations and Motives in the Exchange of Maps and Geographical Information among Inuit and *Qallunaat* in the Nineteenth and Twentieth Centuries." In *Transferts culturels et métissages Amérique/Europe, XVI^e^–XX^e^ siècle,* ed. Laurier Turgeon, Denys Delâge, and Réal Ouellet, 377–95. Sainte-Foy, Quebec: Presses de l'Université Laval, 1996. **6, 154**

Ruz Lhuillier, Alberto. *El Templo de las Inscripciones, Palenque.* Mexico City: Instituto Nacional de Antropología e Historia, 1973. **234**

Ryan, Judith. *Paint up Big: Warlpiri Women's Art of Lajamanu.* Melbourne: National Gallery of Victoria, [1990]. 354

———. *Spirit in Land: Bark Paintings from Arnhem Land in the National Gallery of Victoria.* Melbourne: National Gallery of Victoria, [1990]. **354, 412**

Sack, Robert David. *Conceptions of Space in Social Thought: A Geographic Perspective.* London: Macmillan, 1980. 3

Sadowski, Robert M. "A Few Remarks on the Astronomy of R. T. Zuidema's 'Quipu-Calendar.'" In *Time and Calendars in the Inca Empire,* ed. Mariusz S. Ziółkowski and Robert M. Sadowski, 209–13. Oxford: BAR, 1989. 287

Sahagún, Bernardino de. *Florentine Codex: General History of the Things of New Spain.* 2d rev. ed. 13 vols. Trans. Arthur J. O. Anderson and Charles E. Dibble. Santa Fe, N.Mex.: School of American Research, 1970–82. **185, 227, 231, 232, 234, 238**

———. *Códice Florentino: El manuscrito 218–220 de la colección Palatino de la Biblioteca Medicea Laurenziana.* Facsimile ed. 3 vols. Florence: Gunti Barbéra and Archivo General de la Nación, 1979. **253**

———. *Primeros memoriales.* Facsimile ed. Norman: University of Oklahoma Press, 1993. **225, 238, 253, 255**

"Sale of Land, with All the Acts of Investigation, Confirmation, and Possession; Will Attached, Azcapotzalco, 1738." In *Beyond the Codices: The Nahua View of Colonial Mexico,* ed. and trans. Arthur J. O. Anderson, Frances Berdan, and James Lockhart, 101–9. Berkeley: University of California Press, 1976. **220**

Salmond, Anne. *Two Worlds: First Meetings between Maori and Europeans, 1642–1772.* Auckland: Viking, 1991. **495, 500**

———. "Kidnapped: Tuki and Huri's Involuntary Visit to Norfolk Island in 1793." In *From Maps to Metaphors: The Pacific World of George Vancouver,* ed. Robin Fisher and Hugh Johnston, 191–226. Vancouver: UBC Press, 1993. **495, 507, 508**

Salomon, Frank. *Native Lords of Quito in the Age of the Incas: The Political Economy of North Andean Chiefdoms.* Cambridge: Cambridge University Press, 1986. **261**

———. "Introductory Essay: The Huarochirí Manuscript." In *The Huarochirí Manuscript: A Testament of Ancient and Colonial Andean Religion,* trans. Frank Salomon and George L. Urioste, 1–38. Austin: University of Texas Press, 1991. **265, 266**

Sanchez y Zayas, E. "The Marianas Islands." *Nautical Magazine* (London) 34 (1865): 449–60, 641–49, and 35 (1866): 205–13, 253–66, 297–309, 356–63, and 462–72. **485**

Sanders, William T., Jeffrey R. Parsons, and Robert S. Santley. *The Basin of Mexico: Ecological Processes in the Evolution of a Civilization.* New York: Academic Press, 1979. 206

Santa Cruz Pachacuti Yamqui Salcamayhua, Juan de. *Relación de antigüedades deste reyno del Piru.* Ed. Pierre Duviols and César Itier. Lima: Institut Français d'Études Andines, 1993. **285**

Sarfert, E. "Zur Kenntnis der Schiffahrtskunde der Karoliner." *Korrespondenz-Blatt der Deutschen Gesellschaft für Anthropologie, Ethnologie und Urgeschichte* 42 (1911): 131–36. **462, 463, 472**

Sarmiento de Gamboa, Pedro. *Historia de los Incas.* 3d ed. Ed. Angel Rosenblatt. Buenos Aires: Emecé, 1947. **284, 285, 289**

Savary, Claude. "Situation et histoire des Bamum." *Bulletin Annuel* (Musée d'Ethnographie de la Ville de Genève) 20 (1977): 117–39. **43, 44**

Saville, Marshall Howard. *Tizoc: Great Lord of the Aztecs, 1481–1486.* Contributions from the Museum of the American Indian, Heye Foundation, vol. 7, no. 4. New York: Museum of the

American Indian, Heye Foundation, 1929. **241**

Savinov, D. G. "Tesinskie 'labirinty'—K istorii poyavleniya personifitsirovannogo shamanstva v yuzhnoy Sibiri" (The Tesinsk "labyrinths"—To the history of personalized shamanism in southern Siberia). *Kunstkamera: Etnograficheskie tetradi* (Kunstkamera: The ethnographic notebooks) 1 (1993): 35–48. **331, 332, 333**

Savvateev, Yu. A. *Risunki na skalakh* (Drawings on the rocks). Petrozavodsk: Karelskoe Knizhnoe Izdatelstvo, 1967. **331**

———. *Zalavruga: Arkheologicheskie pamyatniki nizov'ya reki Vyg* (Zalavruga: Archaeological monuments of the lower Vyg River). 2 vols. Leningrad: Nauka, 1970–77. **331, 332**

Sayers, Andrew. *Aboriginal Artists of the Nineteenth Century.* Melbourne: Oxford University Press in association with the National Gallery of Australia, 1994. **356, 410**

Scarre, Christopher, ed. *Past Worlds: The Times Atlas of Archaeology.* London: Times Books, 1988. **329**

Schele, Linda. "The Olmec Mountain and Tree of Creation in Mesoamerican Cosmology." In *The Olmec World: Ritual and Rulership,* 105–17. Princeton: Art Museum, Princeton University, 1995. 190, **234, 235**

Schele, Linda, and David A. Freidel. *A Forest of Kings: The Untold Story of the Ancient Maya.* New York: William Morrow, 1990. 234

Schele, Linda, and Mary Ellen Miller. *The Blood of Kings: Dynasty and Ritual in Maya Art.* New York: George Braziller, 1986. 200, **233, 234, 235, 255**

Schieffelin, Edward L. *The Sorrow of the Lonely and the Burning of the Dancers.* New York: St. Martin's Press, 1976. 434

———. "Mediators as Metaphors: Moving a Man to Tears in Papua, New Guinea." In *The Imagination of Reality: Essays in Southeast Asian Coherence Systems,* ed. A. L. Becker and Aram A. Yengoyan, 127–43. Norwood, N.J.: Ablex, 1979. 434

Schlatter, Gerhard. *Bumerang und Schwirrholz: Eine Einführung in die traditionelle Kultur australischer Aborigines.* Berlin: Reimer, 1985. **359**

Schoeman, P. J. *Hunters of the Desert Land.* 2d rev. ed. Cape Town: Howard Timmins, 1961. 23

Scholes, France Vinton, and Ralph Loveland Roys. *The Maya Chontal Indians of Acalan-Tixchel: A Contribution to the History and Ethnography of the Yucatan Peninsula.* 2d ed. Norman: University of Oklahoma Press, 1968. 210

Schomburgk, Moritz Richard. *Richard Schomburgk's Travels in British Guiana, 1840–1844.* 2 vols. Ed. and trans. Walter E. Roth. Georgetown, Guyana, 1922–23. 320

Schoolcraft, Henry Rowe. *Narrative Journal of Travels through the Northwestern Regions of the United States.* Albany: E. and E. Hosford, 1821. **85**

———. *Historical and Statistical Information respecting the History, Condition, and Prospects of the Indian Tribes of the United States.* 6 vols. Illustrated by Seth Eastman. Philadelphia: Lippincott, Grambo, 1851–57. **79, 80, 81**

Schreiber, Katharina J., and Josué Lancho Rojas. "The Puquios of Nasca." *Latin American Antiquity* 6 (1995): 229–54. 277

Schubert, Rose, Ernst Feist, and Caroline Zelz. "Zur frühen Seefahrt in der Südsee: Schiffahrt und Navigation in Polynesien und Mikronesien." In *Kolumbus: Oder Wer entdeckte Amerika?* Ed. Wolfgang Stein, 90–99. Munich: Hirmer, 1992. **492**

Schück, A. "Die astronomischen, geographischen und nautischen Kentnisse der Bewohner der Karolinen- und Marshallinseln im westlichen Grossen Ozean." *Aus Allen Welttheilen* 13 (1882): 51–57 and 242–43. 462

———. "Die Entwickelung unseres Bekanntwerdens mit den astronomischen, geographischen und nautischen Kentnissen der Karolineninsulaner, nebst Erklärung der Medo's oder Segelkarten der Marshall-Insulaner, im westlichen grossen Nord-Ocean." *Tijdschrift van het Nederlandsch Aardrijkskundig Genootschap, gevestigd te Amsterdam,* 2d ser., 1 (1884): 226–51. **485**

———. *Die Stabkarten der Marshall-Insulaner.* Hamburg, 1902. **492**

Schwartzberg, Joseph E. "Cosmographical Mapping." In *The History of Cartography,* ed. J. B. Harley and David Woodward, vol. 2.1 (1992), 332–87. Chicago: University of Chicago Press, 1987–. **181**

———. "Nautical Maps." In *History of Cartography,* ed. J. B. Harley and David Woodward, vol. 2.1, 494–503. Chicago: University of Chicago Press, 1987–. 488

Seler, Eduard. *Codex Fejérváry-Mayer: An Old Mexican Picture Manuscript in the Liverpool Free Public Museums.* London, 1901–2. 229, 232

———. *Codex Borgia: Eine altmexikanische Bilderschrift der Bibliothek der Congregatio de Propaganda Fide.* 3 vols. Berlin, 1904–9. **229**

———. "The Mexican Picture Writings of Alexander von Humboldt in the Royal Library at Berlin." *Smithsonian Institution, Bureau of American Ethnology Bulletin* 28 (1904): 123–229. **222, 253**

———. *Comentarios al Códice Borgia.* 3 vols. Trans. Mariana Frenk. Mexico City: Fondo de Cultura Económica, 1963. **229, 239**

Senkevich-Gudkova, V. V. "K voprosu o piktograficheskom pis'me u kazymskikh khantov" (To the question of a picture language of the Kazym Khanty). *Sbornik Muzeya Antropologii i Etnografii (Leningrad–St. Petersburg)* (Yearbook of the Museum of Anthropology and Ethnography, Leningrad–St. Petersburg) 11 (1949): 171–74. **343**

Serov, S. Ia. "Guardians and Spirit-Masters of Siberia." In *Crossroads of Continents: Cultures of Siberia and Alaska,* ed. William W. Fitzhugh and Aron Crowell, 241–55. Washington, D.C.: Smithsonian Institution Press, 1988. **333**

Sharon, Douglas. "Distribution of the *Mesa* in Latin America." *Journal of Latin American Lore* 2 (1976): 71–95. **269**

Sharp, Andrew. *Ancient Voyagers in the Pacific.* Wellington: Polynesian Society, 1956. **444, 461**

———. "Polynesian Navigation to Distant Islands." *Journal of the Polynesian Society* 70 (1961): 219–26. 461

Sherbondy, Jeanette E. "Organización hidráulica y poder en el Cuzco de los Incas." *Revista Española de Antropología Americana* 17 (1987): 117–53. **291**

———. "Water Ideology in Inca Ethnogenesis." In *Andean Cosmologies through Time: Persistence and Emergence,* ed. Robert V. H. Dover, Katherine E. Seibold, and John H. McDowell, 46–66. Bloomington: Indiana University Press, 1992. **265**

———. "Irrigation and Inca Cosmology." In *Culture and Environment: A Fragile Coexistence,* ed. Ross W. Jamieson, Sylvia Abonyi, and Neil A. Mirau, 343–51. Calgary: University of Calgary Archaeological Association, 1993. **286, 295**

———. "Water and Power: The Role of Irrigation Districts in the Transition from Inca to Spanish Cuzco." In *Irrigation at High Altitudes: The Social Organization of Water Control Systems in the Andes,* ed. William P. Mitchell and David Guillet, 69–97. Arlington, Va.: Society for Latin American Anthropology, American Anthropological Association, 1993. **261, 286**

Sherzer, Joel. *An Areal-Typological Study of American Indian Languages North of Mexico.* Amsterdam: North-Holland, 1976. 53

Shirina, D. A. *Ekspeditsionnaya deyatel'nost' Akademii Nauk na Severovostoke Azii, 1861–1917 gg.* (Expeditionary activity of the Academy of Science in Northeast Asia, 1861–1917). Novosibirsk: Nauka, 1993. 340

Shirokogoroff, S. M. *Psychomental Complex of the Tungus.* London: Kegan Paul, Trench, Trubner, 1935. **333, 334**

Shore, A. F. "Egyptian Cartography." In *The History of Cartography,* ed. J. B. Harley and David Woodward, 1:117–29. Chicago: University of Chicago Press, 1987–. 24
Shortland, Edward. *The Southern Districts of New Zealand: A Journal with Passing Notices of the Customs of the Aborigines.* London: Longman, Brown, Green, and Longmans, 1851. Reprinted Christchurch: Capper Press, 1974. **496, 514, 516, 517, 518, 519, 533, 534**
Silverblatt, Irene Marsha. *Moon, Sun, and Witches: Gender Ideologies and Class in Inca and Colonial Peru.* Princeton: Princeton University Press, 1987. **295**
Silverman, Eric Kline. "Clifford Geertz: Towards a More Thick Understanding?" In *Reading Material Culture,* ed. Christopher Tilley, 121–59. Oxford: Basil Blackwell, 1990. 442
———. "The Gender of the Cosmos: Totemism, Society and Embodiment in the Sepik River." *Oceania* 67 (1996): 30–49. 426
———. "Politics, Gender, and Time in Melanesia and Aboriginal Australia." *Ethnology* 36 (1997): 101–21. 427
Silverman, Helaine. "Beyond the Pampa: The Geoglyphs in the Valleys of Nazca." *National Geographic Research* 6 (1990): 435–56. 276
———. "The Early Nasca Pilgrimage Center of Cahuachi and the Nazca Lines: Anthropological and Archaeological Perspectives." In *The Lines of Nazca,* ed. Anthony F. Aveni, 207–44. Philadelphia: American Philosophical Society, 1990. 276
———. "The Paracas Problem: Archaeological Perspectives." In *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul, 349–415. Iowa City: University of Iowa Press, 1991. 275
———. *Cahuachi in the Ancient Nasca World.* Iowa City: University of Iowa Press, 1993. 273–74, 278
Silverman-Proust, Gail P. "Significado simbólico de las franjas multicolores tejidas en los wayakos de los Q'ero." *Boletín de Lima* 10, no. 57 (1988): 37–44. 267, 268
———. "Weaving Technique and the Registration of Knowledge in the Cuzco Area of Peru." *Journal of Latin American Lore* 14 (1988): 207–41. 263, 266, 267, 268
Silverstein, Michael. "Shifters, Linguistic Categories, and Cultural Description." In *Meaning in Anthropology,* ed. Keith H. Basso and Henry A. Selby, 11–55. Albuquerque: University of New Mexico Press, 1976. 363
Simons, Stacey. *The Codex Ríos.* Vanderbilt University Publications in Anthropology, forthcoming. 234
Simpson, Thomas. *Narrative of the Discoveries on the North Coast of America.* London: R. Bentley, 1843. 157
Sinclair, Keith. "Browne, Sir Thomas Gore (1807–87)." In *An Encyclopaedia of New Zealand,* 3 vols., ed. Alexander H. McLintock, 1:258–59. Wellington: Government Printer, 1966. 528
Skar, Harold O. *The Warm Valley People: Duality and Land Reform among the Quechua Indians of Highland Peru.* 2d ed. Göteborg: Göteborgs Etnografiska Museum, 1988. 261
Skinner, William Henry. "The Old-Time Maori." *N.Z. Surveyor: The Journal of the New Zealand Institute of Surveyors* 18, no. 2 (1942): 6–9. 496, 497
Smethurst, Gamaliel. *A Narrative of an Extraordinary Escape out of the Hands of the Indians, in the Gulph of St. Lawrence.* London, 1774. 68
Smith, Andrew B. "Metaphors of Space: Rock Art and Territoriality in Southern Africa." In *Contested Images: Diversity in Southern African Rock Art Research,* ed. Thomas A. Dowson and David Lewis-Williams, 373–84. Johannesburg: Witwatersrand University Press, 1994. 17, 26
Smith, Bernard. *European Vision and the South Pacific.* 2d ed. New Haven: Yale University Press, 1985. 355
Smith, James G. E. "Economic Uncertainty in an 'Original Affluent Society': Caribou and Caribou Eater Chipewyan Adaptive Strategies." *Arctic Anthropology* 15, no. 1 (1978): 68–88. 135
Smith, John. *The Generall Historie of Virginia, New-England, and the Summer Isles: With the Names of the Adventurers, Planters, and Governours from Their First Beginning An° 1584 to This Present 1624.* London: Michael Sparkes, 1624. 69, 70
Smith, Mary Elizabeth. "Las glosas del Códice Colombino/The Glosses of the Codex Colombino." Published with the facsimile reproduction *Códice Colombino.* Mexico City: Sociedad Mexicana de Antropología, 1966. 224
———. *Picture Writing from Ancient Southern Mexico: Mixtec Place Signs and Maps.* Norman: University of Oklahoma Press, 1973. 98, 191, 195, 198, 199, 208, 212, 213, 215, 249
Smith, Michael. "The Aztlan Migrations of the Nahuatl Chronicles: Myth or History?" *Ethnohistory* 31 (1984): 153–86. 218
Smyth, R. Brough, comp. *The Aborigines of Victoria.* 2 vols. Melbourne: J. Ferres, Government Printer, 1878. 354
Snow, Dean R. "Eastern Abenaki." In *Handbook of North American Indians,* ed. William C. Sturtevant, 15:137–47. Washington, D.C.: Smithsonian Institution, 1978–. 84
Solheim, Wilhelm G. "The Nusantao Hypothesis: The Origin and Spread of Austronesian Speakers." *Asian Perspectives* 26, no. 1 (1984–85): 77–88. 488
Sorokin, Pitirim Aleksandrovich. *Social and Cultural Dynamics.* Vol. 1, *Fluctuation of Forms of Art (Painting, Sculpture, Architecture, Music, Literature, and Criticism)* New York: American Book Company, 1937. 2, 3
Sorrenson, M. P. K. "Mantell, Walter Baldock Durrant, 1820–1895." In *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869,* 267–68. Wellington: Allen and Unwin, 1990. 521
Soucek, Svat. "Islamic Charting in the Mediterranean." In *The History of Cartography,* ed. J. B. Harley and David Woodward, vol. 2.1 (1992): 263–92. Chicago: University of Chicago Press, 1987–. 24
Spalding, Karen. *Huarochirí: An Andean Society Under Inca and Spanish Rule.* Stanford: Stanford University Press, 1984. 261
Sparke, Matthew. "Between Demythologizing and Deconstructing the Map: Shawnadithit's New-found-land and the Alienation of Canada." *Cartographica* 32, no. 1 (1995): 1–21. 73
Spate, O. H. K. *Paradise Found and Lost.* London: Routledge, 1988. 419
Speck, Frank G. *Naskapi: The Savage Hunters of the Labrador Peninsula.* Norman: University of Oklahoma Press, 1935. 141, 142
———. *Montagnais Art in Birch-Bark, a Circumpolar Trait.* Indian Notes and Monographs, vol. 11, no. 2. New York: Museum of the American Indian, 1937. 142
Spencer, Baldwin. *Wanderings in Wild Australia.* 2 vols. London: Macmillan, 1928. 366
Spencer, Baldwin, and F. J. Gillen. *The Native Tribes of Central Australia.* London: Macmillan, 1899. 359
Spink, John, and D. Wayne Moodie. *Eskimo Maps from the Canadian Eastern Arctic.* Ed. Conrad Heidenreich. Monograph 5, *Cartographica,* 1972. 157, 159
Spores, Ronald. *The Mixtecs in Ancient and Colonial Times.* Norman: University of Oklahoma Press, 1984. 204
Spriggs, Matthew, and Atholl Anderson. "Late Colonization of East Polynesia." *Antiquity* 67 (1993): 200–217. 420
Sproat, Gilbert Malcolm. *Scenes and Studies of Savage Life.* London: Smith, Elder, 1868. 112
———. *The Nootka: Scenes and Studies of Savage Life.* Ed. and annotated Charles Lillard. Victoria: Sono Nis Press, 1987. 112
Stack, James West. *South Island Maoris: A Sketch of Their History and Legendary Lore.* 1898. Reprinted Christchurch: Capper Press, 1984. 498, 523

Staehelin, Felix. *Die Mission der Brüdergemeine in Suriname und Berbice im achtzehnten Jahrhundert.* 3 vols. in 1. Herrnhut, Germany: Vereins für Brüdergeschichte in Kommission der Unitätsbuchhandlung in Gnadau, [1914]. **322**

Stanner, W. E. H. "Religion, Totemism and Symbolism." In *Aboriginal Man in Australia: Essays in Honour of Emeritus Professor A. P. Elkin,* ed. Ronald Murray Berndt and Catherine Helen Berndt, 207–37. Sydney: Angus and Robertson, 1965. **354, 360**

———. *White Man Got No Dreaming: Essays, 1938–1973.* Canberra: Australian National University Press, 1979. **386**

Stanton, John E. *Images of Aboriginal Australia.* Exhibition catalog. Nedlands: University of Western Australia, Anthropology Research Museum, 1988. **358**

Stea, David, James M. Blaut, and Jennifer Stephens. "Mapping as a Cultural Universal." In *The Construction of Cognitive Maps,* ed. Juval Portugali, 345–60. Dordrecht: Kluwer Academic, 1996. **1**

Steel, R. H. *Late Iron Age Rock Engravings of Settlement Plans, Shields, Goats and Human Figures: Rock Engravings Associated with Late Iron Age Settlements of Olifantspoort Site 20/71 circa A.D. 1500–1800, Rustenburg District, TVL (Sites 77/71 and 78/71).* Johannesburg: University of the Witwatersrand Archaeological Research Unit, 1988. **18, 21**

Steinen, Karl von den. *Durch Central-Brasilien: Expedition zur Erforschung des Schingú im Jahre 1884.* Leipzig: F. A. Brockhaus, 1886. **320**

———. *Unter den Naturvölkern Zentral-Brasiliens: Reiseschilderung und Ergebnisse der Zweiten Schingú-Expedition, 1887–1888.* Berlin: Dietrich Reimer, 1894. **320**

Stern, Steve J. *Peru's Indian Peoples and the Challenge of Spanish Conquest: Huamanga to 1640.* 2d ed. Madison: University of Wisconsin Press, 1993. **261**

Stevens Arroyo, Antonio M. *Cave of the Jagua: The Mythological World of the Taínos.* Albuquerque: University of New Mexico Press, 1988. **324**

Stevenson, Fanny. *The Cruise of the "Janet Nicol" among the South Sea Islands.* New York: C. Scribner's Sons, 1914. **492**

Steward, Julian H., ed. *Handbook of South American Indians. See entries under individual authors.*

Stewart, Frank H. "Jamestown, Virginia, Indian Document of May 1607, Reminder of Capt. John Smith, Found in Haddonfield." *Haddon (N.J.) Gazette,* 15 February 1945, 2. **90**

Stirling, Edward, and Edgar R. Waite. "Description of Toas, or Australian Aboriginal Direction Signs." *Records of the South Australian Museum* 1 (1919–21): 105–55. **383**

Stokes, John F. G., and Hugh Rodman. Discussion section of the *United States Naval Institute Proceedings* 54 (1928): 138–40. Reprinted in *Journal of the Polynesian Society* 37 (1928): 85–87. **486**

Stone, Jeffrey C. *A Short History of the Cartography of Africa.* Lewiston: E. Mellen Press, 1995. **24**

———, ed. *Maps and Africa: Proceedings of a Colloquium at the University of Aberdeen, April 1993.* Aberdeen: Aberdeen University African Studies Group, 1994. **24**

Stone, Lyle M., and Donald Chaput. "History of the Upper Great Lakes Area." In *Handbook of North American Indians,* ed. William C. Sturtevant, 15:602–9. Washington, D.C.: Smithsonian Institution, 1978–. **83**

Stone, Russell C. J. "Williamson, James, 1814–1888." In *The Dictionary of New Zealand Biography,* vol. 1, *1769–1869,* 598–99. Wellington: Allen and Unwin, 1990. **525**

Street, Brian V., and Niko Besnier. "Aspects of Literacy." In *Companion Encyclopedia of Anthropology,* ed. Tim Ingold, 527–62. London: Routledge, 1994. **425**

Strehlow, T. G. H. *Aranda Traditions.* Melbourne: Melbourne University Press, 1947. **359, 365, 384**

———. "The Art of Circle, Line, and Square." In *Australian Aboriginal Art,* ed. Ronald Murray Berndt, 44–59, Sydney: Ure Smith, 1964. **384**

———. "Geography and the Totemic Landscape in Central Australia: A Functional Study." In *Australian Aboriginal Anthropology: Modern Studies in the Social Anthropology of the Australian Aborigines,* ed. Ronald Murray Berndt, 92–140. Nedlands: University of Western Australia Press for the Australian Institute of Aboriginal Studies, 1970. **361**

———. *Songs of Central Australia.* Sydney: Angus and Robertson, 1971. **361, 365**

Strong, William Duncan. *Paracas, Nazca, and Tihuanacoid Cultural Relationships in South Coastal Peru.* Salt Lake City: Society for American Archaeology, 1957. **275**

Struck, Bernhard. "König Ndschoya von Bamum als Topograph." *Globus* 94 (1908): 206–9. **42**

Struve, B. V. *Vospominaniya o Sibiri* (Memoirs about Siberia). St. Petersburg, 1889. **339**

Stuart, David. "The Paintings of Tomb 12, Rio Azul." In *Rio Azul Reports 3, The 1985 Season/Proyecto Rio Azul, Informe Tres: 1985,* ed. R. E. W. Adams, 161–67. San Antonio: University of Texas, 1987. **255**

Stuart, David, and Stephen D. Houston. *Classic Maya Place Names.* Studies in Pre-Columbian Art and Archaeology 33. Washington, D.C.: Dumbarton Oaks, 1993. **199**

Sturtevant, William C. "The Meanings of Native American Art." In *The Arts of the North American Indian: Native Traditions in Evolution,* ed. Edwin L. Wade, 23–44. New York: Hudson Hills Press, 1986. **55**

———, ed. *Handbook of North American Indians.* Washington, D.C.: Smithsonian Institution, 1978–. **57** *See also entries under individual authors.*

Sutton, George Miksch. "The Exploration of Southampton Island, Hudson Bay." *Memoirs of the Carnegie Museum* 12, pt. 1 (1932). **155**

Sutton, Peter. "From Horizontal to Perpendicular: Two Recent Books on Central Australian Aboriginal Painting." *Records of the South Australian Museum* 21 (1987): 161–65. **363**

———. "Mystery and Change." In *Songs of Aboriginal Australia,* ed. Margaret Clunies Ross, Tamsin Donaldson, and Stephen A. Wild, 77–96. Sydney: University of Sydney, 1987. **360, 377**

———. "Dreamings." In *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton, 13–32. New York: George Braziller in association with the Asia Society Galleries, 1988. **357, 377, 388**

———. "The Morphology of Feeling." In *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton, 59–88. New York: George Braziller in association with the Asia Society Galleries, 1988. **380, 381, 405**

———. "Responding to Aboriginal Art." In *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton, 33–58. New York: George Braziller in association with the Asia Society Galleries, 1988. **364, 366, 372, 373, 390**

———. "Bark Painting by Angus Namponan of Aurukun." *Memoirs of the Queensland Museum* 30 (1990–91): 589–98. **353, 377, 378, 379**

———. "The Pulsating Heart: Large Scale Cultural and Demographic Processes in Aboriginal Australia." In *Hunter-Gatherer Demography: Past and Present,* ed. Betty Meehan and Neville White, 71–80. Sydney: University of Sydney, 1990. **361**

———, ed. *Dreamings: The Art of Aboriginal Australia.* New York: George Braziller in association with the Asia Society Galleries, 1988. **353, 354, 369, 376, 379** *See also entries under individual authors.*

Sutton, Peter, Philip Jones, and Steven Hemming. "Survival, Regeneration, and Impact." In *Dreamings: The Art of Aboriginal Australia,* ed. Peter Sutton, 180–212. New York: George Braziller in association with the Asia Society Galleries, 1988. **355**

Sutton, Peter, et al. *Aak: Aboriginal Estates and Clans between the Embley and Edward Rivers, Cape York Peninsula.* Adelaide: South Australian Museum, 1990. **377**

Sverbeev, N. "Proezd s Urchenskoy yarmarki do Udskogo ostroga" (The road from the Urchen Fair to the Udskii Fort). *Vestnik Russkago Geograficheskago Obshchestva* (Herald of the Russian Geographic Society) 4 (1853): 95–109. **339**

Swain, Tony. *A Place for Strangers: Towards a History of Australian Aboriginal Being.* Cambridge: Cambridge University Press, 1993. **354**

Swanton, John R. "The Tawasa Language." *American Anthropologist,* n.s. 31 (1929): 435–53. **99**

Szabo, Joyce M. *Howling Wolf and the History of Ledger Art.* Albuquerque: University of New Mexico Press, 1994. **118**

Taçon, Paul S. C. "Contemporary Aboriginal Interpretations of Western Arnhem Land Rock Paintings." In *The Inspired Dream: Life as Art in Aboriginal Australia,* ed. Margie K. C. West, 20–25. South Brisbane: Queensland Art Gallery, 1988. **357**

Tamrat, Taddesse. *Church and State in Ethiopia, 1270–1527.* Oxford: Clarendon Press, 1972. **28**

Tanner, Adrian. *Bringing Home Animals: Religious Ideology and Mode of Production of the Mistassini Cree Hunters.* New York: St. Martin's Press, 1979. **141**

Tanner, Helen Hornbeck, ed. *Atlas of Great Lakes Indian History.* Norman: University of Oklahoma Press for the Newberry Library, 1987. **94**

———, ed. *The Settling of North America: The Atlas of the Great Migrations into North America from the Ice Age to the Present.* New York: Macmillan, 1995. **172**

Tardits, Claude. *Le royaume Bamoum.* Paris: Armand Colin, 1980. **42, 43**

Taube, Karl A. "The Teotihuacan Cave of Origin: The Iconography and Architecture of Emergence Mythology in Mesoamerica and the American Southwest." *Res* 12 (1986): 51–82. **239**

Taylor, Colin. "The Subarctic." In *The Native Americans: The Indigenous People of North America,* 182–203. New York: Smithmark, 1991. **135**

Taylor, Gerald, and Antonio Acosta, trans. *Ritos y tradiciones de Huarochirí: Manuscrito quechua de comienzos del siglio XVII.* Lima: Instituto de Estudios Peruanos, 1987. **266**

Taylor, Luke. "Ancestors into Art: An Analysis of Pitjantjatjara Kulpidji Designs and Crayon Drawings." B.A. honors thesis, Department of Prehistory and Anthropology, Australian National University, 1979. **359, 392**

———. *Seeing the Inside: Bark Painting in Western Arnhem Land.* Oxford: Clarendon Press, 1996. **354, 359**

Taylor, William A. *Lore and History of the South Island Maori.* Christchurch: Bascands, 1952. **523, 535**

Teben'kov, Mikhail Dmitrievich. *Atlas of the Northwest Coasts of America: From Bering Strait to Cape Corrientes and the Aleutian Islands, with Several Sheets on the Northeast Coast of Asia.* Trans. and ed. Richard A. Pierce. Kingston, Ont.: Limestone Press, 1981. **157**

Tedlock, Dennis, trans. *Popol Vuh: The Mayan Book of the Dawn of Life.* Rev. ed. New York: Simon and Schuster, 1996. **204, 237**

Teggart, Frederick John, ed. *The Portolá Expedition of 1769–1770, Diary of Miguel Costansó.* Berkeley: University of California Press, 1911. **113**

Tello, Julio C. *Paracas.* Vol. 1, *El medio geográfico: La explotación de antiguedades en el centro Andino. La cultura Paracas y sus vinculaciones con otras del centro Andino.* New York: Institute of Andean Research, 1959. **273**

———. *Chavín: Cultura matriz de la civilización andina.* Lima: Universidad Nacional Mayor de San Marcos, 1960. **272, 273**

———. *Paracas.* Vol. 2, with Toribio Mejía Xesspe, *Cavernas y necrópolis.* Lima: Universidad Nacional Mayor de San Marcos, 1979. **274, 275, 277**

Thalbitzer, William Carl. "Ethnographical Collections from East Greenland (Angmagsalik and Nualik) Made by G. Holm, G. Amdrup and J. Petersen." In *The Ammassalik Eskimo: Contributions to the Ethnology of the East Greenland Natives,* 2 vols., ed. William Carl Thalbitzer, Meddelelser om Grønland, 39–40, 1:319–754. Copenhagen, 1914. **167, 168**

Thiessen, Thomas D., W. Raymond Wood, and A. Wesley Jones. "The Sitting Rabbit 1907 Map of the Missouri River in North Dakota." *Plains Anthropologist* 24, pt. 1 (1979): 145–67. **123, 173**

Thomas, Cyrus. "Notes on Certain Maya and Mexican Manuscripts." In *Third Annual Report of the Bureau of Ethnology (1881–1882),* 3–65. Washington, D.C.: United States Government Printing Office, 1884. **232**

Thomas, S. D. *The Last Navigator.* New York: Henry Holt, 1987. **462, 463, 470, 471, 472, 475**

Thompson, John Eric Sidney. *Sky Bearers, Colors and Directions in Maya and Mexican Religion.* Carnegie Institution of Washington Contributions to American Archeology, vol. 2, no. 10. Washington, D.C.: Carnegie Institution of Washington, 1934. **203**

———. *A Commentary on the Dresden Codex: A Maya Hieroglyphic Book.* Philadelphia: American Philosophical Society, 1972. **184, 198, 209, 228, 240**

Thompson, Robert Farris. "Yoruba Artistic Criticism." In *The Traditional Artist in African Societies,* ed. Warren L. d'Azevedo, 18–61. Bloomington: Indiana University Press, 1973. **7**

Thompson, Robert Farris, and Joseph Cornet. *The Four Moments of the Sun: Kongo Art in Two Worlds.* Washington, D.C.: National Gallery of Art, 1981. **27**

Thrower, Norman J. W. *Maps and Civilization: Cartography in Culture and Society.* Chicago: University of Chicago Press, 1996. **444**

Thwaites, Reuben Gold, ed. *The Jesuit Relations and Allied Documents: Travels and Explorations of the French Jesuit Missionaries among the Indians of Canada and the Northern and Northwestern United States, 1610–1791.* 73 vols. Cleveland: Burrows Brothers, 1896–1901. **86, 89, 142**

Tibbetts, Gerald R. *Arab Navigation in the Indian Ocean before the Coming of the Portuguese.* London: Royal Asiatic Society of Great Britain and Ireland, 1971. **488**

———. "Later Cartographic Developments." In *The History of Cartography,* ed. J. B. Harley and David Woodward, vol. 2.1 (1992), 137–55. Chicago: University of Chicago Press, 1987–. **37**

———. "The Role of Charts in Islamic Navigation in the Indian Ocean." In *The History of Cartography,* ed. J. B. Harley and David Woodward, vol. 2.1 (1992), 256–62. Chicago: University of Chicago Press, 1987–. **488**

Tilbrook, Lois. *Nyungar Tradition: Glimpses of Aborigines of South-western Australia, 1829–1914.* Nedlands: University of Western Australia Press, 1983. **409**

Tindale, Norman B. "Natives of Groote Eylandt and of the West Coast of the Gulf of Carpentaria, Part II." *Records of the South Australian Museum* 3 (1925–28): 103–34. **366**

———. *Aboriginal Tribes of Australia: Their Terrain, Environmental Controls, Distribution, Limits, and Proper Names.* Berkeley: University of California Press, 1974 (revised from 1940). **397, 408**

———. "Kariara Views on Some Rock Engravings at Port Hedland, Western Australia." *Records of the South Australian Museum* 21 (1987): 43–59. **357**

Toledo Maya Cultural Council. *Maya Atlas: The Struggle to Preserve

Maya Land in Southern Belize. Berkeley, Calif.: North Atlantic Books, 1997. **540**

Tolman, Edward Chance. "Cognitive Maps in Rats and Men." *Psychological Review* 55 (1948): 189–208. **4**

Tonkinson. Robert. *The Mardu Aborigines: Living the Dream in Australia's Desert.* 2d ed. Fort Worth, Tex.: Holt, Rinehart and Winston, 1991. **393, 399**

Tooley, R. V. *Collectors' Guide to Maps of the African Continent and Southern Africa.* London: Carta Press, 1969. **24**

Torquemada, Juan de. *Monarquía indiana.* 3d ed. 7 vols. Mexico City: Instituto Nacional de Antropología e Historia, 1975. **221**

Toussaint, Manuel, Federico Gómez de Orozco, and Justino Fernández. *Planos de la Ciudad de México, siglos XVI y XVII: Estudio histórico, urbanístico y bibliográfico.* Mexico City, 1938. **224**

Townsend, Richard F. *State and Cosmos in the Art of Tenochtitlan.* Studies in Pre-Columbian Art and Archaeology 20. Washington, D.C.: Dumbarton Oaks, 1979. **234, 235, 255**

———. "Deciphering the Nazca World: Ceramic Images from Ancient Peru." *Museum Studies* 11 (1985): 116–39. **277, 278**

———, ed. *The Ancient Americas: Art from Sacred Landscapes.* Chicago: Art Institute of Chicago, 1992. **259**

Travers, W. T. Locke. *The Stirring Times of Te Rauparaha (Chief of the Ngatitoa).* Christchurch: Whitcombe and Tombs, 1906. **498**

Trezise, P. J. *Rock Art of South-east Cape York.* Canberra: Australian Institute of Aboriginal Studies, 1971. **357**

Trigger, David S. *Nicholson River (Waanyi/Garawa) Land Claim.* Darwin: Northern Land Council, 1982. **405**

Trik, Aubrey S. "The Splendid Tomb of Temple I at Tikal, Guatemala." *Expedition* 6, no. 1 (1963): 2–18. **234**

Triulzi, Alessandro. "Prelude to the History of a No-Man's Land: Bela Shangul, Wallagga, Ethiopia (ca. 1800–1898)." Ph.D. diss., Northwestern University, 1980. **47**

Troike, Nancy P. "The Interpretation of Postures and Gestures in the Mixtec Codices." In *The Art and Iconography of Late Post-classic Central Mexico,* ed. Elizabeth Hill Boone, 175–206. Washington, D.C.: Dumbarton Oaks, 1982. **198**

Troll, Carl. "The Cordilleras of the Tropical Americas: Aspects of Climatic, Phytogeographical and Agrarian Ecology." In *Geo-ecology of the Mountainous Regions of the Tropical Americas,* 15–56. Bonn: Ferd Dümmlers, 1968. **259, 260**

Trotter, Michael Malthus. "Moa-Hunter Research since 1956." In *The Moa-Hunter Period of Maori Culture,* by Roger Duff, 3d ed., 348–78. Wellington: Government Printer, 1977. **497**

Tschopik, Harry. "The Aymara of Chucuito, Peru." *Anthropological Papers of the American Museum of Natural History* 44 (1951): 137–308. **269, 270**

Tuan, Yi-Fu. *Topophilia: A Study of Environmental Perception, Attitudes, and Values.* Englewood Cliffs, N.J.: Prentice-Hall, 1974. **270, 539**

———. "Images and Mental Maps." *Annals of the Association of American Geographers* 65 (1975): 205–13. **4**

———. *Space and Place: The Perspective of Experience.* Minneapolis: University of Minnesota Press, 1977. **270**

———. "Traditional: What Does It Mean?" In *Dwellings, Settlements and Tradition: Cross-Cultural Perspectives,* ed. Jean-Paul Bourdier and Nezar Alsayyad, 27–34. Lanham: University Press of America, 1989. **541**

Turnbull, David. *Maps Are Territories, Science Is an Atlas: A Portfolio of Exhibits.* Geelong, Victoria: Deakin University, 1989. Reprinted Chicago: University of Chicago Press, 1993. **10, 80, 155, 258**

———. "Constructing Knowledge Spaces and Locating Sites of Resistance in the Modern Cartographic Transformation." In *Social Cartography: Mapping Ways of Seeing Social and Educational Change,* ed. Rolland G. Paulston, 53–79. New York: Garland, 1996. **540**

Turner, Victor W. "Symbols in African Ritual." In *Symbolic Anthropology: A Reader in the Study of Symbols and Meanings,* ed. Janet L. Dolgin, David S. Kemnitzer, and David Murray Schneider, 183–94. New York: Columbia University Press, 1977. **8**

Tyler, Josiah. *Forty Years among the Zulus.* Boston: Congregational Sunday-School and Publishing Society, 1891. **19**

Ucko, Peter J., ed. *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe. See entries under individual authors.*

Urcid Serrano, Javier. "Zapotec Hieroglyphic Writing." 2 vols. Ph.D. diss., Yale University, 1992. **199**

Urton, Gary. *At the Crossroads of the Earth and the Sky: An Andean Cosmology.* Austin: University of Texas Press, 1981. **260, 261, 277, 295**

———. "Astronomy and Calendrics on the Coast of Peru." In *Ethnoastronomy and Archaeoastronomy in the American Tropics,* ed. Anthony F. Aveni and Gary Urton, 231–47. New York: New York Academy of Sciences, 1982. **276**

———. "Chuta: El espacio de la práctica social en Pacariqtambo, Perú." *Revista Andina* 2 (1984): 7–43. **270**

———. "Andean Social Organization and the Maintenance of the Nazca Lines." In *The Lines of Nazca,* ed. Anthony F. Aveni, 173–206. Philadelphia: American Philosophical Society, 1990. **261, 263, 270, 277**

———. *History of a Myth: Pacariqtambo and the Origin of the Inkas.* Austin: University of Texas Press, 1990. **295**

———. "A New Twist in an Old Yarn: Variation in Knot Directionality in the Inka Khipus." *Baessler-Archiv,* n.s. 42 (1994): 271–305. **290**

Urton, Gary, and Anthony F. Aveni. "Archaeoastronomical Fieldwork on the Coast of Peru." In *Calendars in Mesoamerica and Peru: Native American Computations of Time,* ed. Anthony F. Aveni and Gordon Brotherston, 221–34. Oxford: BAR, 1983. **272**

Vansina, Jan. *Oral Tradition as History.* Madison: University of Wisconsin Press, 1985. **8**

Vasilevich, G. M. "Drevniye geograficheskiye predstavleniya evenkov i risunki kart" (Ancient geographical ideas and map sketches of the Evenk people). *Izvestiya Vsesoyuznogo Geograficheskogo Obshchestva* (Annals of the All-Union Geographical Society) 95, no. 4 (1963): 306–19. **340**

Vega, Garcilaso de la. *Royal Commentaries of the Incas, and General History of Peru.* Trans. Harold V. Livermore. Austin: University of Texas Press, 1966. **285, 290**

Vidal Ontivero, Sylvia Margarita. "Reconstrucción de los procesos de etnogenesis y de reproducción social entre los Baré de Río Negro (siglos XVI–XVIII)." Ph.D. diss., Instituto Venezolano de Investigaciones Cientificas, Caracas, 1993. **317**

Villagra Caleti, Agustín. "Mural Painting in Central Mexico." In *Handbook of Middle American Indians,* vol. 10, ed. Gordon F. Ekholm and Ignacio Bernal, 135–56. Austin: University of Texas Press, 1971. **256**

Villiers du Terrage, Marc de. "Note sur deux cartes dessinées par les Chikachas en 1737." *Journal de la Société des Américanistes de Paris,* n.s. 13 (1921): 7–9. **101, 103**

Vinnicombe, Patricia. *People of the Eland: Rock Paintings of the Drakensberg Bushmen as a Reflection of Their Life and Thought.* Pietermaritzburg: University of Natal Press, 1976. **13, 15**

Vinogradov, N. *Solovetskiye labirinty: Ikh proiskhozhdeniye i mesto v ryadu odnorodnykh doistoricheskikh pamyatnikov* (Labyrinths of Solovki: Their origins and place among homogeneous prehistoric monuments). Petrozavodsk, 1947. **331**

Vogelsang, T. "Ceremonial Objects of the Dieri Tribe, Cooper Creek, South Australia (Ochre Balls, Woven String Wrappers, and Pointing Sticks) Called the 'Hearts of the Two Sons of the Muramura Darana.'" *Records of the South Australian Museum* 7 (1941–43): 149–50. 384

Vollmar, Rainer. *Indianische Karten Nordamerikas: Beiträge zur historischen Kartographie von 16. bis zum 19. Jahrhundert.* Berlin: Dietrich Reimer, 1981. 55, 57

———. "Kartenanfertigung und Raumauffassung nordamerikanischer Indianer." *Geographische Rundschau* 34 (1982): 302–7. 55

Von Haast, Heinrich Ferdinand. *The Life and Times of Sir Julius von Haast: Explorer, Geologist, Museum Builder.* Wellington, 1948. **523**

Wachtel, Nathan. "The *Mitimas* of the Cochabamba Valley: The Colonization Policy of Huayna Capac." In *The Inca and Aztec States, 1400–1800: Anthropology and History,* ed. George A. Collier, Renato I. Rosaldo, and John D. Wirth, 199–235. New York: Academic Press, 1982. **262**

Wade, Edwin L., ed. *The Arts of the North American Indian: Native Traditions in Evolution.* New York: Hudson Hills Press, 1986. **115**

Wagner, Roy. *Habu: The Innovation of Meaning in Daribi Religion.* Chicago: University of Chicago Press, 1972. **431, 434, 442**

Walam Olum; or, Red Score, the Migration Legend of the Lenni Lenape or Delaware Indians: A New Translation, Interpreted by Linguistic, Historical, Archaeological, Ethnological, and Physical Anthropological Studies. Indianapolis: Indiana Historical Society, 1954. 8

Waldman, Carl. *Atlas of the North American Indian.* New York: Facts on File, 1985. 99, 128

Walker, J. R. "The Sun Dance and Other Ceremonies of the Oglala Division of the Teton Dakota." *Anthropological Papers of the American Museum of Natural History* 16 (1917): 51–221. 53, 539

Wallace, Anthony F. C. *The Death and Rebirth of the Seneca.* New York: Vintage Books, 1972. 54

Wallace, Dwight T. "A Technical and Iconographic Analysis of Carhua Painted Textiles." In *Paracas Art and Architecture: Object and Context in South Coastal Peru,* ed. Anne Paul, 61–109. Iowa City: University of Iowa Press, 1991. **273**

Wallis, Helen M., and Arthur H. Robinson, eds. *Cartographical Innovations: An International Handbook of Mapping Terms to 1900.* Tring, Eng.: Map Collector Publications in association with the International Cartographic Association, 1987. **83, 359**

Warhus, Mark. *Cartographic Encounters: An Exhibition of Native American Maps from Central Mexico to the Arctic.* Chicago: Hermon Dunlap Smith Center for the History of Cartography, 1993. **56**

———. *Another America: Native American Maps and the History of Our Land.* New York: St. Martin's Press, 1997. **56, 57, 73**

Warkentin, John, and Richard I. Ruggles, eds. *Manitoba Historical Atlas: A Selection of Facsimile Maps, Plans, and Sketches from 1612 to 1969.* Winnipeg: Historical and Scientific Society of Manitoba, 1970. **141, 143, 151**

Warner, W. Lloyd. *A Black Civilization: A Social Study of an Australian Tribe.* Rev. ed. New York: Harper, 1958. **359, 372, 384**

Waselkov, Gregory A. "Lamhatty's Map." *Southern Exposure* 16, no. 2 (1988): 23–29. **96**

———. "Indian Maps of the Colonial Southeast." In *Powhatan's Mantle: Indians in the Colonial Southeast,* ed. Peter H. Wood, Gregory A. Waselkov, and M. Thomas Hatley, 292–343. Lincoln: University of Nebraska Press, 1989. **94, 95, 96, 99, 101, 103**

———. "Indian Maps of the Colonial Southeast: Archaeological Implications and Prospects." In *Cartographic Encounters: Perspectives on Native American Mapmaking and Map Use,* ed. G. Malcolm Lewis, chap. 9. Chicago: University of Chicago Press, 1998. **123**

Wassén, Henry. "The Ancient Peruvian Abacus." In *Origin of the Indian Civilizations in South America,* ed. Erland Nordenskiöld, Comparative Ethnographical Studies, vol. 9, 189–205. 1931; reprinted New York: AMS Press, 1979. **291**

———. "El antiguo ábaco peruano según el manuscrito de Guaman Poma." *Etnologiska Studier* 11 (1940): 1–30. **291**

Wassmann, Jürg. "The Nyaura Concepts of Space and Time." In *Sepik Heritage: Tradition and Change in Papua New Guinea,* ed. Nancy Lutkehaus et al., 23–35. Durham: Carolina Academic Press, 1990. **426, 428**

———. *The Song to the Flying Fox: The Public and Esoteric Knowledge of the Important Men of Kandingei about Totemic Songs, Names, and Knotted Cords (Middle Sepik, Papua New Guinea).* Trans. Dennis Q. Stephenson. Boroko, Papua New Guinea: National Research Institute, 1991. **426, 428**

———. "Worlds in Mind: The Experience of an Outside World in a Community of the Finisterre Range of Papua New Guinea." *Oceania* 64 (1993): 117–45. **435, 436, 437, 438, 439**

———. "The Yupno as Post-Newtonian Scientists: The Question of What Is 'Natural' in Spatial Description." *Man,* n.s. 29 (1994): 645–66. **435**

Waterman, T. T. "The Religious Practices of the Diegueño Indians." *University of California Publications in American Archaeology and Ethnology* 8 (1908–10): 271–358. **112**

———. *Yurok Geography.* University of California Publications in American Archaeology and Ethnology, vol. 16, no. 5. Berkeley: University of California Press, 1920. **181**

Watson, Helen. "Aboriginal-Australian Maps." In *Maps Are Territories, Science Is an Atlas: A Portfolio of Exhibits,* by David Turnbull, 28–36. Geelong, Victoria: Deakin University, 1989. Reprinted Chicago: University of Chicago Press, 1993. **364**

Watson, Helen, and David Wade Chambers. *Singing the Land, Signing the Land: A Portfolio of Exhibits.* Geelong, Victoria: Deakin University, 1989. **364**

Wauchope, Robert, ed. *Handbook of Middle American Indians. See entries under individual authors.*

Weiner, James F. *The Heart of the Pearl Shell: The Mythological Dimension of Foi Sociality.* Berkeley: University of California Press, 1988. **442**

———. *The Empty Place: Poetry, Space, and Being among the Foi of Papua New Guinea.* Bloomington: Indiana University Press, 1991. **434**

Wellmann, Klaus F. *A Survey of North American Indian Rock Art.* Graz: Akademische Druck- u. Verlagsanstalt, 1979. **57, 61**

Werbner, Richard P. *Ritual Passage, Sacred Journey: The Process and Organization of Religious Movement.* Washington, D.C.: Smithsonian Institution Press, 1989. **440, 441**

West, Margie K. C. *Declan: A Tiwi Artist.* Perth: Australian City Properties, 1987. 359

———, ed. *The Inspired Dream: Life as Art in Aboriginal Australia.* South Brisbane: Queensland Art Gallery, 1988. **358**

Weule, Karl. *Native Life in East Africa.* Trans. Alice Werner. New York: D. Appleton, 1909. 37

Wheat, Carl I. *Mapping the Transmississippi West, 1540–1861.* 5 vols. San Francisco: Institute of Historical Cartography, 1957–63. **126**

Wheatley, Paul. *The Pivot of the Four Quarters: A Preliminary Enquiry into the Origins and Character of the Ancient Chinese City.* Chicago: Aldine, 1971. **270, 539**

White, J. Peter, and James F. O'Connell. *A Prehistory of Australia, New Guinea and Sahul.* Sydney: Academic Press, 1982. **354**

White, John. *The Ancient History of the Maori, His Mythology and*

Traditions. 6 vols. Wellington: Government Printer, 1887–90. **500**
Whitehead, Neil L. "The Mazaruni Pectoral: A Golden Artefact Discovered in Guyana and the Historical Sources concerning Native Metallurgy in the Caribbean, Orinoco and Northern Amazonia." *Journal of Archaeology and Anthropology* 7 (1990): 19–40. **315**
———. "El Dorado, Cannibalism and the Amazons—European Myth and Amerindian Praxis in the Conquest of South America." In *Beeld en Verbeelding van Amerika,* ed. Wil G. Pansters and J. Weerdenberg, 53–69. Utrecht: University of Utrecht Press, 1992. **324**
———. "The Historical Anthropology of Text: The Interpretation of Ralegh's *Discoverie of Guiana.*" *Current Anthropology* 36 (1995): 53–74. **324**
———, ed. *The Patamona of Paramakatoi and the Yawong Valley: An Oral History.* Georgetown, Guyana: Hamburgh Register Walter Roth Museum of Anthropology, 1996. **306**
———, ed. *The Discoverie of the Large, Rich and Bewtiful Empyre of Guiana,* by Walter Ralegh. Manchester: Manchester University Press; Norman: University of Oklahoma Press, 1997. **319, 322, 324**
Whitley, David S. "Shamanism and Rock Art in Far Western North America." *Cambridge Archaeological Journal* 2 (1992): 89–113. **63, 181**
Wicke, Charles R. "Once More around the Tizoc Stone: A Reconsideration." In *Actas del XLI Congreso Internacional de Americanistas (1974),* 3 vols., 2:209–22. Mexico City: Instituto Nacional de Antropología e Historia, 1975. **235**
Wilbert, Johannes. "Eschatology in a Participatory Universe: Destinies of the Soul among the Warao Indians of Venezuela." In *Death and the Afterlife in Pre-Columbian America,* ed. Elizabeth P. Benson, 163–89. Washington, D.C.: Dumbarton Oaks Research Library, 1975. **311, 315**
———. "Geography and Telluric Lore of the Orinoco Delta." *Journal of Latin American Lore* 5 (1979): 129–50. **308, 313**
———. "Warao Cosmology and Yekuana Roundhouse Symbolism." *Journal of Latin American Lore* 7 (1981): 37–72. **311, 316**
Williams, Barbara J. "Aztec Soil Glyphs and Contemporary Nahua Soil Classification." In *The Indians of Mexico in Pre-Columbian and Modern Times,* International Colloquium, Leiden, 1981, 206–22. Leiden: Rutgers B.V., 1982. **224**
———. "Mexican Pictorial Cadastral Registers: An Analysis of the Códice de Santa María Asunción and the Codex Vergara." In *Explorations in Ethnohistory: Indians of Central Mexico in the Sixteenth Century,* ed. H. R. Harvey and Hanns J. Prem, 103–25. Albuquerque: University of New Mexico Press, 1984. **203, 224, 294**
Williams, Denis. "Controlled Resource Exploitation in Contrasting Neotropical Environments Evidenced by Meso-Indian Petroglyphs in Southern Guyana." *Journal of Archaeology and Anthropology* 2 (1979): 141–48. **309**
———. "Petroglyphs in the Prehistory of Northern Amazonia and the Antilles." In *Advances in World Archaeology,* 5 vols., 4:335–87. Orlando, Fla.: Academic Press, 1982–86. **309, 315**
———. "The Forms of the Shamanic Sign in the Prehistoric Guianas." *Journal of Archaeology and Anthropology* 9 (1993): 3–21. **306**
Williams, Herbert William. *A Dictionary of the Maori Language.* Ed. under the auspices of the Polynesian Society. 5th ed. Wellington: Marcus F. Marks, Government Printer, 1917. 6th rev. ed., 1957. 7th ed., 1971. **495, 498, 518, 520**
Williams, Nancy M. *The Yolngu and Their Land: A System of Land Tenure and the Fight for Its Recognition.* Canberra: Australian Institute of Aboriginal Studies, 1986. **401, 403**
———. "Yolngu Geography: A Preliminary Review of Yolngu Map-Making." Work in progress. **402**
Williams, William. *A Dictionary of the New-Zealand Language, and a Concise Grammar to Which Are Added a Selection of Colloquial Sentences.* Paihia, 1844. 2d ed., 1852. 3d ed., 1871. 4th ed., 1892. 4th rev. ed., 1915. **494, 495**
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Winkler, Captain [Otto?]. "On Sea Charts Formerly Used in the Marshall Islands, with Notices on the Navigation of These Islanders in General." *Annual Report of the Board of Regents of the Smithsonian Institution, 1899,* 2 vols., 1:487–508. Washington, D.C.: United States Government Printing Office, 1901. A translation of "Ueber die in früheren Zeiten in den Marschall-Inseln gebrauchten Seekarten, mit einigen Notizen über die Seefahrt der Marschall-Insulaner im Allgemeinen." *Marine-Rundschau* 10 (1898): 1418–39. **476, 477, 478, 479, 480, 482, 483, 484, 492**
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———. "The Fine Line between Mapping and Mapmaking." *Cartographica* 30, no. 4 (1993): 50–60. **24, 257**
———. "Maps and Mapmaking." In *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures,* ed. Helaine Selin, 26–31. Dordrecht: Kluwer Academic, 1997. **2**
Wood, Denis, with John Fels. *The Power of Maps.* New York: Guilford Press, 1992. **1**
Wood, R. Raymond, comp. *An Atlas of Early Maps of the American Midwest.* Springfield: Illinois State Museum, 1983. **132**
Woodward, David. *The All-American Map: Wax-Engraving and Its Influence on Cartography.* Chicago: University of Chicago Press, 1977. **1**
———. "Medieval *Mappaemundi.*" In *The History of Cartography,* ed. J. B. Harley and David Woodward, 1:286–370. Chicago: University of Chicago Press, 1987–. **29, 40**
———. "Maps as Material Culture." In *Maps as Material Culture,* Yale-Smithsonian Reports on Material Culture no. 6. Forthcoming, 1998. **1, 5**
———, ed. *Five Centuries of Map Printing.* Chicago: University of Chicago Press, 1975. **1**
Worsnop, Thomas, comp. *The Prehistoric Arts, Manufactures, Works, Weapons, etc., of the Aborigines of Australia.* Adelaide: Government Printer, 1897. **384**
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Yoneda, Keiko. *Los mapas de Cuauhtinchan y la historia cartográfica prehispánica.* 2d ed. Mexico City: Centro de Investigaciones y Estudios Superiores en Antropología, 1991. **191, 219, 221, 251**
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