

# SHAPING THE RURAL ENVIRONMENT: SURVEYORS IN ANCIENT ROME\*

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(Plate I)

Horace, reflecting on his relationship with Maecenas and the top men or 'gods' in Rome, complained that passers-by asked him questions about affairs of state, expecting him to be privy to the deliberations of the great. One question was: 'What about the land allocations (*praedia*) that the emperor promised to the soldiers? Will they be on the three-cornered island (Sicily) or on Italian soil? When I swear that I know nothing about it they are amazed at me as the only mortal who knows how to keep a vital unfathomable secret' (*Serm.* II.6.51-8).

The poet strikingly illustrates how land distribution was a familiar and important aspect of Roman life and of great interest not only to soldiers but also to many citizens, perhaps partly because of their apprehension about expropriations, which had created great anguish during the civil wars. We see too how the whole business was viewed as under the personal direction of the emperor and his entourage, and incidentally how difficult it was for people to find out about decisions taken behind the scenes.

But land division was also the object of professional attention:

Among all the observances and practices of measurement the most distinguished handed down to us is the establishment of *limites*. For it has its origin in the heavens and its legacy is timeless; it has an easy-to-use system for surveyors which includes a certain width for straight-line boundaries; the appearance of the maps is beautiful and the marking out of the fields themselves is attractive.<sup>1</sup>

Hyginus 2 (probably second century A.D.) illustrates crucial aspects of the work of land-surveyors as described in the *Corpus Agrimensorum Romanorum* — the establishment of dividing balks and roadways (*limites*); the demarcation of squares or rectangles (*centuriae*), which could then be subdivided to provide allotments for settlers; the drawing of maps to record land division; and the traditional association of the origins of the process with augural practice. Hyginus proudly celebrates the importance and dignity of surveying as a profession, its notable accomplishments and even its beauty, visible in the impressive physical appearance of the countryside. In the early fifth century A.D., Agennius Urbicus, in his commentary on land disputes, could still assert the responsibility of the surveying profession, and the necessity of high personal standards in its practitioners:

In adjudicating, the surveyor should conduct himself as a good and just man and not be influenced by ambition or greed; he should lay up a reputation for professional skill and integrity.<sup>2</sup>

Roman land-surveyors<sup>3</sup> have important things to say about the ancient world, not least because in the main they were people outside the upper classes and the governing group which traditionally provide most of the evidence that comes from literature. They were also closely involved in land distribution and colonial settlement, which were

\* In trying to make sense of the *Agrimensores* I have benefited immensely from several discussions with Professor Michael Crawford who also kindly permitted me to see part of *Roman Statutes* before publication. Professor Fergus Millar read a longer version of this paper with his usual interest and enthusiasm, and the final version was much improved by the perceptive and stimulating observations of my colleague, Dr John Curran. I also thank Dr Mauro de Nardis who generously permitted me to cite his unpublished London University PhD thesis.

<sup>1</sup> Hyginus Gromaticus, hereafter in this study Hyginus 2 (C. Thulin, *Corpus Agrimensorum Romanorum* 1.1 (Leipzig, 1913; repr. 1971), 131.3-8); see also n. 6.

<sup>2</sup> T 50.9-11. For Urbicus, see below, p. 76.

<sup>3</sup> In the early period 'surveyor' was expressed in Latin by *finitor* and later by *ensor*; *agrimensor* appears in the imperial period, and *gromaticus* (derived from the *groma* or surveying instrument) in the later Empire.

central to the political, social, and economic history of the Roman state from the early Republic to the second century A.D. Indeed the framework of Roman land division, marked by *limites* which had width and substance, often persisted in the field-systems and cultivation practices of later ages and remains relevant to the landscape of many areas of modern Europe and North Africa. These are the subject of increasingly detailed investigation, using aerial photography, maps, computer-assisted analysis, and archaeology.<sup>4</sup> For these reasons alone the viewpoint of the *Agrimensores* would be important, but their value to the historian goes much further, since they help to explain the factors that influenced where many Roman towns were situated (often in locations inhabited up to the present day), why they were laid out in a particular way, and the shape of the land. Furthermore, the surveyors explain the technical details of land division and allocation, which reveal how rural communities were established and veteran soldiers settled, and how the relationship between town, country, and central government developed.

With their fresh perspective the *Agrimensores* enliven and enhance the history of rural life in colonial settlements that otherwise would be mainly illustrated by archaeology and comparative studies; they comment vividly on landholding and related social problems — how men co-existed on the land and how they came into dispute — another significant part of the law and life of Rome; and they provide numerous historical examples, especially of the role of the founders of colonies. They also raise a question that inspires much modern scholarly debate, namely, how the Romans defined the world they conquered and the conceptualization of space by the drawing of lines.<sup>5</sup>

In what follows, Section I briefly examines the most important authors (for the purposes of this paper) in the *Corpus Agrimensorum Romanorum*; Section II the methods used in establishing an urban settlement in a rural setting; Section III patterns of landholding in new settlements; Section IV the role of the founder, especially the contribution of Augustus in establishing settled conditions in the countryside.

## I

The *Corpus Agrimensorum Romanorum* is a collection of manuals by different authors relating to various aspects of land survey. Although the original collection may date to the fourth century A.D., further material was added subsequently and the wide

<sup>4</sup> For recent studies on Roman land surveyors, see O. A. W. Dilke, *The Roman Land Surveyors* (1971) (hereafter *RLS*); F. T. Hinrichs, *Die Geschichte der gromatischen Institutionen* (1974); O. Behrends and L. Capogrossi Colognesi (eds), *Die römische Feldmesskunst: Interdisziplinäre Beiträge zu ihrer Bedeutung für die Zivilisationsgeschichte Roms* (1992); G. Chouquer and F. Favory, *Les arpenteurs romains: théorie et pratique* (1992); M. Clavel-Lévêque et al., *Siculus Flaccus. Les conditions des terres* (1993); C. Moatti, *Archives et partage de la terre dans le monde romain (IIe siècle avant - Ier siècle après J.-C.)* (1993). For the legal framework of the regulation and distribution of land, see now D. J. Gargola, *Lands, Laws and Gods. Magistrates and Ceremony in the Regulation of Public Lands in Republican Rome* (1995).

For a useful account of attempts to identify Roman field-systems and relate them to the morphology of the ancient world, see Chouquer and Favory, *op. cit.*, 101–67 and the bibliography there cited. Archaeological investigations are too extensive to be examined in detail in this paper, which deals primarily with the theory of land survey and the information provided by the texts. However the following general surveys are of particular interest: O. A. W. Dilke, 'Archaeological and epigraphic evidence of Roman land surveys', *ANRW* II.1 (1974), 564–92; *Estudios sobre centuriaciones romanas en España* (1974) — a review of Roman field-systems identified in Spain; P. Troussset, 'Les bornes du Bled Segui: nouveaux aperçus sur la centuriation romaine du sud Tunisien',

*Antiquités africaines* 12 (1978), 125–77; R. Bussi (ed.), *Misurare la terra: centuriazione e coloni nel mondo romano* (1983); M. Clavel-Lévêque (ed.), *Cadastrés et espace rural: approches et réalités antiques* (1983); M. Clavel-Lévêque and F. Favory, 'Les "gromatici veteres" et les réalités paysagères: présentation de quelques cas', in *Römische Feldmesskunst*, 89–139; G. Chouquer et al., *Structures agraires en Italie centro-méridionale: cadastrés et paysages ruraux* (1987); G. Barker and J. Lloyd (eds), *Roman Landscapes: Archaeological Survey in the Mediterranean Region*, Archaeological Monographs of the British School at Rome 2 (1991); P. N. Doukellis and L. G. Mendoni (eds), *Structures rurales et sociétés antiques* (1994). There is a useful case study of Modena in R. Bussi (ed.), *Misurare la terra: centuriazione e coloni nel mondo romano, il caso modenese* (1984). For computer-assisted investigation of field-systems, see J. W. M. Peterson, 'Information systems and the interpretation of Roman cadastrés', in S. P. Q. Rahtz (ed.), *Computer Applications and Quantitative Methods in Archaeology: CAA 88*, BAR Int. Ser. S446 (1988), 133–49; 'Flavian fort sites in South Wales: a spreadsheet analysis', in J. Huggett and N. Ryan (eds), *Computer Applications and Quantitative Methods in Archaeology*, BAR Int. Ser. 600 (1995), 87–93.

<sup>5</sup> See C. Nicolet, *L'inventaire du monde. Géographie et politique aux origines de l'Empire romain* (1988), esp. chs 7–8, and the review by N. Purcell, *JRS* 80 (1990), 178–82; see further below, p. 89.

range of later manuscripts, copied in part from two main recensions, testifies to the popularity of writings on surveying in later times.<sup>6</sup> The most informative treatises for the question of land settlement are those of Frontinus, Hyginus 1 and 2, Siculus Flaccus, and Agennius Urbicus.

The text ascribed to Frontinus is preserved firstly through a number of excerpts transmitted under his name, most importantly in the Arcerianus and Palatine manuscripts (T 1–19). Moreover, later commentaries preserve quotations and themes from Frontinus' work. Urbicus<sup>7</sup> analysed land disputes (T 20–51) by assembling general and theoretical definitions which allowed disputes to be placed in categories. However, specific examples of boundary disputes seem to be taken mainly from Frontinus, although he is not mentioned in the extant text. Two other texts, a commentary on categories of land and a commentary on land disputes, mistakenly attached to Urbicus in the *Corpus*, were probably the work of a Christian schoolteacher writing in the fifth century A.D. Both commentaries make extensive use of Frontinus, Hyginus 1, and Siculus Flaccus, often with direct quotations, but add little new.<sup>8</sup>

If the texts in the *Corpus* ascribed to Frontinus are the work of Sextus Julius Frontinus, who had a distinguished career in which he was consul III with Trajan in 100, this might indeed suggest the increasing status and importance of surveying. Frontinus was much respected in upper-class circles, and wrote a number of didactic manuals: the management of the water-supply of Rome, Greek and Roman military science (now lost), and the *Strategemata*, a collection of stratagems and ploys used by historical military commanders.<sup>9</sup> However, these topics embraced traditional senatorial responsibilities, whereas land survey was not an upper-class pursuit, its practitioners being mainly of low social status.<sup>10</sup> There is no external evidence that Frontinus was interested in surveying, and it may be difficult to accept that at times he wrote as if giving advice to fellow surveyors.<sup>11</sup> It is possible, therefore, that when didactic and technical works were being collated and copied, an anonymous treatise was mistakenly ascribed to Frontinus by a copyist who knew that he had written similar books. On the other hand, we may note from Frontinus' comments in the *De Aquis* that he took a lively interest in the technical details and background of any task he was assigned to administer, and was reluctant to depend solely on the advice of subordinates.<sup>12</sup> If Frontinus had been made responsible by an emperor for organizing a colony, he may well have decided to research the background of surveying and the problems associated with new settlements, producing a summary of his conclusions which could be used by other founders to check that the subordinate surveyors were doing their job properly. A discussion of land disputes might also be valuable to magistrates and provincial governors who had to deal with these problems.

It is impossible to recover the scope and full significance of Frontinus' work on surveying since his surviving text is clearly fragmentary and was transmitted by authors who presumably recorded what they thought valuable for their own teaching or the

<sup>6</sup> The standard edition, containing most of the works in the *Corpus*, is F. Blume, K. Lachmann and A. Rudorff, *Die Schriften der römischen Feldmesser* (2 vols, 1848; 1852; repr. 1967). Hereafter, references to texts in Lachmann are by page or page and line number prefixed by L. All references to those texts included in Thulin (n. 1) are by page or page and line number prefixed by T. The contents of the *Corpus* are usefully summarized in Dilke, *RLS*, 126–32; 227–30. For the manuscript tradition, see L. D. Reynolds (ed.), *Texts and Transmission: A Survey of the Latin Classics* (1983), 1–6; J. N. Carder, *Art Historical Problems of a Roman Land Survey Manuscript: The Codex Arcerianus A, Wolfenbüttel* (1978), 1–35; L. Toneatto, 'Note sulla tradizione del *Corpus agrimensorum Romanorum*, I. Contenuti e struttura dell' "ars" gromatica di Gisemundus (IX sec.)', *MEFRM* 94 (1982), 191–313; 'Tradition manuscrite et éditions modernes du *Corpus agrimensorum Romanorum*', in Clavel-Lévêque, op. cit. (n. 4, 1983), 21–50; 'Il nuovo censimento dei manoscritti latini d'agrimensura (trad-

izione diretta e indiretta)', in Behrends and Capogrossi Colognesi, op. cit. (n. 4), 26–66.

<sup>7</sup> A date in the late fourth to early fifth century for Urbicus has been argued most recently by Dr Mauro de Nadis in his unpublished PhD thesis, *The Writings of the Roman Land Surveyors: Technical and Legal Aspects* (University College London, 1994).

<sup>8</sup> cf. Th. Mommsen, 'Die Interpolationen des gromatischen *Corpus*', *Bf* 96/97 (1895), 272–92 = *Ges. Schr.* VII (1909), 464–82, esp. pp. 468–9; C. Thulin, 'Der Frontinuskommentar. Ein Lehrbuch der Gromatik aus dem 5.–6. Jahrh.', *Rhein. Mus.* 68 (1913), 110–27; also 'Kritisches zu Iulius Frontinus', *Eranos* 11 (1911), 131–5.

<sup>9</sup> *PIR*<sup>2</sup> I.322; A. R. Birley, *The Fasti of Roman Britain* (1981), 69–72; B. Campbell, 'Teach yourself how to be a general', *JRS* 77 (1987), 14–15.

<sup>10</sup> See below, n. 22.

<sup>11</sup> See e.g. T 16–18.

<sup>12</sup> *De Aquis*, praef. 2

solution of individual problems.<sup>13</sup> As it has come down to us, Frontinus' work consists of a definition of categories of land and their general characteristics (T 1-3). He then examines disputes arising from these lands, listing fifteen types, although the basic causes are two — boundary and site — and certain types of dispute occur only in certain lands (T 4-10). There is also a section on the origins, layout, and measurement of *limites*, and detailed problems of land measurement in cases of uneven and irregular boundaries in rough terrain (T 10-19). An account by Frontinus of land disputes and boundary-marking techniques perhaps underlies Urbicus' *De Controversiis Agrorum* (T 20-51),<sup>14</sup> in which there is a notable similarity in the ordering of topics and method of treatment. But Urbicus does not quote his sources and it is not possible to know with certainty how much Frontinus originally wrote, what other sources Urbicus used, or if he is quoting verbatim a text of Frontinus containing later accretions from unidentified sources.

Two treatises in the collection appear under the name Hyginus (hereafter Hyginus 1 (T 71-98) and Hyginus 2 (T 131-71)). Hyginus 1 was writing in the late first/early second century A.D. He refers to a recent distribution of land in Pannonia to veteran soldiers of Trajan, who is described as 'Trajan Augustus Germanicus'; if Hyginus 1 is precise about the emperor's titlature, he must be writing before the end of A.D. 102, when Trajan acquired the *cognomen* 'Dacicus' (T 84.11). Furthermore, he describes how he discovered that in Samnium land distributed by Vespasian was now occupied by the same men who had received it, but in a different way (T 95.2-13). He implies that they were still alive, which suggests that his investigations can hardly have taken place much after A.D. 100.

Hyginus 1 was a practising surveyor, who recounts his own methods for expressing measurements 'whenever I conducted a survey' (T 85.4-7), and who, in addition to his investigations in Samnium, had travelled to Cyrene, where he discovered how royal lands occupied by private people had been reclaimed by Vespasian, and incidentally provides the solitary piece of clear evidence for land owned by the Roman people in the provinces (T 85.16-86.1). He also cites the views of distinguished legal experts, refers to edicts of Augustus and the Flavian emperors, and mentions a previous work in which he had collected imperial decisions (T 97.6-8). Throughout, Hyginus 1 writes offering advice, guidance, warnings, and suggestions for those involved in the routine work of surveying. This indicates a good level of literacy and education among professional surveyors, even though they were not of high social status.

Hyginus 1 pursues the following major themes: the appropriate width and designation of *limites* in allocated lands; the allocation of land by lot; the demarcation of territories; boundary marking techniques; the categories and general characteristics of land and their designation on maps; complications and disputes. Hyginus 1 insists on the importance of law, and his method is to cite the text of laws and then analyse the wording; surveyors are advised to collect all relevant laws and records and maps and to make a personal inspection.

The text of Hyginus 2 has confused and corrupt manuscript headings, but it seems that what the copyists were trying to convey was a book on surveying by Hyginus (*Liber Hygini Gromaticus*); however, in modern works the author is sometimes misleadingly called 'Hyginus Gromaticus'. Manuscript P, which starts at T 132.6, has: 'There begins

<sup>13</sup> Thulin, *op. cit.* (n. 8, 1911), 131-3, argued on the basis of a passage in Urbicus (T 25.3-13) that Frontinus had written a handbook for training surveyors and an account in six books of the science of measurement, including a section on land disputes. But there is no good reason to attribute any of this to

Frontinus, who is not mentioned specifically; Urbicus is more likely to be referring to material he has collated from various surveying manuals for the instruction of students.

<sup>14</sup> Argued convincingly by de Nardis, *op. cit.* (n. 7), 100-30.

the work of Hyginus the freedman of Augustus about the establishment of *limites*.<sup>15</sup> This is a mistaken attempt to identify the author with Gaius Julius Hyginus, the freedman of Augustus who was appointed as librarian of the Palatine library and who wrote a variety of works on agriculture, literature, history, archaeology, and religion. Hyginus 2 has only one datable reference — a quote from the *Bellum Civile* of Lucan (A.D. 39–65) (T 151.18–19). But the quality of his Latin is such that the work should probably be dated no later than the second or third century A.D.<sup>16</sup> Even if the author called Hyginus 2 cannot be identified with Hyginus 1 or any known person, the value of his treatise is undiminished, with its detailed exposition of the establishment, measurement, and alignment of *limites*, the designation of marker stones, map notations, distribution of land by lot, territorial demarcation, and the history of colonial foundations.

Siculus Flaccus (T 98–130) mentions a ruling made by Domitian on *subseciva*; in addition, the quality of his Latin is good and there are some slight indications of a relatively early date. At T 122.3–17 Flaccus refers to the allocation of a specific width for the river Pisaurus which the local community sold off to adjacent landholders. He does not, however, explain all the consequences, even though he had made a personal investigation. Hyginus 1 obliquely describes the same incident without naming the Pisauenses (T 88.13–18),<sup>17</sup> and these events may well have been a *cause célèbre* in the late first/early second century A.D., which contemporary or nearly contemporary authors did not need to explain in full detail. Furthermore, at T 126.26–127.5 Flaccus describes his personal investigation into the ramifications of changes in landholding among veterans of Caesar and Augustus. His precise explanation suggests that these were at least still recognizable in his own day and did not belong to the distant past.

Flaccus was a practising, professional surveyor,<sup>18</sup> who often refers to his personal investigation of individual cases and consultation of maps and public records (e.g. T 126.26–127.5; 127.26), and in some cases at least this seems to have involved fieldwork, possibly at Pisaurum (T 122.3), Beneventum (T 124.3–6), and Nola (T 126.19–21). His extant writings contain an account of types of land in Italy and the provinces and the historical context of their development, *limites*, methods of boundary marking, the role of formal records, typical problems encountered by surveyors, questions of ownership and jurisdiction, territorial demarcation. In dealing with these topics, Flaccus also covers the origins of many likely land disputes even though he does not treat them as a separate topic.

Since in the extant texts, which have no explanatory prefaces and end rather abruptly,<sup>19</sup> the writers neither explain why they are writing about surveying nor state their authority in the subject, it is difficult to establish the scope and ultimate direction of the work of the *Agrimensores* and the systematization of the principles of surveying.

<sup>15</sup> MS A has: 'There begins the *Constitutio* of Hyginus' ('Inc. Hygini Constitutio'), and 'There ends with good fortune the *Constitutio* of Hyginus Gromaticus' ('Exp. Kygyni Gromatici Constitutio feliciter'). MS B has: 'There begins the Book on Surveying by Hyginus' ('Inc. Lib. Hygini Gromaticus'), and 'There ends the Book on Surveying by Hyginus' ('Liber Hygini Gromaticus Exp.'). MS B also has a subscript which apparently relates to a lost book: 'The Surveying Book by Hyginus about Land Division ends' ('Liber Gromaticus Hygini de Divisionibus Agrorum Exp.'). MS P reads: 'Inc. Kygeni Augusti Liberti de Limitibus Constituendis'. See L. Toneatto, 'Una tradizione manualistica difficile: l'agrimensore Igino e gli scritti collegati al suo nome. Attribuzioni et datazioni', *Miscellanea (Università degli studi di Trieste)* 4 (1983), 123–51.

<sup>16</sup> It is generally believed that Hyginus 2 is distinct from Hyginus 1, though on the subjective grounds of stylistic differences; see A. Gemoll, *Hermes* 11 (1876), 164–78. But it might be more helpful to emphasize the broad similarities between the works which have come down to us under the name 'Hyginus', sug-

gesting perhaps access to common sources, or, more likely, the presence of a body of established material relevant to the study and teaching of land surveying.

*De Munitionibus Castrorum* is the name given in the sixteenth century to a treatise, the beginning and end of which have been lost, which deals with the methods for measuring out a military camp and setting up its defences. It is preserved in the Arcerianus manuscript and was wrongly associated with the work of Hyginus 2; it is now generally agreed that the *De Munitionibus* was not written by either Hyginus 1 or Hyginus 2 (M. Lenoir, *Pseudo-Hygin: des fortifications du camp* (1979), vii–viii; 111–33).

<sup>17</sup> Urbicus, in a passage perhaps derived from Frontinus (T 44.22), briefly mentions the ascription of a width to the river.

<sup>18</sup> He mentions *professio nostra* (T 98.9).

<sup>19</sup> For the importance of the preface in ancient literature, see T. Janson, *Latin Prose Prefaces: Studies in Literary Conventions* (1964); for the preface in military handbooks, B. Campbell, *JRS* 77 (1987), 13–19.

And since the date of Siculus Flaccus and Hyginus 2 cannot be securely fixed, the authors cannot be placed in an unambiguous chronological relationship.<sup>20</sup> Therefore, I think that the most we can do is to gain a general view through the main writers in the *Corpus* of what were considered the essential principles of land surveying, by examining the themes that interested them and the character of their writing.

All the authors emphasize the importance of a land division system based on *limites*, measured and aligned according to set principles using the *ferramentum* (below, p. 84). Clear definitions of categories of land are produced: divided and allocated, quaestorian (land entrusted to the quaestors to be sold off in blocks of fifty *iugera*), lands without formal boundary (*arcifinius* or *occupatorius*), and also areas unsuitable for allocation, especially *subseciva*, since much of the surveyor's work depended on recognizing the type of land with which he was dealing.<sup>21</sup> Great importance is attached to recognizing subtle variations in methods of boundary marking, and to the formal recording on maps and registers of all transactions and decisions in respect of any land settlement. All authors are concerned with the definition of territorial divisions and the complicated question of jurisdiction between communities. Land disputes figure prominently in the extant works, either directly through the adjudication of surveyors, or obliquely through the exposition of other related topics such as boundary marking and the designation of *limites* and *centuriae* by means of marker stones. The apparent absence of discussion about the methodology of measurement (apart from Frontinus — T 15–19) can be explained by the hypothesis that there were separate works on this theme.

The surviving writers have a similar approach. They freely give their own views and comment on those of others, creating a climate of scholarly debate on controversial subjects. In part, they provide a history of the origins and development of land division, with many general definitions and explanations that could interest anyone with a passing or non-specialist interest in the subject. But in the main they are concerned to give advice and instructions, and their overall purpose is didactic, presumably for an expected audience of practising surveyors or those learning the profession. The writers often use the first person plural, identifying themselves with surveyors, and issue direct instructions or advice, expressed in various ways (e.g. *debere*, *oportet*, gerundive of obligation, subjunctive of command or prohibition). The instructions are frequently extremely detailed, especially in respect of measurements, inscribing stones, designating *limites*, sortition, boundary marking, and legal regulations relating to individual colonies and *municipia*. A large amount of illustrative material is quoted from laws, edicts, and maps. The writers also expound technical terms, summarize the types of evidence available to the surveyor, point out areas of particular difficulty where previous experts had gone wrong, and offer practical advice such as the necessity of keeping an open mind and recognizing the local practices of disparate regions. Throughout all the works there is a concern to give specific examples from Italy and the provinces, often based on extensive personal investigation and research, famous test cases, and hypothetical problems. Frontinus, Hyginus 1 and 2, and Siculus Flaccus accentuate the surveyors' role, the significance of the range of adjudication required of them (involving private individuals, large landholders, communities, religious bodies, and the emperor), the

<sup>20</sup> For verbal parallels or similarities, cf. the following passages of Frontinus:

T 3.14–15 and Hyginus 2 (T 161.17–19); T 9.10–11 and Hyginus 2 (T 164.12–13); T 10.20–11.8 and Hyginus 2 (T 131.8–132.4); T 11.4–5 and Hyginus 2 (T 134.18–19); T 11.9–14 and Hyginus 2 (T 132.6–12); T 12.5–10 and Hyginus 2 (T 135.10–14); T 12.11–15 and Hyginus 2 (T 132.18–21); T 13.2–7 and Hyginus 2 (T 132.21–133.4) and also Siculus Flaccus (T 117.5–7); T 14.17–19 and Hyginus 2 (T 135.7–10); Hyginus 1 (T 74.8–9) and Siculus Flaccus (T 128.16–17); T 80.7–11 and Siculus Flaccus (T 127.14–20); T 83.12–18 and Siculus Flaccus (T 121.18–25); T 90.1 and Siculus Flaccus (T 103.11); T 94.5 and Siculus Flaccus (T 107.24);

T 96.15–19 and Siculus Flaccus (T 127.6–11); T 97.15–20 and Siculus Flaccus (T 128.8–16).

The omission of certain themes in authors need not be significant since we cannot know if our texts are complete. Similar or identical phraseology can suggest that one writer had access to another's text or that both had a common source; in fact such phraseology is limited to a few words and the main correspondences are more thematic than in points of detail. Moreover, many of these passages concern well-known topics, like the origins of *limites* and distinctions in boundary markers, where there was doubtless an established view.

<sup>21</sup> For the basic categories of land see Hyginus 1 (T 78–80); Siculus Flaccus (T 99–102; 116–18).

great responsibility of protecting the rights of the people, preserving regional customs, and avoiding injudicious innovation, so as to safeguard the integrity of the profession. Hyginus 1's description of territorial divisions between communities illustrates not only his didactic approach but also the complexity of the surveyor's job, and a conservative respect for the force of law:

What else can I advise about this other than that, as I said above, we should read the laws carefully and that they should be interpreted according to individual circumstances. (We should establish) whether boundaries recorded by the ancients remain in the same status, or whether anything has been added or taken away; how the territories were demarcated, sometimes by mountain ridges and watersheds, sometimes by the establishment of *limites*, sometimes by the alignment of the land division itself. So, as I said, the laws must always be carefully scrutinized and interpreted word by word. Indeed I urge that the authority of the law should be analysed in the same way, so to speak, as the human body is probed in all the joints of the limbs. (T 97.11-22)

The emergence of a surveying literature was in my view the product of a long-term, unsystematic development in which the accretion of new theories and fresh material was doubtless piecemeal. But by the early imperial period surveying had an increasingly important role to play, the technical terminology of land division was appearing in contemporary literature, and surveyors had a more secure professional status despite their rather low social standing.<sup>22</sup> The great activity in land division may well have encouraged more analysis of the practice of surveying and perhaps more effective collation of material by professional surveyors and teachers. Gradually a canon of recognized surveying procedure will have been established, on which the manuals in the *Corpus Agrimensorum Romanorum* were based, though as the texts stand it appears that only limited progress had been made in the creation of a standard technical vocabulary. In the fourth to early fifth century A.D. Urbicus and the anonymous commentator tried to expound a series of related surveying topics by combining earlier treatises in the form of a commentary, which could then be expanded if necessary with wider cross references. The compilers of the *Corpus Agrimensorum* may have intended to produce a general compendium of all aspects of surveying, though we cannot know if they collected all the texts available to them or if the texts available were necessarily complete.

## II

The most important official role for land-surveyors was the measurement and division of land either for individual settlers or for colonies. The colony was in essence an urban community surrounded by its territory, a kind of miniature city-state modelled on Rome.<sup>23</sup> Such settlements were, therefore, expected to be self-sufficient, and with their arable land received areas of pasture and occasionally woodland. Colonization was sponsored by the state, through a decision of the senate or a popular assembly, until the last century of the Republic when politically dominant individuals assumed responsibility. Early colonies, consisting of Latins or Roman citizens, were established in strategic locations to protect Roman interests and security and to enforce Roman domination. Perhaps as many as 40,000 received plots of land between 200 and 173 B.C., involving about 252,000 ha of territory, as Rome appropriated and distributed the lands of conquered peoples.<sup>24</sup> Later, strategic considerations took second place to the satisfaction

<sup>22</sup> For discussion see Dilke, *RLS*, 31-46; Hinrichs, *op. cit.* (n. 4), 158-70; R. K. Sherck, 'Roman geographical exploration and military maps', *ANRW* II.1 (1974), 544-56; also my forthcoming translation of and commentary on the *Corpus Agrimensorum Romanorum* in the JRS Monograph series. Military surveyors (Sherck) were in the main ordinary soldiers ranking among the *immunes*; they were responsible for laying out camps and surveying other military sites and may occasionally have assisted in the establish-

ment of military colonies; they could also be seconded to work on the projects of local communities (e.g. *ILS* 5795).

<sup>23</sup> Aulus Gellius, *Noctes Atticae* xvi.13.9.

<sup>24</sup> T. Frank, *An Economic Survey of Ancient Rome* I (1959), 122-24. Aquileia in 181 B.C. was the last purely Latin colony to be founded (see in general E. T. Salmon, *Roman Colonization under the Republic* (1969), 40-111).

of the economically disadvantaged or the reward of veteran soldiers, and other Roman citizens were often mulcted of their land to satisfy the requirements of the military dynasts. The civil wars brought colonization to the forefront of Roman life, and between 41 and 14 B.C. more than 200,000 veterans were allocated land, involving the foundation of about fifty colonies in Italy, twenty eight of these being established after Actium and later. Colonies were also founded in the provinces of Africa, Sicily, Macedonia, Spain, Achaëa, Asia, Syria, Gallia Narbonensis, and Pisidia.<sup>25</sup> These settlements in total represent a significant movement of population and social and economic adjustment. Even if each settler received only ten *iugera*, this would amount to two million *iugera*, or about 504,000 ha. In this huge process of measurement, valuation (since after Actium Augustus compensated those from whom land was taken), allocation, and subsequent monitoring, surveyors must have found very frequent employment. They were the instruments of the will of military dynasts and subsequently of emperors in the efficient management of land allocation. Augustus introduced the idea of a regular cash discharge payment for legionaries, and the military treasury was set up in A.D. 6/7 to sustain the burden of these emoluments. After Augustus, more soldiers received cash handouts than were settled in military colonies (though they could of course use their money to buy land and settle individually), but the process of settling groups of soldiers in military colonies continued until the time of Hadrian, although it is unlikely that any colonies were founded in Italy after the Flavians.<sup>26</sup>

The *Agrimensores* present a lively history of land acquisition and division, both in the early Roman state and in the late Republic. This was not intended as a mere antiquarian digression for the casual reader. In part it was an explanation of surveying practices, in the way that Vitruvius argued that architects should be familiar with history so that they could explain why they had incorporated certain designs.<sup>27</sup> But surveyors also believed that the historical consequences of earlier settlements were an integral part of current surveying practice and relevant to problems of choice of site, boundary demarcation, landholding, and jurisdiction. Violence and aggrandizement were at the heart of the process, as Siculus Flaccus said: 'Wars created the motive for dividing up land' (T 119.7), and 'the status of land is indeed complex diverse and variable, as a result of the chances of war or the self-interest of the Roman people or injustice, as people say' (T 101.18–21). In periods of Roman military conquest, the nature of settlements often depended on the level of resistance encountered:

For some peoples waged war stubbornly against the Romans, while others, having experienced their valour, maintained peace; others, recognizing Roman good faith and justice, associated themselves with Rome and frequently fought against her enemies. Consequently, each community received laws in accordance with its services to Rome. (T 98.19–99.2)

In time of conquest the creation of *limites* and the division of land provided a public and highly visible demonstration of Roman power and the humiliation of the enemy; they announced complete Roman control of the disposal of the land, permanent occupation, and a probable intention to distribute the fruits of victory to her own citizens and soldiers. Surveyors of course recognized that the land division systems they studied or

<sup>25</sup> For settlements from 59–44 B.C., see P. A. Brunt, *Italian Manpower* (1971) (hereafter *IM*), 255–9; L. Keppie, *Colonisation and Veteran Settlement in Italy 47–14 B.C.* (1983) (hereafter *CVSI*), 49–58; preference of soldiers for land rather than cash — P. A. Brunt, 'The army and the land in the Roman revolution', *JRS* 52 (1962), 69–85, revised version in *The Fall of the Roman Republic* (1988), 240–80. Settlements between 41 and 14 B.C., see Keppie, *CVSI*,

58–86; cf. Brunt, *IM*, 319–44; 473–512; Salmon, *op. cit.* (n. 24), 128–44; provincial colonies — *RG* 28.

<sup>26</sup> J. C. Mann, *Legionary Recruitment and Veteran Settlement during the Principate* (1983); L. Keppie, 'Colonisation and veteran settlement in Italy in the first century AD', *PBSR* 52 (1984), 77–114. For the size of individual allocations, see p. 86.

<sup>27</sup> *De Architectura* 1.1.5.



helped create were inherent in the advance of Roman power and did not imply any restriction in that advance.<sup>28</sup>

### *Choosing the site*

In the Republic, decisions on the foundation of colonies were taken after debate in the senate or people's assembly, the motives were in the public domain and can be recovered from Livy and other writers. But even so, we are largely ignorant of how the site for a colony was chosen, of how information was sought, and what factors were deemed important. In the late Republic this process was even more obscure since decisions were taken by military dynasts, or, in the imperial period, by emperors and their advisers. We may surmise that military motives were uppermost, both for the settlement of veteran soldiers and as a contribution to the security of areas recently annexed or pacified, e.g. Augusta Praetoria Salassorum (Aosta) in the Alps,<sup>29</sup> Augusta Emerita (Mérida) in Spain,<sup>30</sup> Sarmizegetusa in Dacia, Thamugadi (Timgad) in Africa, Aelia Capitolina at Jerusalem.<sup>31</sup> However other motives are cited even in the imperial period. Hyginus 2, who noted that distinguished Romans had sought to strengthen the state by distributing land in colonies, often as a reward for military service (T 140.16–141.4), believed that in some settlements Augustus attempted to revive declining communities with more land and a fresh influx of population (T 142.8–12). Similarly, Tacitus implies that the Neronian veteran settlements at Antium and Tarentum, and possibly also at Capua and Nuceria, were intended to relieve under-population.<sup>32</sup> Vespasian settled praetorians and legionary veterans from Upper Germany and Britain in his home town of Reate.<sup>33</sup>

The precise site of colonies must have been carefully chosen, since emperors were presumably concerned about their future success. Indeed Augustus boasted in the *Res Gestae* that his colonies in Italy were distinguished and populous in his lifetime (28.2). Vitruvius may be thinking of the imperial role in the choice of site when he recounts how the architect Dinocrates was rebuked by Alexander the Great for a grandiose plan to reshape Mount Athos and build a city, which however took no account of land necessary for growing corn.<sup>34</sup> It is impossible to know what input surveyors had in any discussions on the founding of a colony, but presumably they must at least have helped to choose the site. Indeed many texts in the corpus expound the role of the surveyor and the possible configuration of the site, suggesting that this was an important aspect of their activities.

According to Hyginus 2, when circumstances allowed the founding of a colony on virgin land, it was best that the central point for the land division, i.e. the right-angled intersection of the two main *limites*, the *decumanus maximus* (often running east–west) and the *kardo maximus* (often running north–south), should be in the intended urban settlement itself, or as close to it as possible. So, these *limites*, establishing the four central *centuriae*, should run through the four gates of the town like a military camp. In

<sup>28</sup> For land division as an expression of the conqueror's power, see N. Purcell, 'The creation of provincial landscape: the Roman impact on Cisalpine Gaul', in T. Blagg and M. Millett (eds), *The Early Roman Empire in the West* (1990), 7–29; C. R. Whitaker, *Frontiers of the Roman Empire. A Social and Economic Study* (1994), ch. 1, esp. 18–20, also emphasizes the point that rectangular surveys occur at times of expanding power and colonial foundation, and were a means of organizing internal control.

<sup>29</sup> Founded probably in 25 B.C. after the defeat of the Salassi for 3,000 veterans of the Praetorian Guard, it guarded the approaches to the Greater and Lesser St Bernard passes. See further below, p. 83.

<sup>30</sup> Founded in 25 B.C. by Publius Carisius, governor of Lusitania, on the river Guadiana for veterans of the V Alaudae and X Gemina legions who had fought in the Cantabrian wars.

<sup>31</sup> Sarmizegetusa was founded after the second Dacian War, Timgad in A.D. 100 for veterans of the III Augusta, on the road from the legions's camp at Lambaesis to Theveste; see Mann, op. cit. (n. 26), 14; 39. Aelia Capitolina, founded by Hadrian after the Jewish revolt of A.D. 132–5, was in my view intended partly as a visible symbol of Roman domination of the Jews, through its location at the traditional cultural and religious centre of the Jewish nation; cf. B. Isaac, *The Limits of Empire* (rev. edn, 1992), 311–32, esp. 323–5.

<sup>32</sup> *Ann.* XIV.27; XIII.31.

<sup>33</sup> *ILS* 2460 = M. McCrum and A. G. Woodhead, *Select Documents of the Principates of the Flavian Emperors A.D. 68–96* (1961), no. 378.

<sup>34</sup> *De Architectura* II. preface, 2–3. Alexander complimented him on the plan but not his choice of site.

this way there would be an equal amount of the colony's territory on every side of the central point; this arrangement was convenient for the landholders and provided equal access for all the inhabitants to the forum and other public buildings. The object was to create a unified structure with an urban centre in a rural community, in which the ideal of equality, particularly relevant to veteran soldiers, was preserved. Hyginus 2 cites as an example Ammaedara (Haïdra in Tunisia), which was the site of the first camp of Legion III Augusta on the road from Carthage to Theveste, and was established as a colony by Vespasian.<sup>35</sup> In settlements where the urban area was central to the land allotments, it was recommended that land was allocated from the outer perimeter inwards, using the first settlers virtually as outer boundary markers. This practice was apparently employed at Augusta Emerita.<sup>36</sup> There could, however, be tension at the crucial point where the public area of the urban centre met the land of the settlers. Urbicus (here perhaps using Frontinus) describes typical disputes involving *culinae*, that is, public areas set aside by communities on the outskirts of the town intended for the funerals of the poor and the punishment of criminals. Private landholders with no respect for religious feeling often appropriated parts of these areas, adding them to their gardens or land (T 47.1-8). In the later Empire Christians were particularly keen to appropriate land belonging to pagan shrines.<sup>37</sup>

Only rarely in the late Republic or imperial period can the surveyor have had a free hand to organize land division as he wished. Most of the best sites had been taken and fresh settlements were constrained by the availability of land and many physical factors resulting from the varied history of land acquisition by the Roman state and by individuals.

When an existing *municipium* was given the status of a colony either for supporting Rome at the right time or for being on the right side in the civil wars, or as an expression of imperial favour, it usually received a fresh influx of settlers and an addition of land. Since the settlement already had an urban site, land division had to start from outside this area. Moreover, many early settlements had been built on high or rough ground for security against attack. So, when a new colony was established on the site with fresh settlers, land was taken from neighbouring communities and the land division had to start some distance from the urban settlement, e.g., the hill town of Hispellum (Spello) in Umbria was built on a terraced hillside overlooking its territory in the narrow plain below (Pl. IA). In these cramped conditions, pasture and woodland for the colonists would often have to be separate from their farms. Mountains had frequently been used by early settlers as a means of defence and a source of water. When their territory was extended, the mountains infringed on the land division, making it impossible to apportion the land equally around the urban centre. Consequently, some communities had their territory situated on both sides of a range of hills (Pl. IB).

The foundation of Augusta Praetoria Salassorum precisely illustrates how surveyors had to overcome difficulties of location. The colony was built towards the middle of a long narrow plain completely encircled by mountains, on the site of the camp of M. Terentius Varro Murena who had defeated the Salassi. The land distribution for the veterans must have taken up virtually all of the cultivable land within the ring of mountains; any of the Salassi who remained will have been confined to the lower slopes of the mountains (Pl. Ic).<sup>38</sup>

<sup>35</sup> T 144.9-17; cf. T 145.10-16 — a surveyor should stick as closely as possible to the preferred system even if the site was difficult. For land division in Africa and the layout of Ammaedara, see W. Barthel, 'Römische Limitation in der Provinz Africa', *Bj* 120 (1911), 39-126; A. Caillemer and R. Chevallier, 'Les centuriations romaines de Tunisie', *Annales (ESC)* 12 (1957), 275-86; *Atlas des centuriations romaines de Tunisie* (1959); Troussset, op. cit. (n. 4), esp. 143-75.

The comparison with the design of military camps should not be pressed too far since the main roads of a camp did not intersect in the middle, which

was occupied by the headquarters building. It is more likely that military and civilian surveyors drew on sources and methods which had certain common features.

<sup>36</sup> See T 44.3-21. For the territory of Augusta Emerita, see R. Wiegels, 'Zum territorium der Augusteischen Kolonie Emerita', *Madriider Mitteilungen* 17 (1976), 258-84.

<sup>37</sup> See the anonymous commentary *De Controversiis* (T 68.17-21).

<sup>38</sup> Dio LIII.25.3-5; *ILS* 6753 = *EJ* 338; Keppie, *CVSI*, 205-7.

Settlements built originally to serve as a port or to protect the sea approaches of Italy occupied the periphery of their land allocation, which could be extended only in limited ways. Moreover, in some colonies, in order to facilitate communications within their territory, the *decumanus* or *kardo maximus* had been laid out along the route of an existing main road, obviously influencing the layout of the site. For example, in Campania at Anxur-Tarracina (Terracina) the *decumanus maximus* followed the route of the Via Appia producing an elongated layout (Pl. Id).<sup>39</sup>

The intentions of surveyors in choice of site reveal the innate conservatism of the profession; the preparation of a settlement required certain features (*limites* and a properly measured layout) and the application of the recommended procedures. They aimed primarily to ensure the welfare and convenience of rural settlers, providing an equitable distribution of land and easy access. In addition they respected the urban environment; the concept of the city state was still prevalent as the basis for a structure of local government and jurisdiction to maintain the settlement. All this presupposes the availability of considerable resources and a highly sophisticated mechanism for organizing settlements. Once the site had been chosen the detailed work of land division could begin.

### *Measuring land*

*Limites* were the essential framework upon which all land measurement was based — ‘all *limites* mark off fields and designate *centuriae*’<sup>40</sup> — and were established with great care. The surveyor’s essential implement was the *groma* or *ferramentum*, a kind of cross-staff used for plotting straight lines and measuring right angles.<sup>41</sup> First simple straight lines of no width (*rigores*) were established, marking the course of the *limites*, which took the form of a roadway often with raised edges like a balk, cut by a plough. Wooden stakes were fixed every 120 Roman feet (*actus*), each of them inscribed with its own number. *Limites* not only demarcated the land division, but also had to serve the surveyor’s purpose in extending or checking the system, and were expected to provide access for landholders and also for the movement of farm produce. This is reflected in the various etymologies offered by the *Agrimensores* for the word: ‘oblique’ or ‘transverse’ from the adjective *limus*, and *limus cinctus* (a garment with a purple stripe across it), or ‘threshold’ from *limen* because ‘through them access roads to fields are preserved’.<sup>42</sup> So that these criteria for rights of way could be satisfied it was important that *limites* had recognized dimensions. The preferred length for the *limites* marking one *centuria* was twenty *actus* (2,400 Roman feet = 709.68 m), producing an area of 200 *iugera* (50.4 ha), though in practice there were many variations. However, the width was more important, conferring a certain ‘status’ as Siculus Flaccus put it (T 122.28). Hyginus 1 recommended a width of between 12 and 30 Roman feet for the *decumanus maximus* (DM) and *kardo maximus* (KM), though it was at the discretion of the founder (T 71.6–7). However an Augustan law had affirmed or reaffirmed a width of 40 Roman feet for the *decumanus maximus* and 20 for the *kardo maximus*.<sup>43</sup> These dimensions were doubtless desiderata which might be affected by factors like the nature of the terrain or the type of roadway they provided. For example, *limites* will normally have taken the

<sup>39</sup> Hyginus 2 (T 144.1–8); see Chouquer, op. cit. (n. 4, 1987), 105–9. The remains of a Roman field-system are particularly well preserved at Tarracina; Chouquer identifies a distribution of land in parallel strips along the north side of the Via Appia overlaid subsequently by *centuriae* of 20 by 20 *actus* (2,400 by 2,400 Roman feet = 200 *iugera*); this extends to the south side of the road.

<sup>40</sup> Siculus Flaccus (T 117.22–3).

<sup>41</sup> For Roman surveying instruments, see Dilke, *RLS*, 66–81; there is a new interpretation of the construction of the *groma* and a useful review of

previous literature by T. Schiöler, ‘The Pompeii-*groma* in new light’, *Analecta Romana* 22 (1994), 45–60. For orientation, usually effected by sighting compass points, and its possible association with augury and Etruscan learning, see Dilke, *RLS*, 32–4; 56–8; 86–7; *Imago Mundi* 21 (1967), 16–18; W. Hübner, ‘Himmel und Erdvermessung’, in Behrends and Capogrossi Colognesi, op. cit. (n. 4), 140–70; Frontinus (T 10–11); Hyginus 2 (T 131–2).

<sup>42</sup> Frontinus (T 13.2–7); Hyginus 2 (T 132.20–133.4).

<sup>43</sup> Hyginus 2 (T 157.9–13).

form of a dirt road, but those that ran along the course of a public highway serving as a military road had the width of the road (Hyginus 2 — T 134.4–5), and must have been paved. The substantial width assigned to the principal *limites* meant that in some areas surveyors omitted them from the land included in a *centuria* and consequently from the allocations of individual landholders; instead the measurement of the *centuria* began from the ‘width prescribed by law for the *limes*’ (Siculus Flaccus — T 122.21–3).

*Limites*, as surveyors strongly affirm, had to be passable for vehicles (Hyginus 1 — T 83.21–2), and if farmers were tempted to make use of the land incorporated in a *limes*, they were obliged to preserve rights of way. So, if farm buildings were constructed so that they blocked a *limes*, or if a *limes* was laid which impinged on existing buildings, an alternative route had to be provided by the landholder which needed to be equally passable as that through the buildings. If necessary, gates had to be provided in a building with a slave to operate them for the benefit of people passing along the *limes*. Siculus Flaccus argued that it was not right for a landholder to take over a *limes* for cultivation merely on the grounds that he preferred to offer a right of way through a field, and in any case the deviation from a *limes* would take up a greater area of land (T 123.4–18).<sup>44</sup>

Apart from the *decumanus maximus* and *kardo maximus* the most important *limes* was the *quintarius*, so called because, although it was the sixth *limes* laid out from both the *decumanus maximus* and the *kardo maximus* (including these two in the reckoning), it closed the fifth *centuria* in both directions. Sometimes called *actuarius*, it was wider than intermediate *limites*, with a recommended width of twelve Roman feet, and was designated with stone markers. The *quintarius* served as a highway like other *limites* but was expected to be laid out with great care and to act as a check on the accuracy of the measurements during the conduct of a survey.<sup>45</sup> Intermediate *limites* marking off individual *centuriae* were called *subruncivi*; this word means ‘weeded’, which implies that they were to be kept clear; the minimum recommended width of eight Roman feet would allow two vehicles to pass.

Although many Roman field-systems from the third century B.C. to the second century A.D. have been identified, there are serious methodological problems in relating the texts to the archaeological evidence. *Limites*, because of their straightness and regular width, offer the best guide; they can be identified by aerial photography and sometimes by on-site investigation because they were often incorporated into later roads or paths. However they have not survived consistently into modern agricultural layouts; for example, in the Rhône valley near Orange there are few traces of the land division depicted in the Orange cadasters (see n. 60), but some east–west internal *limites* have survived, probably because hedges were planted here as a protection against the prevailing north wind (the Mistral). Field-systems can also be identified from inscribed boundary stones, from which layouts can be partially reconstructed, as in North Africa, because of the regimentation of Roman land survey; but the survival of these stones is comparatively rare and identification from the dimensions of *centuriae* alone is not always safe because there were many variations, as the *agrimensores* themselves admit, and mistakes in measurement sometimes occurred. There is also the difficulty of dating land-division grids and distinguishing them from overlapping grids, from pre-Roman field-systems, and even from the systems of later ages which may have copied Roman models. A classic example of the attempt to relate archaeological data to the evidence of the surveying texts, especially the *Liber Coloniarius*, is Chouquer’s skilful reconstruction of Roman field-systems in Campania and central Italy.<sup>46</sup> But even here the difficulty of establishing the exact relationship of land-division systems can be seen in the problems associated with *scamna* and *strigae* (strips of land which, according to the survey’s

<sup>44</sup> cf. the charter of Caesar’s colony at Urso (Osuna) in southern Spain, which laid down that the *limites* were not to be blocked or ploughed over (*FIRA*<sup>2</sup> 1, 191, clause 104).

<sup>45</sup> Hyginus 2 (T 139.9–16; 154.14–20).

<sup>46</sup> Most notably in *Structures agraires*, op. cit. (n. 4). The *Liber Coloniarius* was probably compiled in the

early fourth century A.D., with some subsequent alterations. Part of it may be based on accounts written in Augustus’ reign, and it gives details of land allocations in Italy from the Gracchi to the second century A.D. However individual entries are of variable quality (see also n. 99; good summary in Keppie, *CVSI*, 8–12).

orientation, were respectively broader than they were long or longer than they were broad). Chouquer argues that this was a primitive system which was subsequently superseded by division by *centuriae*, and from this makes deductions about the relationship of one grid to another and the development of settlements. But the evidence for a consistently early date for *scamna* and *strigae* remains unproved, and it is possible to believe that land division into strips was not necessarily a primitive system but a variation dictated by circumstances, for example in cases where the land was too rough or awkwardly located to make division into *centuriae* feasible, or where, if only a small amount of land was required for settlement, full-scale division into *centuriae* was deemed unnecessary. It may be significant that Hyginus 2 envisages the deliberate employment by surveyors of *scamna* and *strigae* in *ager arcifinalis* subject to tax, to distinguish it from surveyed and divided land: 'Just as the status of these lands is different, so the method of measurement ought also to be different'. He seems to recognize *scamnatio* and *strigatio* as a valid alternative method of land division (T 167-71).

It is worth noting that by the end of the second century A.D. military colonies were no longer being founded and major conquests had ended, and that there were therefore few large-scale settlements marked out with the traditional attention to detail; smaller foundations, which may have occurred on rougher terrain since the most cultivable land was already in use, or modifications to existing systems, will have made less impact on the land and are more difficult to trace in modern field-systems, even though the work of the surveyors continued.

The size of individual allocations varied greatly and internal divisions of *centuriae* are particularly difficult to trace.<sup>47</sup> Hyginus 2, perhaps using genuine records,<sup>48</sup> describes how 66<sup>2/3</sup> *iugera* were distributed at an unidentified location to veterans of Legion V Alaudae, that is, three men to each *centuria*. Indeed, at La Marsa near Carthage where the *centuriae* are of two hundred *iugera*, there are signs of a tripartite internal division with the proportions 2:1:2, though it is possible that there were further internal divisions now obscured by changes in cultivation and habitation.<sup>49</sup> At Zara in Dalmatia a system of *centuriae* containing two hundred *iugera* has been preserved by local roads and stone walls, and in some cases there are traces of internal division into squares of fifty *iugera*. There is evidence of a similar subdivision in some of the *centuriae* at Pola in Histria, a colony perhaps founded by Julius Caesar. Colonists may have received fifty *iugera*, or again there may have been further subdivisions.<sup>50</sup> Of course allocations could not always be accomplished as neatly as this, and Frontinus mentions a hypothetical case in which a settler received three-quarters of his land in one *centuria* and the rest in another (T 5.17-21).

### *Designating and distributing land*

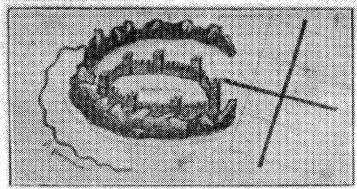
Surveyors devised a recognized system for designating the whole layout of the land division, so that the location of each *centuria* in the scheme could be identified, allocations properly recorded and checked if necessary, and boundaries identified. According to Hyginus 2, the surveyor should stand at the intersection of the *decumanus maximus* and *kardo maximus*, look along the original orientation, and establish the right and left of the *decumanus* and the near and far side of the *kardo*. On this basis he apportioned the four central *centuriae*. In the corners of each of these *centuriae* stones were set up; the one at the central point was marked DM KM; the stones on the two adjacent corners were marked as follows: that on the *kardo* KM DII, and that on the *decumanus* DM KII. The remaining corner, furthest from the central point was known

<sup>47</sup> For discussion of the size of allocations, see Brunt, *IM*, 53-5; 193-4; 295-6; 309-11; 314-15; 341-2; Keppie, *CVSI*, 91-6.

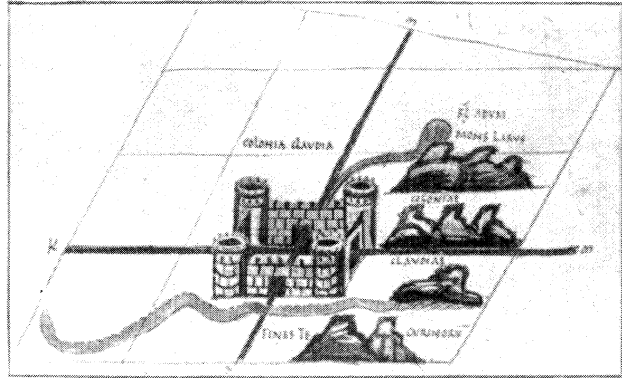
<sup>48</sup> See below, p. 89.

<sup>49</sup> J. Bradford, *Ancient Landscapes* (1957), 198-9.

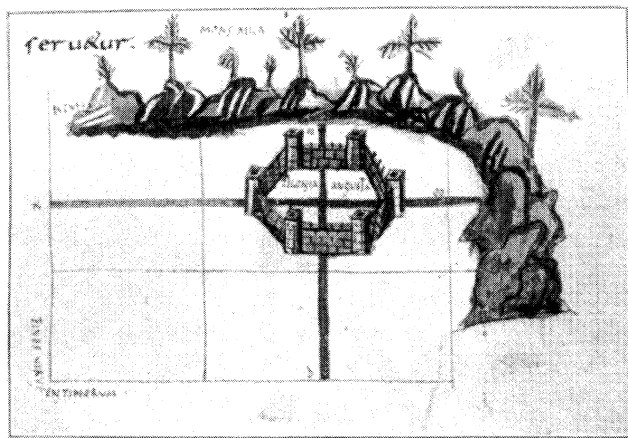
<sup>50</sup> *ibid.*, 175-83; R. Chevallier, 'La centuriation romaine dell' Istria e della Dalmazia', *Att. Mem. Soc. Istr.* 9 (1961), 11-23; Keppie, *CVSI*, 203-4. There is a brief summary of possible identifications of internal divisions of *centuriae* in Bussi, *op. cit.* (n. 4), 88-93.



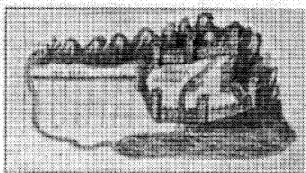
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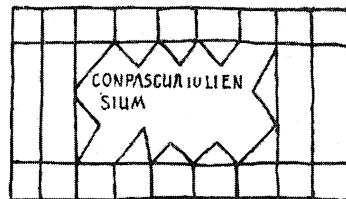
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ILLUSTRATIONS TAKEN FROM THE MANUSCRIPTS OF THE *Corpus Agrimensorum Romanorum*. See notes on plate (p. 99).

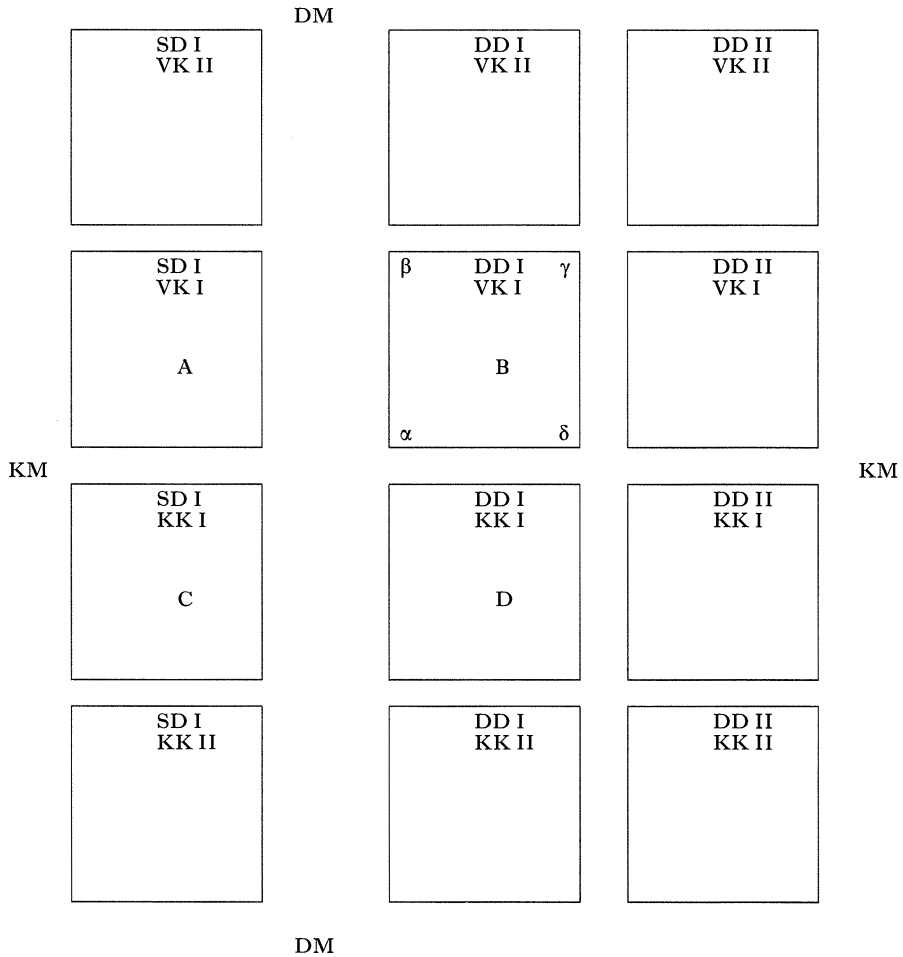


FIG. 1  
KEY:

- ABCD = 4 central *centuriae*
- αβδ = corners nearest to the central point of the survey
- γ = *angulus clusaris*
- Examples of designations on stones:
- α = DM KM
- β = DM KII
- δ = KM DII
- γ = DDI VKI

as the closing corner (*angulus clusaris*), and its stone was inscribed with the co-ordinates of the *centuria*, carved from top to bottom, e.g., DD I VK I (to the right of *decumanus* I, beyond *kardo* I). This procedure was then extended to the entire layout so that no matter how extensive the settlement, each *centuria* had an unambiguous designation (Fig. 1).<sup>51</sup>

The equitable distribution of land to individual settlers involved the use of lot, which is presented by Hyginus 1 and 2 as normal practice and must have been laid down by the founders, perhaps in accordance with the original enactment setting up the colony. Land was often apportioned by dividing settlers into groups (Hyginus 1 mentions tens, Hyginus 2 threes). According to the method described by Hyginus 1 this involved three separate drawings of lots — of the land, of the groups of settlers, and within groups to establish an order of precedence. Hyginus 2 describes a similar system,

<sup>51</sup> T 136-9; 157-9.

though involving only two drawings of lots.<sup>52</sup> Surveyors were the independent arbitrators of a lottery designed to guarantee equality and fair play for all settlers, who are said to be of equal status and in most cases were probably veteran soldiers.<sup>53</sup> Moreover, the procedure involved sophisticated methods, careful planning, and assumed a degree of literacy and awareness on the part of the settlers. When the sortition was complete the surveyor led the settlers to their allocations and ensured that everything was in order.<sup>54</sup>

### Registering land

The writers in the *Corpus* repeatedly advise that a surveyor should consult existing documentary evidence, among which they cite: laws, records and registers, maps (both official and private), edicts, letters and other imperial decisions, definitions of territorial area and jurisdiction, lists of *subseciva*, and the book of *beneficia*, as well as private legal documents.<sup>55</sup> In the surveyor's work maps were crucial, and if faced with a problem or dispute his first action was to consult the map of the area and compare it with the existing situation. It was, therefore, a surveyor's duty to prepare a map of any new land division and settlement for which he was responsible.

Maps and some other records were generally carved in bronze, although wood and parchment were also used.<sup>56</sup> Bronze was clearly regarded as the most prestigious and trustworthy medium, and indeed Siculus Flaccus warned surveyors that they must not accept a proposition as valid just because there was a bronze record; if there was a dispute they must check the details with the copy in the imperial record office (T 118.24–119.6).<sup>57</sup> Hyginus 2 confirms the importance of bronze as a permanent, reliable record (T 160.19–21). Moreover, in the texts the word *aes* is frequently used without further explanation to refer to maps and other records, and there is also the technical term *aes miscellum*, referring to a situation where new owners had taken over properties without appropriate alteration of the records (T 126.26–127.5).<sup>58</sup> It is plausible to suppose that bronze maps and records were normally retained in the colony, while copies on parchment or papyrus were transported to the imperial record office in Rome.

Maps were intended to contain a representation of the variegated pattern of Italian rural communities, including *centuriae*, probably identified by their designation and with their boundaries demarcated, neighbouring territories, woods and public pasture,

<sup>52</sup> T 73.6–24; 163.2–164.5. Lots could of course be drawn individually; the total number of settlers and the size of allocations were established, and therefore the number who could be accommodated in a *centuria*. The names were inscribed individually on lots and drawn out in turn; the man whose name was drawn out first then made the first draw of the lots containing the location of the plots of land (T 162.12–163.2). For a detailed discussion of texts relating to sortition, see B. Campbell, 'Sharing out land: two passages in the *Corpus Agrimensorum Romanorum*', *CQ* 45.2 (1995), 540–6.

<sup>53</sup> cf. T 73.24; 141.7–8; 144.13–16. Siculus Flaccus mentions equal distributions to soldiers (T 119.9), although there were often exceptions (120.12–23).

<sup>54</sup> Hyginus 2 (T 167.12).

<sup>55</sup> See e.g. Agennius Urbicus (T 35.9; 35.19; 36.18; 37.22; 39.11; 44.1); Hyginus 1 (T 71.1; 74.9; 81.7; 81.11; 82.28; 88.20–1; 89.6–7; 97.5–8; 97.12; 98.4); Siculus Flaccus (T 102.9; 102.13–14; 118.17; 119.28; 125.5–6; 126.8; 126.20; 127.18; 128.14–15; 128.31; 129.9; 130.11); Hyginus 2 (T 161.10–12; 163.18–164.5; 165.4–6; 165.10–166.2; 167.13–15). For detailed discussion of the keeping of archives for land division schemes, see Moatti, *op. cit.* (n. 4). The records of land distribution which accompanied the

map (*forma*) have a variety of Latin terms: *scriptura*, *instrumentum*, *libri*, *tabulae*, *commentarii*; see my forthcoming translation and commentary (above n. 22).

<sup>56</sup> Maps — see e.g. T 118.16–19; 84.12; other records on bronze — T 94.20–95.1; 102.9–10; 163.19–164.5; 165.10–16.

<sup>57</sup> cf. T 102.9–10 — 'There is no bronze record, no map of these lands (*occupatorii*) which could provide any officially recognized proof for landholders . . .'. Maps made privately in these lands had validity only if agreed by both parties. Note that the tenants on the imperial estates at Souk-el-Khmis emphasize in their petition to Commodus that there should be no dispute since the agreement concerning their obligations 'has been preserved in its permanent form up to this very day by being inscribed on bronze and circulated on all sides by all our neighbours . . .' (*FIRA*<sup>2</sup> 1, 497; translation from *Ancient Roman Statutes*, no. 265).

<sup>58</sup> Note also the words *commalleo* and *commalliolo*, used to refer to the attaching of an additional piece of land to a property (T 41.13; 167.4–5), but which perhaps also suggest the hammering out of a bronze sheet for welding on to a bronze map (cf. *OLD*, s.v. *malleatus* — 'beaten' or 'hammered').



land and other areas owned by the community, land belonging to the Roman people, land owned by religious bodies such as the Vestal Virgins, land excluded from the allocation, land with special circumstances attaching, such as land returned to the previous owner, rivers (sometimes with a note of their width); there is some indication that other natural features like mountains were normally included, and presumably major roads were marked.<sup>59</sup> In Trajan's time one surveyor in Pannonia inscribed the area of each veteran's allocation on the map (T 84.8–26) though this may have been merely an experiment in a small settlement. A fragmentary bronze inscription discovered in Spain, which seems to be part of a surveyor's map of a land-division system, portrays the *centuriae* with their size designated, the course of the river Ana (Guadiana), and the territory of the adjacent Lacimurgenses.<sup>60</sup>

Hyginus 2 gives a list of approved map notations (T 165.10–14), and words were often written in full, with letters spaced out to fill the designated area (T 159.20–160.3). Abbreviations were sometimes used,<sup>61</sup> but the amount of detail for inclusion was such that maps would have required a very large scale; at Arausio with a largish scale of around 1:6,000, the largest of the inscriptions measured about 5 m 90 high and 7 m 56 wide.<sup>62</sup> Such maps would have been difficult to consult but were doubtless intended more for general public display in the forum of the colony's urban settlement. We may also surmise that much of the relevant information was recorded not on the map but in the registers that were lodged with the map in the imperial record office (e.g. T 119.1–4). These too were often carved in bronze and surveyors assume that they were to be compiled along with the map, and accord them almost equal importance. We may note, for example, the recording in a register of the result of sortition; some surveyors had given the name *tabulae* to groups of three in the sortition because they were entered in ledgers, and from the fresh wax they called it the first 'entry'. This was presumably a temporary record. Hyginus 2 then cites a typical entry in the bronze records:

Entry 1 (*tabula prima*): to the right of *decumanus* 35, beyond *kardo* 47  
 Lucius Terentius son of Lucius, of the tribe Pol(lia), 66<sup>2/3</sup> *iugera*;  
 Gaius Numisius son of Gaius, of the tribe Ste(latina), 66<sup>2/3</sup> *iugera*;  
 Publius Tarquinius son of Gnaeus, of the tribe Ter(entina), 66<sup>2/3</sup> *iugera*.  
 (T 163.11–164.5)<sup>63</sup>

Maps record the surveyors' management of space as an area of land defined by the *limites* they drew. But their writings show that they regarded these *limites* in a practical, not an abstract way; they were roads and rights-of-way for travel and the movement of produce, they assisted the survey, they gave the land a pleasant appearance, and above all they secured the demonstrably equitable distribution of land for settlers and the proper management of public areas. In short *limites* were a means to an end, and

<sup>59</sup> T 165.14–16 (*centuriae*, neighbouring territories); T 80.1–2; 121.16; 128.6–7; 164.11–12 (pasture and woods); T 80.7; 127.14 (land of Vestals and other priests); T 79.17–19; 119.16–27; 120.10–12; 121.14–15 (land restored to individuals, exchanged; *excepta*); T 84.17–20 (*subseciva*); 122.1–8 (rivers); T 161.21–4 (mountains); T 165.10–16 (summary of typical map contents).

<sup>60</sup> P. Sáez Fernández, 'Estudio sobre un inscripción catastral colindante con Lacimurga', *Habis* 21 (1990), 205–27. In this case details of ownership and public land and smaller items of topography were presumably recorded elsewhere.

The famous inscriptions from Arausio (Orange) are records of the local community of a survey carried out for taxation purposes, and not a surveyor's topographical map, though doubtless they owed much to current surveying practice; they depict the *decumanus maximus* and *kardo maximus*, *centuriae* with their designations, topographical features including rivers and roads, and contain notations describing the status and area of land, occupancy, and rental (see A. Piganiol, *Les documents cadastraux de la colonie romaine d'Orange*, Gallia suppl. xvi (1962)).

The Lex Agraria (l. 78) refers to public maps of land in Africa (M. H. Crawford (ed.), *Roman Statutes* (1995), No. 2, p. 121).

<sup>61</sup> Hyginus 2 (T 166.10).

<sup>62</sup> cf. Moatti, op. cit. (n. 4), 45–6, who cites Clavel-Lévêque's suggestion (in a work not available to this author) that the fragment of the Spanish *forma* (n. 60) had a scale of 1:46,750. However I think that there is insufficient evidence to justify the wider contention that Roman land surveyors generally employed a consistent scale of about 1:48,000 for their maps (cf. M. Clavel-Lévêque, 'Centuriation, géométrie et harmonie, le cas du Biterrois', in J. Y. Guillaumin (ed.), *Mathématiques dans l'Antiquité* (1992), 161–76).

<sup>63</sup> The *tabula* was a wax-covered wooden tablet which often served as a public record; cf. the Lex Agraria (*FIRA*<sup>2</sup> 1, 104, 7 = Crawford, op. cit. (n. 60), No. 2, p. 113, 7), in respect of public land '... IIIvir dedit adsignavit reliquit inve formas tabulasve retulit referive iusit'. Keppie (*CVSI*, 94) argued that Hyginus 2 was using genuine records here, perhaps relating to the foundation of Augusta Emerita in 25 B.C. In my translation of Hyginus 2 I have corrected Thulin's misprint of XLVI for LXVI at 164.3.

although surveyors regarded them as crucial to their art, they were principally concerned with the people in the spaces between the lines.<sup>64</sup>

The maps and registers of a new colony, as proof of the equitable distribution achieved by surveyors, were to be signed by the founder and lodged in the settlement itself, while copies were to be sent to the imperial record office (*tabularium* or *sanctuarium*) in Rome. Hyginus 2 illustrates the procedure precisely:

We shall place in the emperor's record office (*tabularium*) the mapping registers and a map of the entire land settlement sketched out according to its established boundaries, with a note of the immediate neighbours. And if any (lands) have been granted or allocated to a colony as an act of munificence (*beneficium*), either close by or in the midst of other communities, we shall record them in the book dealing with *beneficia*. As regards anything else that is relevant to the documentation used by surveyors, not only the colony but also the imperial record office ought to hold a copy personally signed by the founder. (T 165.14–166.2)

Hyginus 2 was in no doubt that the emperor was personally involved in the whole process of colonial foundation and would use the information provided by surveyors in making further decisions:

We should make a ledger recording all the *subseciva* so that whenever an emperor wishes he can find out how many men can be settled in that area. Or if they have been granted to a colony, we shall write on the bronze map: 'granted to the colony'. (T 165.4–7)<sup>65</sup>

The extent and detail of these bronze records and the meticulous care taken in their preparation and storage remind us that land allocation was both a centralized procedure, firmly under the control of the government in Rome, and also an important matter of public concern in local communities, just like the municipal laws which were also carved on beautiful and expensive tablets of bronze for permanent public display.

### III

What patterns of landholding emerged from the surveyors' work and what was the shape of the land after settlement? We can approach this by examining (i) the nature of individual holdings; (ii) rivers and the natural environment within settlements; (iii) the consequences of expropriation in the appearance of the land; (iv) surplus and returned land; (v) fresh settlement and subsequent ownership changes.

(i) Surveyors tried to ensure that allocation by lot provided a quantity of arable land for each settler. A decision of Augustus, confirming that land should be granted 'as far as the scythe and plough shall go', presupposes arable cultivation, and in the writings of the *Agrimensores* this is assumed to be the norm.<sup>66</sup> Indeed Hyginus 2 interpreted the wording to mean that colonists should receive a reasonable amount of farming land, which also included some woodland and perhaps pasture (T 166.10–167.1). Possibly up to twenty *iugera* would be needed to support a settler's family and farm animals used in transport and ploughing. Small farmers would be assisted by the availability of common grazing, and surveying writers regarded pasture or *pascuum* (rough grazing), as opposed to *pratium* (green grazing or cut forage), as an essential adjunct to farming land; *pascuum*

<sup>64</sup> Purcell, *op. cit.* (n. 5), 180–1 (see also n. 28) rightly emphasizes the importance of lines in the Roman definition of space, including centuriated land. But in my view surveyors were not significantly interested in symbolic or psychological aspects of this kind in their work.

<sup>65</sup> The emperor himself did not necessarily sign the map and registers left in the new settlement; that

could be left to his agent. It is possible however that he signed the copy stored in Rome.

<sup>66</sup> T 166.11–13. It is worth noting the provision of the *Lex Mamilia* that an area within five or six feet of a boundary could not be appropriated as it was to serve as a pathway to fields or as a space in which to turn a plough. For the origins of this law, see M. Crawford, *Athenaeum* 67 (1989), 179–90.

was assigned to individuals or in common to groups of landholders or to entire communities (Pl. IE).<sup>67</sup>

Trees figure prominently in the writings of surveyors, often in respect of the demarcation of boundaries, where the marking and planting or uprooting of trees must have had an important role in the afforestation or deforestation of the Italian countryside.<sup>68</sup> But we also hear of woods or groves consisting of olives, vines, chestnut, acorns, trees for firewood, and other trees sold for profit. All this points to the variable balance of pasture, wood, and arable land, which, as Spurr has contended, is central to the understanding of Italian agriculture and rural settlement.<sup>69</sup> The combination of landholding in one province is neatly illustrated by the definition according to fertility of lands subject to rent or tax in Pannonia: first-class land; second-class land; a meadow; an acorn-bearing wood; a shared wood; pasture land.<sup>70</sup> Depending on the layout of the site, areas designated as common pasture and woodland could be at some distance from a settler's main holding, or located between several farms; in this case they were susceptible to gradual appropriation by neighbouring landholders (T 76.19–22; 116.13–18; 164.14–19). *Subsecivum* (land originally unsuitable or not required for allocation) was often granted by the founder to the community or to individuals, and could also be used for grazing. It was located not only on the periphery of allocated land but also occasionally within *centuriae* (e.g. T 120.1–9). As *subseciva* were brought into use or expropriated by private individuals, so they affected the appearance and development of settlements. Indeed so great was the disturbance in Italy when Vespasian proposed to reclaim *subseciva* for their rightful owners, that he was persuaded to intermit his ruling by many deputations of aggrieved occupiers of the land (T 41.13–26).

(ii) Rivers were a common and often destructive part of the Italian landscape. This appears vividly in descriptions of the depredations caused in northern Italy by the river Po swollen by melting snows in the Alps.<sup>71</sup> Colonial settlements were intended to be self-sufficient, and rivers were essential to rural life; they provided a ready water-supply for drinking and domestic needs; they contributed to irrigation; alluvial deposit was an important element in the enrichment of the soil, a process recognized by land-surveyors.<sup>72</sup> Settlers in some communities had been allocated land abutting the river bank, either because the founder had been compelled to do this through shortage of land or because landholders often welcomed the opportunity to be close to a source of water or accepted whatever land sortition brought them. But problems arose over the ownership of alluvial land and the threat of flooding in season, with consequent destruction of property and the diminution of useable land. So, settlers wanted part of a river but also needed protection from it.

The situation was exacerbated in cases where no formal width had been assigned to a river in surveyors' records. Eventually colonial founders, probably under advice from surveyors, assigned a definite width to a river to be noted on the map of the settlement. Many indeed took the further step of assigning an additional area beyond the banks throughout all the *centuriae* in which the river flowed. This was supposed to allow for flooding, that is, the width eventually assigned to a river was the fullest it had been known to attain. Adjacent landholders might be permitted to use the area of land assigned to the river, when the river was again flowing within its usual course, even though it did not belong to them. This concession was held to be a form of compensation

<sup>67</sup> For the status of *compascua* see Crawford, *op. cit.* (n. 60), p. 161; importance of common grazing land for small farmers — K. D. White, *Roman Farming* (1970), 336; 345–6; P. A. Brunt, *IM*, 194; *JRS* 62 (1972), 158 (review of White); P. Halstead, *JHS* 107 (1987), 84; M. S. Spurr, *Arable Cultivation in Roman Italy c. 200 B.C.–A.D. 100* (1986), 120–26, emphasizing, however, that *prata* were essential for oxen and equines.

<sup>68</sup> R. Meiggs does not mention the *Gromatici* in the index of passages cited in *Trees and Timber in the Ancient Mediterranean World* (1982).

<sup>69</sup> *op. cit.* (n. 67), 122–3. It was possible that forest

areas could be brought under cultivation by cutting down and burning numbers of small trees and undergrowth; the ash then acted as a fertilizer (*ibid.*, 121).

<sup>70</sup> Hyginus 2 (T 168.13–169.2). Surveyors had to be on their guard against false definitions and declarations, which led to disputes. This way of defining land seems to have operated also in Phrygia and the rest of the province of Asia, where we are told the same kinds of dispute occurred (T 169.2–4).

<sup>71</sup> T 42.18–43.8 (Urbicus, probably following Frontinus); Hyginus 1 (T 87.12–15).

<sup>72</sup> See Spurr, *op. cit.* (n. 67), 8, n. 22.

since heavy storms sometimes forced the river beyond its prescribed width, causing damage in neighbouring fields.<sup>73</sup>

In this way surveyors sought to control and circumscribe the rural landscape for the benefit of colonists. There is a striking example of the problems caused by a river and the gradual emergence of a solution, in the case of Augusta Emerita (Mérida).<sup>74</sup> The river Ana (Guadiana) flowed through the centre of the colony's extensive territory, and in the original foundation all useable land was included right up to the river (i.e. no width was assigned to the Ana). However, since the lands were so extensive, in the first instance no settlers were located close to the river. In time many people occupied unallocated land (*subseciva*) around the river. When Vespasian reclaimed all *subseciva*, those who had appropriated land of this type had to buy it back. But landholders resented the need to buy the river, which was public property, or unfertile land deposited by it in flood. So they approached the provincial governor, obtaining from him an undertaking to designate a specific width for the Ana, so that they would not have to pay for this area.

A different problem occurred in the colony of Pisaurum (Pesaro) in Umbria, founded in 184 B.C., which received some of Antony's veterans, perhaps in 41 B.C. The community had the idea of selling off the land designated between the river and the neighbouring landholders. Subsequently, serious legal problems arose from the sale; since the land was subject to regular flooding the buyers sued for the entire area of land they had bought according to the map, because some of it had been washed away.<sup>75</sup>

The natural landscape of settlements was closely observed by surveyors, who had to demarcate territorial boundaries. These were of great importance to communities, since the extent of their land, the number of their inhabitants, and the range of their natural resources affected their revenues and obligations. Territorial descriptions cited natural landmarks — hills, slopes, ridges, mountain tops, rivers, watersheds, natural stones — which were sometimes enhanced or supplemented by man-made markers — marked boundary stones, *limites*, roads, ditches, monuments (Siculus Flaccus — T 128.8–13). Such descriptions must have been comprehensible locally, and perhaps help us to understand how the inhabitants conceptualized their environment. Hyginus 1 quotes an example from a public document, which gives a kind of topographical running commentary which originally will have contained the local place-names:

'From the small hill called such and such, to such and such a river, and along that river to such and such a stream or such and such a road, and along that road to the lower slopes of such and such a mountain, a place which has the name such and such, and from there along the ridge of that mountain to the summit, and along the summit of the mountain past the watersheds to the place called such and such, and from there down to such and such a place, and from there to the cross roads of such and such a place, and from there past the tomb of such and such' to the place from which the description began. (T 74.10–19)

(iii) Siculus Flaccus' description of land utilization tells us something of the appearance of smallholdings and larger estates. Naturally confiscations and changes in the pattern of ownership left their mark:

. . . When people had been expelled and what had been the estates of the rich were divided up, what had been the land of one man was now partitioned and allocated to several people. So, when several men received land, whatever appearance that land had will remain the same, but spread over the property of several men . . . Sometimes the opposite happens, so that land previously allocated to several people comes into the hands of a single owner, even though the old boundaries can still be seen. (T 125.18–126.10)

Hyginus 1 (T 93.16–94.2) is probably referring to this when he points out how the owners of several contiguous farms normally assign two or three fields to one farmhouse and leave the boundary markers which used to demarcate the individual fields. Later,

<sup>73</sup> See Urbicus (T 42–44); Hyginus 1 (T 87–88); Siculus Flaccus (T 121.26–122.17). The question of ownership of alluvial land was a matter for lawyers, though surveyors could be called in as expert technical witnesses by adjudicating officials.

<sup>74</sup> See above, p. 83.

<sup>75</sup> Hyginus 1 (T 88.13–18); Siculus Flaccus (T 122.2–17).

when the other farmhouses had been abandoned (except the one to which the fields were now assigned) neighbouring landholders cleverly removed their own boundary markers and tried to represent as theirs markers which had originally demarcated individual fields on the neighbouring farm, thereby extending their property. It is entirely possible that some of the great estates (*latifundia*) that had emerged in Italy by the early first century A.D. consisted of many smaller, almost self-contained units, which may indeed have encouraged diversification in farming method within estates.<sup>76</sup>

(iv) Patterns of landholding were also influenced by the distribution of land that was surplus to the requirements of the original colonists. The disposal of such land was entirely at the discretion of the founder; he could reserve it for himself, give it to chosen friends, or bestow it on the colony for common pasture or woodland for profit; but he could also restore the land or some of it to its previous owners:

But not all conquered peoples were deprived of their lands. For in some cases their status, or influence, or friendship persuaded the victorious commander to grant their own lands to them.<sup>77</sup>

This practice was apparently common since it is frequently mentioned by the *Agrimensores*, who treat the idea as a normal aspect of land distribution. Furthermore, there was a special map notation for restored land: '... there are landholdings which have been given back to certain named individuals, who have it written down on the map how much has been returned to each of them'.<sup>78</sup> And in a list of mapping definitions we find: 'given and allocated, granted, excepted, returned, exchanged for his own property, returned to the original owner (*redditum veteri possessori*)'.<sup>79</sup> Indeed the last expression was so common in the bronze records that an abbreviation of another version appeared — CVP (*concessum veteri possessori*). Siculus Flaccus (n. 77) may initially have had in mind provincial lands; but it is inconceivable that the practice was not extended to Italy as well, and part of a triumviral edict preserved in the *Liber Coloniarum* refers to the restoration to individuals of estates with their ancient boundaries (L 246.11–15).

Even in the more peaceful times of the early Principate landholders had their property sequestered for new settlements and were recompensed on the basis of their own statement of the value of their holdings, which was presumably checked by surveyors acting on behalf of the founder. However, the original landholders might receive land equivalent in value to their previous holdings, but in a different location. This practice was also commonly mentioned by the *Agrimensores* and included in the list of map notations: 'restored and exchanged for his own'.<sup>80</sup> Doubtless such an exchange sometimes benefited the original landholders in that while exchanging their old land for new they could consolidate scattered holdings in one location. But the main purpose of exchanges will have been to ensure that veteran settlers had contiguous property for mutual security in an alien and perhaps hostile environment. Despite land exchanges it sometimes happened that individuals, having had their farms returned, owned enclaves of land within the territory of a colony surrounded by new settlers. In this case, the original landholders did not belong to the new colony's jurisdiction but to that of their own community.<sup>81</sup>

(v) Land utilization was further affected by fresh settlements and by changes of ownership within communities. In the case noted above,<sup>82</sup> Hyginus 1 discovered that veterans settled in Samnium by Vespasian had bought or sold parts of their allocation, but without defining formally the changes of ownership, with the result that the original bronze map gave a misleading impression. This may indeed suggest a close-knit, self-dependent veteran community. Siculus Flaccus describes a different case. Men settled as colonists by Caesar later resumed their military service for Octavian, and after the wars returned to reclaim their lands. However the land of those who had been killed was distributed to different men. So, in the records of the *centuriae* there appeared the names

<sup>76</sup> For the organization of estates, see K. D. White, 'Latifundia', *Bulletin of the Institute of Classical Studies* 14 (1967), 62–79; *Roman Farming*, op. cit. (n. 67), ch. 12.

<sup>77</sup> Siculus Flaccus (T 119.10–13).

<sup>78</sup> Hyginus 1 (T 79.17–21).

<sup>79</sup> Hyginus 2 (T 165.10–12).

<sup>80</sup> *ibid.*

<sup>81</sup> Hyginus 1 (T 82.20–3). See further below, p. 97.

<sup>82</sup> p. 77.

of the original settlers, which had not been erased, and of those who replaced them. Because of this reduplication, Flaccus discovered that the total area of the plots of land recorded in each *centuria* exceeded the amount of land in the *centuria*.<sup>83</sup>

The writings of surveyors tend to confirm a relatively large degree of continuity in land utilization in colonial settlements in the late Republic and early imperial period, even though these communities had in part been artificially created, and the land had been transfigured by changes in ownership. It is unlikely that many of those dispossessed with or without compensation worked the land of the new owners, who, being in the main veteran soldiers, were not wealthy enough to employ tenants or labourers. Moreover, many had recovered their own land or remained in the neighbourhood on land of equivalent value, and in some cases entire estates were returned intact; the experience and probably conservative influence of local farmers in agricultural methods and the planting of crops will still have been important; there was not necessarily a violent interruption of local economic life or the creation of large numbers of rural unemployed. Indeed the infusion of new settlers and more capital will have assisted the development or resuscitation of many communities, as we are told was the intention of Augustus and others.<sup>84</sup> The writings of the *Agrimensores* suggest that land was bought and sold with confidence, that there were many small transactions, and that such was the desire for land that surveyors had to be vigilant to prevent encroachment on public land, not so much by the owners of estates or the agents of the emperor, as by small landholders whose enthusiasm and enterprise are strikingly illustrated.

## IV

The personal role of the founder of a new settlement is vividly highlighted by his signature guaranteeing the fairness of the land allocations and the accuracy of the mapping and registration. Publius Sulla, founder of a settlement of the dictator Sulla's veterans at Pompeii, as patron remained so popular with the colonists and the original inhabitants that he was 'thought not to have dispossessed one group but to have established both'.<sup>85</sup> The pre-eminent position of the founder is also apparent in the law granted to Caesar's colony at Urso shortly after his death; a clause required a secret ballot and a quorum of members before the local senate could elect as patron anyone other than the 'man who according to the Lex Iulia had the right of granting and allocating land to the colonists, and the man who founded the colony, and their children and descendants . . .'.<sup>86</sup>

The foundation of a new community was symbolized by the official ploughing of a sacred furrow round the settlement, and Vergil was certainly thinking of this and the personal role of the founder when he described the foundation of a city for the Trojans who were to stay behind in Sicily — 'Meanwhile Aeneas marked out the city with the plough and allocated the houses (by lot)'.<sup>87</sup> Although military dynasts and subsequently emperors were personally responsible for settling their soldiers, they could delegate routine tasks to others. So, the boundary stones (*cippi*) set up to mark a fresh settlement by Octavian at Capua in 36 B.C. do not imply that he supervised in person — 'on the orders of Imperator Caesar where the plough was drawn'.<sup>88</sup> Similarly in A.D. 71 Publius

<sup>83</sup> T 126.26–127.5. This also illustrates Flaccus' meticulous methods of investigation.

<sup>84</sup> For discussion of communities where divisions between the original inhabitants and the new settlers may have persisted, see Brunt, *IM*, 306–7; Keppie, *CVSI*, 101–4; G. D. B. Jones, 'Civil war and society in southern Etruria', in M. R. D. Foot (ed.), *War and Society: Historical Essays in Honour and Memory of J. R. Western 1928–1971* (1973), 281–7; also n. 85 below.

<sup>85</sup> Cicero, *Pro Sulla* 61–2. It seems unlikely that Cicero will have distorted the nature of the relation-

ship between his client and the community at Pompeii since his statement could so easily be checked.

<sup>86</sup> *FIRA*<sup>2</sup> I, 188.97.

<sup>87</sup> *Aen.* v.755–56; vii.157–59; cf. I.422–26; III.137; cf. Bussi, op. cit. (n. 4), 140–2.

<sup>88</sup> *ILS* 6308 — 'qua aratrum ductum est', presumably celebrating the ploughing of a new sacred furrow. Note bronze coins (reign of Augustus) from Augusta Emerita showing a priest ploughing (A. Burnett, M. Amandry and P. P. Ripollès, *Roman Provincial Coinage* Vol. I, Part I (1992), nos 5–7; 13).

Babullius Sallu[uius Ru]fus, military tribune of Legion XXII Deiotariana, procurator of the emperor, was sent 'to divide the land for the veterans who were led under his charge (?) to the colony Flavia Prima at Paestum'.<sup>89</sup> The name of the colony, which should probably be interpreted to mean 'first in loyalty to the Flavian dynasty', emphasizes the personal association of emperor and colonists.<sup>90</sup>

Signs of Augustus' personal intervention in the process of settlement are seen in his generous provision of buildings for new colonies and his designation as 'patron' on three known occasions.<sup>91</sup> His continuing personal concern for the welfare of his veterans settled on the land is apparent from his letter addressed to the soldiers of Legion IV Macedonica who had been settled at Firmum, probably after the Battle of Philippi. A copy of the letter was held in the imperial archives and was later cited by Domitian, who noted how Augustus advised 'his own men of the fourth legion', to whom he was most attentive and benevolent, to combine and sell off surplus unused land.<sup>92</sup>

Although the practice of land division and allocation was well-established, Augustus was a major formative influence. Through personal intervention and his willingness to address serious issues, he protected the interests of his veterans and established a framework for ensuring fair play in rural communities, equitable assessments, secure boundaries, and the protection of property rights. This was crucial in his efforts to achieve peace, reconciliation, and stability. But he seems to have gone further and to have paid great attention to the mechanism of land survey, which was, of course, also central to the conduct of the census.<sup>93</sup> Of course, as Vitruvius had discovered, the emperor had wide-ranging interests, which were not merely confined to political life.<sup>94</sup>

How do we estimate Augustus' contribution? Firstly, we may note the amount of literary activity in his reign dealing with aspects of land settlement. Augustus himself produced at least one speech, several edicts, and an account of the eleven regions of Italy including an enumeration of the colonies,<sup>95</sup> while Gaius Julius Hyginus, the emperor's freedman and librarian of the Palatine library, wrote a treatise on the origins and topography of Italian towns.<sup>96</sup> The title of the *Liber Coloniarius* in the Arcerianus manuscript is: 'Book of Augustus Caesar and Nero'; the latter should probably be identified with Tiberius Claudius Nero before his adoption by Augustus in A.D. 4. It seems that Augustus had ordered the compilation of a commentary recording details of land allocations and settlements up to his own time. The *Liber Coloniarius* also refers to books published under Augustus about the measurement of *limites* and boundaries, and also to one Balbus, a surveyor who 'in the time of Augustus wrote up in notebooks the established maps and measurements of communities in all the provinces and who differentiated and published land law in all its variations throughout the provinces' (L 239.14-19). It is often assumed, with no good reason, that this is a mistaken reference to the Balbus who conducted military surveys and wrote at the end of the first century A.D. (L 91-108).<sup>97</sup> Augustus' role was certainly important in encouraging accurate definitions, mapping, and the keeping of detailed records of land settlements, and

<sup>89</sup> *AE* 1975.251; for discussion, see Keppie, *op. cit.* (n. 26), 98-104; cf. M. Mello and G. Voza, *Le iscrizioni latine di Paestum* (1968), no. 86. It seems that Babullius was sent to Paestum either as procurator of the emperor, or with this title.

<sup>90</sup> We find the same procedure for colonial settlement in the despatch by Trajan of veterans to Cyrene, probably after the Jewish revolt in A.D. 115, under Lucius Gavius Fronto 'entrusted by the divine Trajan with three thousand legionary veterans to found a colony at Cyrene . . .' (E. M. Smallwood, *Documents Illustrating the Principates of Nerva, Trajan and Hadrian* (1966), no. 313).

The personal responsibility of the emperor in finding land for his veterans was recognized by some veterans settled in Deultum in Thrace by Vespasian — 'Since we served in Legion VIII Augusta and after completion of our [twenty-five years] of service [have been settled] by the most revered emperor in the

colony of Deultum . . .' (McCrum and Woodhead, *op. cit.* (n. 33), no. 486).

<sup>91</sup> See Keppie, *CVSI*, 112-22.

<sup>92</sup> *FIRA*<sup>2</sup> 1, 423.

<sup>93</sup> *RG* 8; Isidorus, *Etym.* v.36.4.

<sup>94</sup> *De Arch.* 1. preface 2 — 'I noted that you were concerned not only with the common life of all mankind and the organization of the state, but also with the provision of public buildings'. See also n. 98.

<sup>95</sup> Frontinus (T 7.9-10); Hyginus 1 (T 82.28-83.3); Pliny, *NH* III.46.

<sup>96</sup> Suet., *De Gram.* 20; Servius, *Ad Aen.* III.553; cf. M. Schanz and C. Hosius, *Geschichte der römischen Literatur*<sup>4</sup> II, 368-79.

<sup>97</sup> cf. Boethius, *Demonstratio Artis Geometricae* (L 402.6-10). For Balbus, see R. Thomsen, *The Italic Regions from Augustus to the Lombard Invasion* (1947), 273-77; but cf. Nicolet, *op. cit.* (n. 5), 171.

possibly in stimulating interest in the topography of Italy and further afield. But surveyors' maps normally covered a small area for a limited professional purpose; each map will have been studied separately since settlers and communities had the usual parochial interest in their own area, and there was no discernible intention to create a unified map of large regions or of Italy itself. Surveyors' maps were not a part of world mapping. Augustus' interest in survey and the compilation of maps and lists was primarily for the benefit of his veterans and to assist efficient land settlement and tax assessment. His repair of the roads of Italy ensured not only that Rome was the centre of attention, but conversely that all regions and communities were accessible.<sup>98</sup>

Secondly, Augustus receives a significant degree of attention in the *Corpus Agrimensorum Romanorum*. The major authors refer to Augustus on eleven occasions, emphasizing not only the extent of his activity in new foundations, but also the significance of his pronouncements and interventions for the theory and practice of land survey and the management of the rural environment.<sup>99</sup>

Thirdly, there is specific evidence for the emperor's interest in the practical implementation of his policies. These may be divided into the following categories: (i) the type of land granted; (ii) the designation of allocations and the keeping of records; (iii) the allocation of surplus land; (iv) jurisdiction and the protection of property rights.

(i) Hyginus 1 and 2 show that Augustus' legal definition was accepted as the norm for land distribution to settlers unless the founder made some specific change — '... the survey of the land must be conducted in accordance with the legislation of Augustus, "as far as the scythe and the plough shall go"'.<sup>100</sup> This phraseology may have been taken from an earlier enactment, but it illustrates Augustus' intention to distribute arable land to form a self-sufficient plot.<sup>101</sup> However not all distributions were satisfactory, and the mutineers of A.D. 14 complained of settlement in distant regions in what passed for land allocations on marshy quagmires or rough mountain terrain.<sup>102</sup> Doubtless Augustus had to weigh the benefit of the soldiers against the expense of land purchase. There is a sign of the activities of Augustus' family in land measurement and settlement in the fact that among the Tungri in Germany there was a unit of measurement known as the 'Drusian foot', which was the equivalent of  $1\frac{1}{8}$  Roman feet (T 86.10–11). This must be named after Nero Claudius Drusus, Tiberius' brother, who from 12 to 9 B.C. was conducting military campaigns between the Rhine and the Elbe.

(ii) Augustus' concern for his veterans may also be seen in his precise instructions concerning the establishment of stones throughout the *centuriae* marked with the number of the *limites*. This had been done before, but the practice was so closely associated with him in the early Empire that boundary stones were known as 'Augustan', because 'Augustus worked out their measurements and where there had been stones before he set up different ones, and in his day ordered that all the land should be measured and allocated to veterans'.<sup>103</sup> Similar stones also designated boundaries between communities, and an example dated A.D. 5/6 was discovered near Salamanca:

Emperor Caesar Augustus, chief pontifex, in the twenty-eighth year of his tribunician power, consul thirteen times, father of the fatherland: Augustan boundary stone, between Bletisa and Mirobriga and Salmantica.<sup>104</sup>

<sup>98</sup> Nicolet's belief (op. cit. (n. 5), 181–99) in an Augustan grand design to develop geographical enquiry and enhance administrative structures, certainly finds little support in the evidence of land surveying texts.

<sup>99</sup> Frontinus (T 7.9–10); Hyginus 1 (T 73.3–4; 82.28–83.3); Siculus Flaccus (T 126.27); Hyginus 2 (T 135.18; 136.17–19; 142.2–12; 157.9–10; 160.10–16; 164.6–7; 166.11–13); Augustus is mentioned twice in the anonymous *Commentum* (T 58.5; 65.16), which may derive from earlier writers.

Augustus is also mentioned twenty times in the *Liber Coloniarius* (L 209.2; 16; 220.1; 10–11; 221.15–16; 224.11; 229.21–22; 230.1; 232.7–8; 10;

15–16; 233.12; 234.9–10; 235.1; 20–21; 236.11; 237.17–18; 239.10; 15; 242.12–13). This may, however, indicate that commentaries written in his reign had been used by the compilers of the *Liber*.

<sup>100</sup> T 73.2–5; 164.6–8.

<sup>101</sup> See above, p. 90, and n. 92. Rullus' land bill of 63 B.C. apparently referred to land that was 'capable of being ploughed or cultivated' (Cicero, *De leg. ag.* II.67).

<sup>102</sup> Tacitus, *Ann.* I.17.

<sup>103</sup> *Liber Coloniarius* (L 242.12–15). Inscribed boundary stones are of course known from the time of the Gracchi.

<sup>104</sup> *ILS* 5970.



Hyginus 2 emphasizes that Augustus was concerned with the clear demarcation not only of public boundaries (he also reaffirmed the provision that a definite width should be assigned to *limites*)<sup>105</sup> but also of the holdings of individual veterans, which were to have wooden markers placed between them.<sup>106</sup> These Augustan initiatives are placed by Hyginus 2 firmly in the context of the development of methods for defining *centuriae* and inscribing their co-ordinates on the stone in the closing corner, and indeed the emperor's interest may have inspired this enhancement of surveying skill. Moreover, it is a reasonable supposition that Augustus encouraged, even if he did not originate, the practice of keeping precise records, maps, and registers with copies in the colony and in the imperial record office, signed by the founder himself.<sup>107</sup>

(iii) Hyginus 2 describes how the special map designations *exceptus* and *concessus* emerged during Augustus' settlements, when he bought up landholders' farms according to the statements they made and allocated them to soldiers.<sup>108</sup> Farms designated *excepti* were exempted from local taxation, while *concessi* were granted to specially favoured individuals, who were permitted to occupy them in excess of the quantity of land normally permitted in the settlement (T 160.8–21). This again demonstrates the personal role of Augustus and the nexus of influence and patronage at a time of turmoil in Italian landholding. So, a land definition recorded in the *Liber Coloniarum* ran: 'Land exchanged through the benefaction of Augustus' (L 247.19). Another aspect of Augustus' personal intervention is recorded in an inscription from Cnossos celebrating Nero's restoration to the colony of Julia Nobilis Cnossos of five *iugera* granted to the temple of Aesculapius by Augustus and confirmed by Claudius.<sup>109</sup>

(iv) One of Augustus' greatest achievements was to avoid after Actium the confiscations and violence that had characterized Triumviral land settlements.<sup>110</sup> Of course disruption and changes of ownership were inevitable, and so it was particularly important that Augustus tried through his speeches and edicts to reassure landholders by reasserting property rights, both private and public, and to define jurisdiction between colonies, which had been newly founded or reinforced, and existing communities. The new settlements were after all intended to be a source of strength and stability in the areas where they were founded.

Colonies in Italy were normally founded on the site of an existing town, usually a *municipium*, whose lands were subsumed into the colony and came under its jurisdiction. Many of Augustus' colonial foundations required extra land, which was therefore taken from neighbouring communities. However, by edict he affirmed a basic rule that whenever land was taken from the territory of another community for allocation to veterans in a colony, only land granted and allocated to the veterans belonged to the jurisdiction of that colony.<sup>111</sup> So unused land, land belonging to towns, and land returned to individuals remained under its original jurisdiction. This protected the rights of existing communities, and Augustus reinforced this in a speech about the status of the municipalities, emphasizing that the urban area of a town normally remained under its existing jurisdiction.<sup>112</sup> Hyginus 1 reckoned from his analysis of the regulations of colonial founders that these provisions were generally followed. Within the designated boundary of the allocated land the founder granted jurisdiction to the colony only in respect of specific areas: 'those lands, those places, those buildings that I

<sup>105</sup> See above, p. 84. In addition Augustus laid down twelve Roman feet for *quintarii* and eight for lesser *limites* (Hyginus 2 — T 157.9–13).

<sup>106</sup> T 136.17–137.3. The interest of emperors in the welfare of their veterans continued, as we learn from the story of how, in Trajan's time, an *evocatus* and surveyor devised an especially sophisticated method of designating individual allocations which ensured that there could be no disputes over the veterans' land (see above, p. 89).

<sup>107</sup> See too Moatti, *op. cit.* (n. 4), 92–4.

<sup>108</sup> See above, p. 93.

<sup>109</sup> *ILS* 8901 = E. M. Smallwood, *Documents Illustrating the Principates of Gaius Claudius and Nero* (1967), no. 385.

<sup>110</sup> He records how he spent 860 million sesterces in purchasing land in Italy and the provinces for his veterans, and boasts: 'I was the first and only one to have done this in the recollection of my contemporaries' (*RG* 16). This is exaggerated; Augustus had the resources of the Roman state at his disposal, and other dynasts had bought up land (T 166.6–8); Rullus' land bill of 63 B.C. had promised purchase at the seller's price (*Cic., De leg. ag.* 1.14; II.67), while Caesar in 59 B.C. used census valuations (*Dio* xxxviii.1.4).

<sup>111</sup> Hyginus 1 (T 82.24–83.6).

<sup>112</sup> Frontinus (T 7.1–13).

have granted and allocated, over them let the jurisdiction and right of enforcement belong to the colony' (to whose citizens the land had been allocated). This form of wording was unnecessary if he meant that they should have jurisdiction over everything.<sup>113</sup> Moreover, the same respect for traditional property rights lay behind the proviso that all sacred places, tombs, shrines, public and local aqueducts, fountains, public and local ditches, and common pasture should remain in the same legal status as they had before any land division had taken place.<sup>114</sup>

Some sign of Augustus' activity in this respect is found in a dedication set up near Capua celebrating Vespasian's restoration of lands consecrated to Diana Tifatina by Cornelius Sulla, 'in accordance with the map of the divine Augustus'.<sup>115</sup> Augustus' map, which presumably depended on a survey, must have been lodged in the imperial record office, and may have been originally associated with land distributions at Capua. In Rome too there is evidence for surveying, the erection of boundary stones, and the redefinition of public and private property, sponsored either by the emperor personally or through the *curatores locorum publicorum iudicandorum*.<sup>116</sup>

Surveyors were at the centre of substantial shifts in population and great changes in the pattern of land ownership engineered by Augustus. And when large-scale settlements ended in the second century A.D., they still had important work to do, in monitoring or extending existing settlements, in measuring land for individuals or communities, in helping to settle disputes, in surveying land for the government for tax or other purposes. The writings and accumulated lore of surveyors not only reveal their thinking and methods, but also illustrate how these men of relatively humble background were well-informed and self-confident in the expression of their opinions, and had a deep respect for the law, individual rights, proper procedures, the detailed preservation of records, and equitable adjudication. Through them we get a rare glimpse of the provision of professional services under an autocratic regime.

The settlements established in this period, despite the social and population change they engendered, were traditional and conservative, reflecting the established concept of the city state as an urban centre, with its surrounding agricultural land and settlers who were self-sufficient owner-occupiers; they therefore served to reinforce Roman ideology and the hierarchical structure of society. Emperors, and before them the military dynasts, aimed primarily to satisfy veterans in the way most convenient for their own interests; soldiers settled by imperial generosity were to repay this by their loyalty to an emperor and his house. Long-term motives of military strategy or boosting population were secondary, and there was no policy of using colonies to repair the damage of economic decline, natural disasters, or the consequences of civil wars. All this is reflected in the surveyors' rules for dividing up land, with their emphasis on equality and the well-being of the settlers, and the protection of existing rights.

That surveyors in the tumultuous period at the end of the Republic were able to develop and exercise their professional skills in a responsible and restrained way was largely due to Augustus, whose role in land distribution was crucial, as in so many aspects of Roman life. His achievement was to take the rewards of veterans out of the arena of political controversy, and after the ravages of civil war to create an atmosphere in which property rights and the application of the law were respected in rural communities. It is indeed significant that so much of surveying writing deals with the demarcation of clear boundaries, the recognition of boundary-marking techniques, and the keeping of maps and records, all of which are vital to a society with a strong concept of individual property. Augustus brought confidence to men of settled respectability, most of whom will have thought, like Cicero, that the object of government was to

<sup>113</sup> T 80.25–83.6; see also Urbicus (T 45.6–15); Siculus Flaccus (T 124.9–125.17; 127.21–129.10).

<sup>114</sup> Siculus Flaccus (T 121.18–25), ascribes this generally to the 'auctores divisionis assignationisque'. Cf. *Lex Coloniae Genetivae Iuliae* (n. 44), clauses 78–9, which guarantee rights of way in the colony's territory and access to water for landholders.

<sup>115</sup> *ILS* 251.

<sup>116</sup> e.g. *ILS* 5935–6. Note also the setting up of boundary stones along the banks of the Tiber — *ILS* 5923a–5924d.

preserve property rights (*De Off.* II.73). Dio, commenting on Augustus' arrangement in 13 B.C. of service conditions and discharge benefits for the army, emphasized precisely this point: '... for the rest of the population (these measures) raised confident expectations that they would no longer be deprived of their property' (LIV.25.6).

## NOTES ON PLATE

There are some slight indications in the texts of Frontinus and Hyginus 2 that in a few instances illustrations accompanied the original treatises. Several manuscripts (most importantly the Arcerianus and Palatine) contain illustrations, but it is likely that many of these were added or at least considerably altered at the time of the recension of the manuscripts. Indeed the illustrations have a variety of possible sources, including the artistic conventions of landscape painting, chorographic cartography, and the maps and notations of surveyors. Pls IA–D derive mainly from the first two sources, with an emphasis on pictorial depiction, Pl. IE with its simple diagrammatic approach is perhaps based on a surveyor's map. However the various approaches were often combined, as we see from the diagrammatic representation of land division grids in Pls IA–D (see O. Dilke, 'Illustrations from Roman surveyors' manuals', *Imago Mundi* 21 (1967), 9–29; *RLS*, 131–2; Carder, op. cit. (n. 6), 167–204). In my view the treatises were often used as teaching manuals and the illustrations of sites were intended to make rebarbative material more comprehensible and entertaining, rather than provide an accurate topographical representation. They express therefore an interpretation of how earlier surveyors had managed the space in a settlement's territory.

Pl. IA (L fig. 152 = T fig. 91). The walled enclosure, which usually represents a colony, is described as 'Colonia Iulia' located on high ground, with a river marked 'flumen finitimum' ('river demarcating a boundary'), and a land-division grid.

Pl. IB (L fig. 156 = T fig. 95). The walled enclosure is designated 'Colonia Claudia', with 'mons Larus', 'flu(men) Adum', neighbouring land — 'fines Tegurinoru(m)', and a land-division grid. Neither the river nor the mountain can be identified, but the Tigorini or Tigurini were a Helvetian tribe who lived near Aventicum (Avenches in Switzerland), and the settlement depicted here has been identified with the colony founded at Aventicum by Vespasian — 'Colonia Pia Flavia Constans Emerita'; in that case 'colonia Claudia' on the map must be a corruption of 'colonia Flavia' (Dilke, *RLS*, 123). However, the comparable diagram in MS E (Erfurt, eleventh century) has 'Colonia Claudia Tiburtino(rum)', which would refer to Tibur (Tivoli) near Rome. No certainty of identification is possible.

Pl. IC (L fig. 157 = T fig. 96). The walled enclosure is described as 'Colonia Augusta', with 'mons Mica' (unidentified), 'fines Viruxentinarum' (possibly the Brixentes known to the elder Pliny, though of uncertain location), and a land-division grid. The site is usually identified with Aosta, which however is not encircled by mountains in the manner depicted (Dilke, *RLS*, 123).

Pl. ID (L fig. 153 = T fig. 92). The walled enclosure is described as 'Colonia A(n)xurnas'; the Via Appia is marked, serving as the *decumanus maximus*. Behind the city is a range of mountains from which a river flows through the city into the sea. Another river far to the left of the city also flows to the sea; at its source a marsh is noted (*paludes*). Land division is marked between the Via Appia and the sea (see above, p. 83). Although the diagram attempts to portray the real geographical location of Tarracina, it is inaccurate in respect of the (Pomptine) marshes, which lay between the road and the sea, and the land-division grid, most of which lay between the Via Appia and the mountains (Dilke, *RLS*, 116–17; 120).

Pl. IE (L fig. 195 = T fig. 134). A diagrammatic representation of a land-division grid in which an irregular area marked 'common pasture of the Iulienses' has been designated.