PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

Absolute Dating from Mesopotamian Records

A. Sachs

Phil. Trans. R. Soc. Lond. A 1970 **269**, 19-22
doi: 10.1098/rsta.1970.0082

Phil. Trans. Roy. Soc. Lond. A. **269**, 19–22 (1970) [19]
Printed in Great Britain

Absolute dating from Mesopotamian records

By A. Sachs
Brown University, Providence, R.I., U.S.A.

In the early 1850s, the pioneering stage of the decipherment of Mesopotamian cuneiform writing, the hallmark of the urban culture of ancient Iraq, was completed. Since then, several hundreds of thousands of clay tablets with this writing have been excavated and are now deposited in various museums of Europe, North America, and the Near East; of these, some tens of thousands have been published. In a sense, we suffer from having *too* much evidence, textual and archaeological, and, as we shall see, a major problem concerning the chronology of the early second millennium B.C. is the assignment of priorities among the various arguments that have been advanced.

I thought that I might best serve the purposes of this meeting if I attempt to give a sketchy outline of the types of evidence, the nature of the results, and some of the complex problems in the field of the chronology of ancient Mesopotamia.

Paradoxically, the modern study of the absolute chronology of ancient Mesopotamia begins outside that country. Ptolemy, the great Greek astronomer who flourished in Alexandria, in Egypt, in the middle of the second century A.D., reports in his Almagest that he had at his disposal series of records of lunar eclipses at Babylon (the ancient capital of southern Mesopotamia) going back to king Nabonassar, whose reign begins, in our reckoning, shortly after 750 B.C. Ptolemy, in fact, makes use of these records, specifically reporting, e.g. an eclipse from around 720 B.C. under king Mardokempados, whom we know as Mardukaplaiddin. In order to ascertain the time interval which elapsed between such eclipses at Babylon and his own time, Ptolemy explicitly introduces an artificial era beginning with the Babylonian king Nabonassar, and he knows precisely where the eclipse of Mardokempados fits in this era, and, equally precisely, where Ptolemy himself is located in the same era. The list of kings between the beginning of this Nabonassar Era and his own time was not included in the Almagest, which has been preserved completely. The list did once form part of another astronomical work of Ptolemy, the Handy Tables, a book that was intended for practical astronomical reckoning, in contrast to the Almagest, which is a compendium of theoretical astronomy. Unfortunately, only the Introduction to Ptolemy's Handy Tables is preserved, and so the list of kings is not preserved there. Fortunately, in the fourth century A.D., Theon of Alexandria, who wrote a commentary on Ptolemy's Almagest, also wrote his own up-dating of the Handy Tables. Theon's Handy Tables, which are preserved in several different copies, do include a king list, the first part of which Theon obviously borrowed from Ptolemy's Handy Tables and then continued the list down to his own time in the fourth century. The beginning of the list gives the regnal years of kings ruling at Babylon from Nabonassar (747 B.C.), including the Achaemenian kings of the Persian Empire (beginning 539 B.C.), down to Alexander the Great and his immediate successors, but now the place of rule shifts from Babylon to Egypt, with the Ptolemaic kings, in turn followed by the Roman emperors. The numbers giving the length of each king's reign have been protected from corruption by the inclusion of an accompanying number which gives the years which have elapsed since the beginning of the Nabonassar Era.

The absolute chronology of the Babylonian first group of kings is easy to establish because, as has been mentioned, Ptolemy quotes the report of an eclipse in the time of king Mardokempados. Even more important, this absolute chronology has been independently confirmed by cuneiform texts from Babylon which contain astronomical observations. These number more than 1000 pieces of day-to-day astronomical observations of positions and phases of the Moon, Mercury, Venus, Mars, Jupiter and Saturn, beginning around 650 B.C. and continuing, in increasingly dense numbers, into the first century before the beginning of our era. Thanks to these astronomical diaries, numerous overlaps with the royal list in Theon's Handy Tables have been established, always in agreement. In other cases, the lengths of the reigns of individual kings in Theon's royal list can be confirmed by the careful study of the dates given in contemporaneous economic and administrative texts found in Babylonia; this is possible because for parts of the period covered by the royal list, we have so many of these texts that they average out to one every few days. In this way—namely, by using Theon's royal list, Babylonian astronomical diaries, and Babylonian dated tablets—one is able to establish with confidence the absolute chronology back to the middle of the eighth century B.C., i.e. the reign of king Nabonassar of Babylon.

In extending this absolute chronology back in time, one must now turn to Assyria, in northern Mesopotamia. Several monarchs in the early part of the royal list which begins with Nabonassar were, in fact, emperors of Assyria who conquered Babylon and whose names and regnal years appear among the rulers of Babylon in the royal list. This allows us to establish a bridge of absolute chronology with certain Assyrian kings. Whereas the Babylonian texts refer to a year by the regnal year and the name of the ruling king, the Assyrians, in the north, operated quite differently. Each year in Assyria is identified by the name of an eponym—the Assyrian technical term is limmu—drawn from a small core of the highest officials and governors of the Assyrian state. In order to keep track of the passage of time for administrative and economic purposes, lists of consecutive limmus were prepared. Numerous pieces of these limmu lists have been preserved, in two varieties. One simply lists one limmu after another line by line; the other type not only lists the limmus but frequently adds, opposite particular limmus, a historical remark, such as the conquest of a city. These limmu lists can be associated with absolute chronology because some of the Assyrian kings, as I have already mentioned, ruled at Babylon and, therefore, appear in the well-dated royal list of Theon. The absolute chronology for limmu dating established in this way is further confirmed by the historical remark concerning a solar eclipse listed opposite the limmu of 763 B.C. The uninterruptedly preserved lists of limmus take us back to the end of the tenth century B.C.

From this vantage point we can continue back, thanks to the discovery, more than 30 years ago, of an almost completely preserved Assyrian king list, covering a period beginning in the early second millennium B.C. and ending well inside the first millennium B.C. Despite the occasional occurrence of a technical term (instead of a number of regnal years), which offers philological difficulties, this Assyrian king list allows us to move back into the so-called Amarna period, from which we have preserved many pieces of international correspondence between the pharaohs of Egypt and the kings of Assyria and the monarchs of Babylonia and the Hittite rulers of Anatolia, and so forth, the middle of the fourteenth century B.C. Synchronisms between an Assyrian king and an Egyptian pharaoh in this correspondence permit us the insight that the use of the Assyrian king list, with slight adjustments, brings us back to the middle of the fourteenth century B.C. with a maximum error of 15 or 20 years. Continuing back with the

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

Assyrian king list soon runs into difficulties because the regnal years for a couple of kings are destroyed, and a whole group of apparently ephemeral kings without regnal years are encountered. Once we make our way back in the Assyrian king list to Šamši-Adad I (whom, as we shall see in a moment, we can associate with events in Babylonia), most scholars would not dare estimate the extent of our doubt at less than 50 or 75 years, even under the assumption —which is rather doubtful itself—that none of the regnal years listed in the Assyrian king list has been transmitted in a corrupt form, or that no kings are missing.

International correspondence—this time found in the course of excavations at a place called Mari, just inside Syria on the Euphrates River—revealed that Šamši-Adad I of Assyria, known otherwise from his own royal inscriptions as well as the Assyrian king list, was contemporaneous with the Babylonian king Ḫammurapi of the so-called First Dynasty of Babylon, under whom the famous law code was promulgated. The date to be assigned to this First Dynasty of Babylon is still a matter concerning which scholars have not been able to agree. At the moment, the only proposals for the end of the First Dynasty of Babylon for which there seems to be some support are 1650, 1594, 1586, and 1530 B.C. It is no accident that these proposed dates are spaced 56($\pm$8) years apart. From the time of king Ammiṣaduqa, who began his reign 52 years before the end of the First Dynasty of Babylon, the dates of the first and last visibility of Venus as morning star and as evening star are recorded for the 21 years of his rule. Unfortunately, we have these reports in a somewhat corrupted form many hundreds of years after the events. This whole set of Venus observations was embedded as a fossil in a much larger astrological composition, many copies of which have been found in major libraries of Assyria and Babylonia in the first millennium B.C. It is not too difficult to correct the figures which are grossly corrupt. The dates for the first appearances and the last appearances of Venus in the intercalated lunar calendar of the Babylonians virtually repeat every 56($\pm$8) years. In this way, then, although we cannot give unique dates for Ammiṣaduqa, we *can* exclude all dates *other* than the triplet cluster of years every 56($\pm$8) years as utterly impossible. At the moment, scholarly opinion, as I have mentioned, is unwilling to consider more than three such triplets, leading to the dates 1650, 1594, 1586 and 1530 B.C. for the end of the First Dynasty of Babylon. The arguments for these possibilities are rather complicated and involved, and are particularly sensitive to events in the middle of the second millennium B.C. in the peripheral regions of Northern Syria and Anatolia. The most radical sceptic would not dare suggest a possible date 56 years *after* 1530 B.C.: there is simply no historical room; on the other end, it is just barely conceivable that one should consider the possibility of a date 56 years *before* 1650.

For historians of ancient Mesopotamia, the dating of the First Dynasty of Babylon is a *very* important problem. Not only is the well-documented relative chronology, 300 years long, of the First Dynasty of Babylon, unhinged over a period of at least 120 years, but an additional relative chronology of more than 500 years preceding the First Dynasty of Babylon could be translated into absolute chronology if one were able to date the First Dynasty of Babylon. King lists, lists of year names corresponding to regnal years of various kings and dynasties, and occasional synchronisms have made it possible to construct, with high plausibility, this long run of years preceding the First Dynasty of Babylon. Preceding *this* set of more than 500 years lie thick archaeological strata to the beginning of the so-called Early Dynastic Period. Archaeologists, art historians, and students of the development of writing are in agreement that this time span covers some hundreds of years.

No matter which of the proposed dates for the First Dynasty of Babylon turns out to be

correct, it is inescapable that a number of recent carbon-14 determinations from the Early Dynastic Period are consistently too late by several centuries when one considers the historical evidence which we have been reviewing. Dates for Early Dynastic I of 2253 B.C. $\pm$ 23, for the Early Dynastic II of 2184 $\pm$ 41, are at variance with all of our historical and archaeological data. Assuming that we can rely on the accuracy of the archaeologists' ascriptions of stratigraphy to the samples submitted for carbon-14 analysis, we must await, with patience, further investigation by physicists.

Bibliographical note

For an extended review of the subject as of 15 years ago, see A. Parrot 1953, *Archéologie mésopotamienne*, **2**, 332–451 (Paris). A more recent discussion, with a rich bibliography for further consultation, is by M. B. Rowton in vol. 1, chapter 6, 1962, of the new edition of the *Cambridge Ancient History*. For the carbon-14 dates for archaeological material from the Early Dynastic period, compare, for example, most recently P. R. S. Moorey in *Iraq*, **28**, 40 (1966).

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES