Review
Reviewed Work(s): Zur Entstehung der babylonischen Mondtheorie: Beobachtung und theoretische Berechnung von Mondphasen by Lis Brack-Bernsen
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Zur Entstehung der babylonischen Mondtheorie: Beobachtung und theoretische Berechnung von Mondphasen. By LIS BRACK-BERNSEN. Boethius, vol. 40. Stuttgart: Franz Steiner Verlag, 1997. Pp. viii + 142 + 15 figs. DM 48.

The Babylonian mathematical astronomy found in cuneiform texts from Babylon and Uruk after about 300 B.C. is in a sense very well understood. We know the exact mathematical rules that were used to generate almost all the columns of data in the tables, to that we can restore and prolong these sequences at will. We also can assign an astronomical meaning to nearly every component of the tables. On the other hand, we really do not know what the applications of this astronomy were or how and why it came into being. In the decade since Neugebauer's death, there has been much enthusiastic talk of a "recontextualization" of Babylonian astronomy within the traditions of Mesopotamian scholarship and divination; but the one solid accomplishment in this direction, Francesca Rochberg's demonstration that the same group of scribes was responsible for the production of observational Diaries and Almanacs and of the mathematical tables, raises more questions than it answers because it is difficult to detect any interdependence between the contents of the two classes of text.

For several years Lis Brack-Bernsen has pursued a different line of research into the origins of the mathematical astronomy and particularly the part of it concerned with the phenomena of the moon. The monograph under review marks a substantial step in this project. The focus of her investigation is a set of six time intervals, known as the Lunar Six, that can be measured at the beginning, middle, and end of any lunar month. These are the times between the moments when the sun and moon cross the horizon, rising or setting, when both are simultaneously close to the horizon; for example, the time from sunset to moonset on the evening of the first lunar crescent or the time from moonset to sunrise on the morning before a full moon. The Lunar Six were measured and recorded in the astronomical Diaries as early as the middle of the seventh century B.C., and indeed Tablet 14 of the astral omen corpus *Enūma Anu Enlil* already presents simple mathematical models for describing the duration of lunar visibility through the course of the month. In the mathematical lunar tables, the final, rightmost columns contain calculations of the Lunar Six.

Brack-Bernsen has studied the periodic behavior of the Lunar Six and has also tried to establish what astronomical information is embedded in these quantities. Her investigation, which was initially theoretical, led to the discovery that while the individual time intervals show great irregularity in their month-to-month variations, these irregularities can be considerably reduced and controlled by taking the sums of pairs of the four times measured close to the full moon, while the sum of all four turns out to exhibit a rather stable periodic pattern and is a good measure of the variation in the moon's apparent speed. Thus we have a possible means by which the Babylonian scribes could have gained control of one of the periodic components of their lunar theory.

Brack-Bernsen has now caused a fair stir among students of ancient astronomy by finding textual evidence for part of her hypothesis in the Goal Year Texts, a category of tablet in which observational records from Diaries dating from specific numbers of years in the past are collected as the basis for forecasting astronomical phenomena in an approaching "goal year." Unlike the sections belonging to the planets, the principles of which have long been known, no one has hitherto been able to explain the rationale for the selection of lunar observations. Now, through the elucidation of passages in the very difficult text TU 11,[1] Brack-Bernsen has shown that the Goal Year Texts use the sums of complementary pairs of the Lunar Six nineteen years in the past as part of a procedure for making accurate predictions of the Lunar Six in the Goal Year.

Brack-Bernsen has since undertaken a more comprehensive study of TU 11, which promises to illuminate the workings of a stage of Babylonian astronomy that was building effectively on the fundamental discovery of the approximate periodic recurrence of phenomena, while also anticipating the invention of the more analytical mathematical models that connected different kinds of phenomena in a web of interdependent patterns of numbers. Hence this is something of an interim report, although it is written in such

[1] Originally published by F. Thureau-Dangin, *Tablettes d'Uruk à l'usage des prêtres du temple d'Anu au temps des séleucides* (Paris, 1922).

a very clear and, so far as the subject allows, nontechnical manner that it would not make a bad introduction to Babylonian lunar theory for beginners.

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Archives and Libraries in the Ancient Near East 1500–300 B.C. By OLOF PEDERSÉN. Bethesda, CDL Press, 1998. Pp. xxii + 291 + 8 figs. $42.

Olof Pedersén has once again put us in his debt by producing a very useful book on archives and libraries in the ancient Near East. Although his title covers the period 1500–300 B.C., he makes several exceptions to include the continued cuneiform traditions in a few instances (most notably Uruk). Although the realities are not always so clear, he makes the distinction that archives are collections of documents and libraries are collections of literary texts (in its widest sense, of course, to include all traditional texts, such as lexical texts, omen texts, and medical texts). As expected, most of the archives and libraries involve cuneiform tablets, but details of texts in other scripts are given in a section called "Western Alphabetic Area."

A sad fact is that in many cases texts were looted by clandestine diggers or were so poorly recorded by the authorized excavators that we can never confidently reestablish what texts were in many of the ancient archives and libraries. In some cases, this can be done by internal criteria, but in many cases it is quite impossible. A sterling exception is Assur, to which Pedersén has previous devoted two volumes.[1]

Pedersén is completely up-to-date in his coverage, though for recent excavations where the texts are generally unpublished, he has had to rely on the brief comments in preliminary excavation reports. In some instances, such as Nuzi, he has gleaned many welcome details from numerous individual studies. To judge from the single earthquake omen text discovered at Nuzi, there must also have been a library elsewhere on the site that has not yet been discovered.

In the case of Assur, Pedersén has an important revision of Ernst Weidner's opinion on the library of Tiglathpilesar I. Pedersén concludes that the library dates to fifty years before the time of Tiglathpilesar. Also, on p. 137 he has a find-spot correction to his *Archives and Libraries in the City of Assur,* part 2, N9–10.

For the Dur-Katlimmu Middle Assyrian texts, one should also consult the review of Canik-Kirschbaum's volume by Shelley Luppert-Barnard in this journal.[2]

Especially welcome are the details of the Sippar library (the latest dated tablet is reported to be dated to the reign of Cambyses II) discovered by Iraqi archaeologists in 1985–86. Pedersén remarks: "This is the oldest library in history that was found essentially intact on its original shelves." Of the approximately 800 tablets found in the library, only a few are published so far, but he announces that a facsimile edition of all the tablets in the library is in preparation by A. Fadhil and W. Sommerfeld.

An interesting factor stands out in the case of Nippur: no Neo-Babylonian library has been identified. The fact is that very few Neo-Babylonian literary texts are known from Nippur. Yet it is likely that there is a library somewhere on the site, to judge from the fact that a Neo-Babylonian prophecy text was discovered on the surface of the mound.[3]

In discussing Emar, Pedersén mentions that there are numerous unpublished Hurrian texts said to include omens, medical prognostications, and a god-list.

In the case of the Elamite tablets said to be from Nineveh, Pedersén says "possibly," and refers to Julian Reade in *Cuneiform Archives and Libraries,*[4] though I cannot find Reade's statement on this.

[1] *Archives and Libraries in the City of Assur: A Survey of the Material from the German Excavations,* parts 1 and 2 (Uppsala, 1985 and 1986).

[2] See Shelley Luppert-Barnard, review of E. C. Cancik-Kirschbaum, *Die mittelassyrischen Briefe aus Tall Šēḫ-Ḥamad* (Berlin, 1996), in *JNES* 60 (2001): 56–59.

[3] It was found by a workman on an unidentified part of the mound.

[4] Julian Reade, "Archaeology and the Kuyunjik Archives," in Klaas R. Veenhof, *Cuneiform Archives and Libraries: Papers Read at the 30e Rencontre Assyriologique Internationale, Leiden, 4–8 July 1983* (Leiden, 1986), pp. 213–22.