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**Jöran Friberg; Farouk N. H. Al-Rawi.** *New Mathematical Cuneiform Texts.* (Sources and Studies in the History of Mathematics and Physical Sciences.) xvii + 553 pp., figs., bibl., indexes. Cham, Switzerland: Springer, 2016. €100.69 (cloth). ISBN 9783319445977.

This book offers a collection of newly published or revisited mathematical cuneiform texts from different periods: Early Dynastic III (ca. 2600–2500 B.C.E.), Ur III (ca. 2100–2000 B.C.E.), Old Babylonian (2000–1600 B.C.E. [hereafter OB]), and Late Babylonian (ca. 563–547 B.C.E. [hereafter LB]). Most of the texts are kept in the British Museum, the Iraq Museum, and the Suleimaniyah Museum and were identified and copied by Farouk Al-Rawi. The book offers, in addition, a complete overview of known numerical and metrological tables dated to the Achaemenid and Seleucid periods (last centuries of the first millennium B.C.E.), with photos and complete transliterations that have not been published before. The excellent copies by Al-Rawi show a deep understanding of the material by this indefatigable discoverer of new mathematical texts. Jöran Friberg’s mathematical interpretations are, as usual, powerful and profound. Thus this book completes and enriches Friberg’s work on cuneiform mathematics and brings new perspectives, especially on the LB material (Chs. 1–4) and on Northern OB mathematical traditions, including the Diyala Valley (Chs. 5–7) and the region of Sippar (Chs. 8 and 9). The final chapters shed some new light on Early-Dynastic (Ch. 12) and Neo-Sumerian (Ch. 13) texts, as well as on curious drawings of labyrinths (Ch. 14; written in collaboration with Anthony Philips). The studies of texts are completed by full overviews on some topics—for example, the surveyors’ formula in Sections 6.2.7, 6.2.8, and 6.2.9 and the volume of pyramids and cones in cuneiform texts, as well as in “ancient Chinese, Greek and Indian mathematical treatises,” in Section 8.5.14.

However, it must be recognized that this book will be difficult reading for non-specialists. These difficulties are due of course to the subject itself: advanced cuneiform

mathematics written in a concise and often elliptical language. They are also due to the Friberg's<sup>1</sup> style—for example, his complex system of numbering texts, his systematic use of acronyms (a practice unfortunately widespread in Assyriology), and the lack of explanations of some key points (for such explanations, the reader is often referred to the author's previous publications). But in my view, the main reason for the reading difficulties comes from the notation conventions for transliterations, translations, and commentaries adopted by the Friberg, some of which are his own and require a great effort of adaptation on the part of the reader. These conventions convey implicit concepts with regard to numbers, measurement values, computation, and reasoning that warrant further discussion.

Chapter 1 provides an exhaustive overview of known LB numerical tables based on lists of “large sexagesimal place value regular numbers,” including tables of reciprocals and squares, classified into eleven categories according to content, provenience, and date, and discusses some of them in detail. It provides new material and unpublished photos or copies of some known texts. The goal of this chapter is to show “the astonishing temporal continuity and regional unity of Babylonian mathematics” (p. 1). In particular, “most of the texts belonging to categories I–III in the survey in Sec. 1.1 can be shown to have a common origin” (p. 6). On this basis, the authors argue that some of the LB numerical tables derive from a common ancestor, a Neo-Babylonian (ca. 626–539 B.C.E.) many-place table of reciprocals (table R) that they try to reconstruct. The hypothesis of a common ancestor is based on mathematical arguments and would benefit from being consolidated with additional historical arguments. In any event, the observations compiled by the authors, as well as those previously and subsequently published (see, e.g., Mathieu Ossendrijver, “Scholarly Mathematics in the Rēš Temple,” in *Scholars and Scholarship in Late Babylonian Uruk*, ed. Christine Proust and

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<sup>1</sup> Is this Friberg in particular, then? (I apologize for what will seem a silly question to someone who knows the answer.) Perhaps I am being thrown off by the title page, which seems to list Friberg and Al-Rawi as coauthors. (I won't repeat this question but will make any necessary changes throughout the review once I've heard from you.)

John Steele [Springer, 2019], pp. 187–217), show the enormous amount of computation and classification work that the ancient scribes had to carry out in order to generate the lists of regular numbers on which the LB numerical tables are based. Such a vast program of calculations suggests another possible scenario, different from that of a single scribe (or group of scribes) developing a table that would become a common ancestor. The LB numerical tables may result from a large-scale collective endeavor conducted over several generations in several scholarly centers, primarily in Uruk and Babylon.

Chapter 2 is devoted to LB tablets containing lists of pairs of reciprocals that were obtained by successive multiplications/divisions. The texts this chapter deals with had already been published and commented on in, for instance, Jeannette C. Fincke and Mathieu Ossendrijver, “BM 46550—A Late Babylonian Mathematical Tablet with Computations of Reciprocal Numbers,” *Zeitschrift für Assyriologie und Vorderasiatische Archäologie*, 2016, 106:185–197, which the author seems not to have been aware of at the time of writing his manuscript (see his note “Added in the Proofs,” p. 86). It must be admitted that Chapter 2 is largely deprived of its originality by the existence of these previous publications.

Chapter 3 complements Chapters 1 and 2 by providing an almost exhaustive list of mathematical texts dated to the first millennium. Then the authors concentrate mainly on metrological texts. They begin by comparing LB and OB metrological texts (for this comparison see also John Steele, “Late Babylonian Metrological Tables in the British Museum,” *SCIAMVS*, 2015, 16:75–90). Chapters 3 and 4 are based on analyses that the Friberg had already published in earlier articles, here supplemented with new data. These two chapters thus give an overview of the great diversity of metrological systems documented in the second half of the first millennium. In particular, they show how texts from the Achaemenid period (547–331 B.C.E.) exhibit a mixture of ancient and recent mathematical cultures: metrological systems dating back to the OB period along with those being developed

at the time, sexagesimal notation along with decimal notation, and Akkadian transcriptions of measurement units along with their representation by Sumerian ideograms.

Chapters 5–7 cover a set of OB mathematical texts from the Diyala Valley, a region north of the Mesopotamian plain. Chapter 5 presents five tablets from Tell Harmal of similar content (procedural texts dealing with linear, quadratic, or cubic problems involving rectangles whose width is equal to two-thirds of their length), the first two being unpublished and the other three having been published previously. Chapter 6 presents three unpublished tablets from Tell Haddad on geometric problems (right trapezoid, circles, semicircles), some with diagrams. The chapter is completed by a handful of numerical tablets (one cubic root table and nine multiplication tables) and ends with a list of the mathematical tablets found in Tell Haddad. Chapter 7 republishes a tablet from Šaduppûm dealing with sharing problems. In short, these three chapters offer new material of considerable interest and open new perspectives on the mathematical cultures of the ancient Near East, especially those developed in the Diyala Valley.

This composite book is mainly devoted to the publication of new texts but leaves much room (especially in Chs. 9–14) for texts already published and consideration of developments on various subjects on which Friberghas already written extensively. The most original parts of the book, in my view, are Chapters 1–4, which provide a complete overview of LB metrological and numerical tables, and Chapters 5–7. *New Mathematical Cuneiform Texts* must now be added to the small body of books that are indispensable to specialists in cuneiform mathematics.

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*on the history and historiography of mathematics in the ancient Near East, with a special interest in social contexts, textuality, and philology of numbers and quantities.*