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Introduction.
Sciences in Ancient Mesopotamia

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Abstract

This Introduction presents the main theme of the dossier *Sciences in Ancient Mesopotamia* and describes the papers that compose it. It also indicates how the dossier may be of interest to different readerships.
Key-words: History of Science; Philosophy of Science; Mesopotamia; Assyriology

Introducción. *Ciencias en la antigua Mesopotamia*

Resumen

Esta Introducción presenta el tema principal del dossier Ciencias en la Antigua Mesopotamia y describe los trabajos que lo componen. También indica cómo el dossier puede ser de interés para diferentes lectores.
Palabras clave: Historia de la ciencia; Filosofía de la ciencia; Mesopotamia; asiriología

The journal *Claroscuro* produces two issues every year, one devoted to contemporary Asia and Africa, and the other to the Ancient Near East, as is the case with the present *Sciences in Ancient Mesopotamia*. The five contributed papers deal with different aspects of knowledge production and use in Ancient Mesopotamia, with topics ranging chronologically from the 3rd to the 1st millennium BCE and thematically from astronomy, mathematics, and medicine to the whole of Mesopotamian disciplines as a meaningful body of scientific practices.

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It is hoped that these papers may give food for thought to a broad readership. To those initiated into the studies of the Ancient Near East, the papers offer questions, reflections and documentation that sample the present state of the research: the issue of knowledge circulation between disciplines, as in the case of mathematics and astronomy (see Steele's paper); the issue of knowledge circulation within the same discipline, as in the case of medicine (see Geller's paper); how mathematical practice—thought to be so abstract—depended on material operations (see Proust's paper); how calculations enabled ancient scribes to simulate empirical phenomena numerically in order to extract useful information (see Ossendrijver's paper); and why the Mesopotamian knowledge tradition of *ṭupšarrūtu* cannot be excluded from the realm of science without incurring deep historiographical loss (see Rochberg's paper).

To the larger readership of the non-initiated, these papers present a singular entrance to the study of the sciences in Ancient Mesopotamia. Their scope extends from the elements that form our basis for understanding Ancient Mesopotamian sciences (i.e., disciplines, professionals, scholarly texts, periodization) to general questions that have become recurrent themes in the literature – the development of the sexagesimal place-value notation, the role of divination in the Mesopotamian sciences, patterns in the long-term development along three millennia of history, and the relations between scribal training and professional practice.

Mark Geller's paper deals with the theme of "Alternative Voices in Babylonian Medicine". One means by which dissonant voices can be detected is to pay attention to the use of the expression "the hand of" a deity to refer to a specific disease. Although frequent in diagnoses and prognoses (as in the so-called *Diagnostic Handbook*), the phrase seldom appears in therapeutic texts. Also, even within the series of the diagnoses and prognoses, differences can be spotted, references to "the hand" being more frequent in the older components of the series, which may also reflect the co-existence of dissonant voices, namely an increased demand for more accurate diagnostics in the later period along with the persistence of the traditional view of the agency of deities in provoking diseases. Two specific texts are then analyzed to provide further evidence for the existence of alternative voices. One of these texts, from Sultanepe, establishes an association between prognostics and astral elements, and may be a representative of a system that later developed into astral medicine. The other text, from Nineveh, presents incantations that try to situate the origins of a series of diseases within the natural environment.

Mathieu Ossendrijver's contribution to this volume, "A Simulation-Based View on Mesopotamian Computational Practices", explores the possibility of understanding iterative computations in Mesopotamian texts as numerical simulations, in line with contemporary works on philosophy of science that show the central role played by modeling in scientific practice. For this, a text dated to the Ur III period presenting the annual growth of a cattle herd and its production of butter oil and cheese is revisited. The ancient text contains year by year the total number of cows and bulls, specified by different ages. Although partly damaged, it is possible to reconstruct its contents. Ossendrijver's paper extends previous arguments that the text is not a simple report of the growth of an actual cattle herd. Instead, it must have been a numerical simulation, in which the cattle population in each year is continually updated through the application of a fixed set of arithmetical rules based on the data of the previous year. One interesting feature reinforcing the simulation interpretation proposed by Ossendrijver is what seems to be a deliberate choice of rules for the model, so that its results hardly differ from reality. In the analyzed text, Ossendrijver argues that the scribe avoids including a mortality rate in the simulation and compensates for this decision with a birthrate that (although unreal) most likely kept the model sufficiently useful for the purposes it was designed.

Christine Proust's paper, "The sexagesimal place-value system inside and outside texts", reflects on the history of the primary number system used in mathematical cuneiform tablets, called in modern terms "sexagesimal place-value notation" (SPVN). For this, Proust goes back to the Ur III period, when the first systematic uses of this system are attested. In some administrative tablets of this period, there are text boxes used as scratchpads. These boxes contain numbers which do not pertain to the main text of these tablets, hence marginal numbers, written in the SPVN or some hybrid form of it. An analysis of these numbers shows that they were auxiliary numbers used by the scribes in order to perform calculations pertaining to the administrative aim of the tablet. More precisely, the measuring systems used in the main text were not practical for calculations, so scribes took values from the main text and annotated them in a marginal box using SPVN, even if partially, since it is more adequate for calculation. The calculations may have been carried out mentally or with the aid of some calculation device, and the results were sometimes also written as marginal numbers in the box, to be finally converted to a measurement value in the main text. Administration, calculations, possible calculation devices, and

marginal numbers were in this way linked in the history of the development and use of the SPVN.

Francesca Rochberg's "*ṭupšarrūtu* and the Historiography of Science" proposes to consider Mesopotamian knowledge not only as knowledge but as science. In order to do this, Rochberg begins by surveying what constituted the body of knowledge known to Mesopotamians as *ṭupšarrūtu*, an abstract noun formed from the word for "scribe," *ṭupšarru*. This body of knowledge included seven divinatory series (i.e., omen collections) plus medicine and astronomy, in the same way that the modern term science comprehends several different disciplines. The largest part of Rochberg's paper is devoted to tackling the issues of realism and representation, demarcation, pessimistic induction, and presentism. These four problems are responsible for much of what has been written about modern science and have often been used to dismiss Mesopotamian science as "unscientific". Rochberg brings compelling reasons for the opposite stance. First, all evidence seems to indicate that *ṭupšarrūtu* did indeed represent and interpret reality for Mesopotamian scribes. Second, the demarcation concerns of modern philosophers, aimed at denouncing so-called *pseudo-sciences*, cannot be applied to *ṭupšarrūtu* without incurring serious historiographical missteps. The same goes for the pessimistic induction: the idea that theories eventually prove to be unscientific depends on establishing modern science as the sole criterium for what can be considered scientific. Finally, the presentist disposition that still pervades the discourse on Mesopotamian science and finds a supposedly lack of rigor in its explanations of the world fails to understand that explanation may not have been a primary goal for Mesopotamian scholars, as clearly illustrated by their highly predictive but non-explanatory astronomy.

John Steele's contribution to this volume, "Babylonian Shadow-Length Schemes: Between Mathematics and Astronomy", presents an analysis of two Late Babylonian texts as evidence for the absorption of astronomical contents into the scholarly mathematical environment. These tablets contain calculations of the length of the shadow of a gnomon (a vertical stick) in specific times after sunrise, in different times of the year. The subject is traditionally an astronomical one, and it goes back to the early astronomical compendium MUL.APIN, composed in the end of the second millennium or the beginning of the first millennium BCE. For this reason, the tablets analyzed in the paper were long thought to pertain to astronomy. In order to unveil the mathematical character of these tablets, two arguments are constructed. In the Late Babylonian period, the style clearly distinguishes between mathematical problem texts,

which contain the statement of a problem followed by its solution, and astronomical procedure texts, which present in a sequence of rules a calculation procedure that serves an astronomical purpose. Thus, an interesting trait of one of the analyzed tablets is its style, which is reminiscent of the mathematical rather than astronomical textual tradition. The second argument applies to a multi-section tablet on shadow length with calculations based on materials that are typical of the mathematics taught in the school environment. Together, this seems to indicate the interest of Late Babylonian scribes—frequently writing both mathematical and astronomical texts—in using astronomic questions in their mathematical explorations.

Read together, these five papers are a testimony to the diversity of Mesopotamian scientific practices and the complex ways they interrelated. They covered a wide range of activities and were, therefore, one of the elements that constituted the social, cultural, and political life of Mesopotamians. To the historian, such ancient practices create the opportunity for challenging but valuable inquiries, advancing our knowledge of Mesopotamia and reflecting on our own discourses about science.

The creation of a dossier like the present one is only possible when a number of authors agree to contribute their time to produce original material. For this reason, the guest editor and the permanent editors of *Claroscuro* want to express their immense gratitude to the authors, all the more because the year of 2021 was so challenging both from the human and the scientific point of view. We hope the readers will appreciate these papers as much as we have.