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Babylonian Astral Sciences and Mathematics in Uruk After 47 CE

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Abstract. This paper argues that the cuneiform tablet TU 11 can be dated to after 47 CE based on a parallel with Greco-Roman sources; that tablet TU 31 can be dated similarly, because it was written by the brother of the scribe of TU 11; and that the new datings of TU 11 and 31 lend further weight to the astronomical dating of tablet W 22340a to 79/80 CE. Some historical consequences of these datings are then examined: Akkadophone scribes appear to have continued after 47 CE to maintain and develop the astral sciences and mathematics of the cuneiform tradition.

Keywords. Babylonian Astronomy, History of Science, Uruk.

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Introduction

Greek and Latin sources from the 1st and 2nd centuries CE express a notion that the ancient Mesopotamian city of Uruk was still very much an active center of astral science in their time.¹ Strabo of Amasea, the Greek-language historian and geographer of the Augustan period (d. after 25 CE), mentions its inhabitants, the Ὀρχηνοί, in the present tense as one of the “clans” (γένη) of “Chaldean” astronomers (*Geography*, XVI, 1, 6). Pliny the Elder (23/24 – 79 CE) calls them *Orcheni* and notes their “Chaldean” doctrine (*Natural History*, VI, 123). An astrological papyrus from Oxyrhynchus dated on paleographical grounds to the 2nd century CE, P. Oxy astr. 4139, ascribes certain astronomical parameters to the Ὀρχη[νοί].

It is often assumed that these references to Uruk reflect an earlier state of affairs because, despite continued occupation of the city, the latest securely dated cuneiform tablet from Uruk (W 18568) is from 108 BCE – a time at which the temples “Irigal, Bīt rēš, and all the god’s houses” are said to still be operating.² An astronomical almanac from Uruk (W 22340a) can arguably be dated to 79/80 CE, but this date does not allow us to account for all the phenomena described in the diary, and skepticism has therefore been expressed regarding such a date³.

This paper will present evidence that the cuneiform tablet from Uruk known as TU 11 = TCL VI, 11 (Paris, Musée du Louvre, inventory number AO 6455) dates from after – arguably, long after – the year 47 CE. A hand-copy of TU 11 was published in 1922 by François Thureau-Dangin.⁴ The tablet was edited for the first time, with a translation and commentary, in 2002

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¹ See Jones, 2019.

² See Kessler, 1984.

³ See Hunger and De Jong, 2014; for a sceptical view of the dating, see Steele, 2019: 155.

⁴ See Thureau-Dangin, 1922: pll. XXII-XXIII.

by Lis Brack-Bernsen and Hermann Hunger.⁵ It “contains a mixture of ... astrological, meteorological and astronomical prediction rules”.⁶

Visual inspection of the tablet at the Musée du Louvre in November 2022 revealed that the tablet measures 133mm in length by 178 mm in height by 14 mm in thickness, and is unusually flat on both sides. Its single-column layout seems unusual for such a wide tablet, as if reflecting a writing board. Its color is ivory white, like a wax tablet. The tablet’s surface exhibits numerous firing-holes (not noted by Thureau-Dangin) and it seems to have been baked. It is written in the regular and aesthetically pleasing hand of a highly proficient scribe.

Collation of the tablet further yielded the following observations about unusual features and difficult passages in the text:

- obv. 9: the line runs over as in Thureau-Dangin’s hand-copy, the overrunning characters being preceded by a double *Trennungszeichen* (i.e. MesZL sign n° 577, duplicated). This feature, which is not reflected in Brack-Bernsen and Hunger’s edition, suggests that the lines in the exemplar were very long.
- obv. 22: MIN is certain.
- obv. 23: PA is certain.
- obv. 35: as on obv. 9, the line runs over and the overrunning characters are preceded by a double *Trennungszeichen*.
- rev. 19: the first sign is clearly *šá* (not 4), written with two verticals atop one vertical. It is tempting to read *šá-niš*. The second 4 is confirmed, but it is also tempting to read *šá¹-niš*.
- rev. 20: the LA sign in *al-la* is a supralinear addition, as suggested by Thureau-Dangin’s hand-copy (this is not reflected in Brack-Bernsen and Hunger’s edition).
- rev. 32: ^{itu}DU₆ 4 (not 5).
- rev. 33: TAR TAR TI (not UB UB TI).
- rev. 34: 30 GI is confirmed.

The chronological significance of the 654-year cycle mentioned in TU 11

The colophon of TU 11 states that it is a “tablet of Nidinti-Ani, son of Ina-qibīt-Ani, descendant of Hunzû, incantation priest of Anu and Antu, from Uruk. Hand of Anu-uballit, his son” (TU 11, rev. 38; transl. Brack-Bernsen and Hunger). In other words, the scribe is referred to as Anu-uballit, son of Nidinti-Ani and grandson of Ina-qibīt-Ani, descendant of Hunzû. Based on this colophon, the editors (following Thureau-Dangin’s opinion) dated the tablet “towards the end of the 3rd century B.C.”, because they believed the scribe to be identical with the Anu-uballit, son of Nidinti-Ani, who wrote the tablets TU 16 and BRM 4,12.⁷ However, in the colophon of TU 16, the scribe is referred to as Anu-uballit, son of Nidinti-Ani and grandson of Anu-bēlšunu (not Ina-qibīt-Ani), descendant of Hunzû; in the colophon of BRM 4, 12, the scribe is referred to as Anu-uballit, son of Nidinti-Ani and grandson of Anu-bēlšunu (not Ina-qibīt-Ani),

⁵ See Brack-Bernsen and Hunger, 2002.

⁶ See Brack-Bernsen and Hunger, 2002: 24.

⁷ “Vers la fin du premier siècle des Séleucides” according to Thureau-Dangin, 1922: unpaginated (“Description des tablettes”); “towards the end of the 3rd century B.C.” according to Brack-Bernsen and Hunger, 2002: 6.

descendant of Ekur-zākir (not Hunzû)⁸. Thus, the dating of TU 11 to the 3rd century BCE based on the identification of its scribe cannot stand.

On the other hand, the scribe of TU 11 seems to have been the brother of the scribe of TU 31, who is referred to as Ina-qibīt-Ani, son of Nidinti-Ani and grandson of Ina-qibīt-Ani, descendant of Hunzû⁹. In this respect, it should also be emphasized that the inventory number of TU 31 (AO 6456) follows immediately upon that of TU 11 (AO 6455).¹⁰ These two tablets share the same unusual flatness on both sides. The dimensions of TU 31 are 12.5 cm in length by 20.5 cm in height by 2.1 cm in thickness.¹¹ Its handwriting is also that of a highly proficient scribe, and it is the same color as TU 11.

It has been argued that tablets AO 6448-6496 from the Louvre Museum in Paris all stem from one specific site within the Rēš temple of Uruk, because of links between some of these tablets and others kept in Berlin, Chicago and Istanbul¹². Because many of these tablets date to the first half of the 2nd c. BCE, the recognition of one homogeneously provenanced group would provide a strong chronological indication that TU 11 and 31 also date from ca. 200-150 BCE. However, this argument is inconclusive: indeed, the Paris tablets linked with the Berlin, Chicago and Istanbul collections are all contained within the subset AO 6470-6486, except for AO 6448¹³; and while AO 6449-6486 were all purchased in one lot from the Dumani brothers, AO 6448 was purchased separately, from Elias Géjou.¹⁴ Hence there is no reason to believe that tablets AO 6449-6469 were found near AO 6470-6486, nor indeed that they all have the same provenance – the Dumani brothers may just as well have sold tablets recovered in various parts of the Rēš temple and elsewhere in Uruk/Warka. Unfortunately, therefore, the limited information available about the provenance of TU 11 and 31 does not provide any means of dating these two tablets.

Fortunately, it is possible nevertheless to establish a *terminus post quem* for TU 11 (and as a corollary, for TU 31) based on a hitherto unnoticed parallel with Greco-Roman sources. In a section dealing with cyclical meteorological phenomena of ominous significance, the text indicates that:

“In 72 years a comet which had appeared in the Tails, will appear (again) in the Tails, (and) in 36 years it will correspond (Akk. *ip-pal*, lit. ‘answer’). In 21 years rain will correspond to rain, flood to flood. In 21 years an earthquake will correspond to an earthquake. In 654 years – broken (Akk. *he-pî*).” (TU 11, rev. 27-28; transl. Brack-Bernsen and Hunger, slightly modified)¹⁵

⁸ See TU 16, rev. 55; BRM 4, 12, 84.

⁹ See TU 31 rev., col. 2, 33-35.

¹⁰ On the mathematical contents of TU 31, an unusual table of reciprocals, see Ossendrijver, 2019: 191-201.

¹¹ Dimensions indicated by Véronique Pataï of the Musée du Louvre (private communication).

¹² See Proust and Steele, 2019: 42-43.

¹³ See Proust and Steele, 2019: 43, Table 1.3.

¹⁴ See Proust and Steele, 2019: 40, n. 48.

¹⁵ See TU 11, rev. 27-28, in Brack-Bernsen and Hunger, 2002 (p. 11): *ina* 1.12 MU.MEŠ ^d*šal-lum-mu-ú šá ina* KUN IGI *ina* KUN.ME IGI *ina* KUN-*ma* IGI / *ina* 36 MU.MEŠ *ip-pal ina* 21 MU.MEŠ ŠÈG *ana* ŠÈG A.KAL *ana* A.KAL *ip-pal ina* 21 MU.ME *ri-i-bi ana ri-i-bi ip-pal*

Before proceeding with the chronological argument, it should be noted that the unpublished tablet BM 36665+37056+37074 from Babylon contains a quasi-duplicate of this passage on Rev. 7-10.¹⁶ While the rest of the section mostly agrees with the Uruk tablet, Rev. 10 reads: *ina* 10, 48 MU.MEŠ¹ *ana* 1-en GUR šá 1MU² [...].¹⁷ Regardless of whether the time-period on the Babylon tablet should be read “in 648 years” or “in 658 years”, two alternative interpretations of the difference with the Uruk tablet offer themselves: either the discrepancy is due to a scribal error, in which case there is no basis on which to decide which tablet has the correct number; or the number, and perhaps the text after it, were altered intentionally to 654 in a precursor of the Uruk text to reflect a difference in world-view, as often happens in scholarly texts. The present author inclines towards the second interpretation, but whatever the case may be, the textual variant 648 (or 658) in BM 36665+ does not significantly weaken the argument that will now be presented for dating TU 11 based on the 654-year period.

At first glance, it may seem hopeless to try to explain this 654-year period, considering that the remainder of the sentence was broken in the tablet from which TU 11 was copied (or in an earlier exemplar). Furthermore, no explanation has been put forward of this number in the context of Mesopotamian astral sciences, which suggests that the number may have a foreign background. And indeed, a similarly cyclical and ominous 654-year period is known from ancient Greek and Roman texts (this parallel does not seem to have been pointed out in previous literature).¹⁸ The Byzantine encyclopedia known as the *Souda*, which compiles valuable ancient sources, indicates the following in its entry on the phoenix:

“During the reign of emperor Claudius (viz. 41-54 CE), they say that it (i.e. the phoenix-bird) came unto the Egyptians after a period of 654 years.” (*Souda*, φ 798; my translation)¹⁹

Similar information is given by the historian Publius Herennius Dexippus (3rd c. CE), as quoted by the Byzantine Chronographer George Syncellus (8th-9th c. CE):

“At this time (viz. during the reign of emperor Claudius), the phoenix-bird appeared, according to the Egyptians’ reports, having appeared 654 years earlier, as Dexippus also agrees.” (P. Herennius Dexippus *apud* George Syncellus, p. 407, ll. 3-4 Mosshammer; my translation)²⁰

ina 6 ME 54 MU.MEŠ *he-pí*. Collation of the original tablet confirmed Thureau-Dangin’s hand-copy and Brack-Bernsen and Hunger’s edition for this passage, including the number 654.

¹⁶ The three fragments in the British Museum were joined by John Steele, who generously permitted me to quote from his forthcoming edition.

¹⁷ According to Prof. Steele, the traces he reads as 48 are also consistent with 58, although he finds this less plausible. The meaning of *ana* 1-en GUR, literally “(they) return to one”, remains unclear to the present author.

¹⁸ On the complex cosmic symbolism of the phoenix in the Greco-Roman world and its relation to the Egyptian *benu*, see Van den Broek, 1972.

¹⁹ See *Souda*, φ 798 Adler, s.v. Φοῖνιξ: Ἐπὶ Κλαυδίου Καίσαρος ἐλθεῖν φασι τοῦτο τοῖς Αἰγυπτίοις διὰ τεττάρων καὶ ν’ καὶ χ’ ἐτῶν.

²⁰ See George Syncellus, *Ecloga chronographica*, p. 407, ll. 3-4 Mosshammer: Ἐν τούτοις τοῖς χρόνοις ἐφάνη τὸ ὄρνειον ὁ φοῖνιξ, καθὼς ἱστοροῦσιν Αἰγύπτιοι, πρὸ χνδ’ (corr. Dindorf: χν’ δὲ codd.) ἐτῶν φανεῖς, ὡς καὶ Δέξιππος συμφωνεῖ. Dindorf’s correction assumes the common scribal error of mistaking the numeral δ’ (4) for the particle δέ (especially in its elided form δ’).

The cyclical character of the Phoenix period is implicitly grounded in the most fundamental aspect of the Phoenix myth, viz. the bird's periodic death and rebirth.²¹ Underlying the terse chronographical reports by Dexippus and the *Souda* is a well attested event of Claudius' reign. Pliny the Elder (*Natural History* X, 5; see also Caius Iulius Solinus, 33, 14, who depends on Pliny) tells us that during the celebrations for the 800th anniversary of the founding of Rome, which took place during the sixth year of Claudius' reign, the emperor had the "phoenix" brought to Rome and put on display on the Comitium (the open-air assembly space) of the Forum Romanum:

Cornelius Valerianus phoenicem devolavisse in Aegyptum tradit Q. Plautio Sexto Papinio coss.; allatus est et in urbem Claudii principis censura anno urbis dccc et in comitio propositus, quod actis testatum est, sed quem falsum esse nemo dubitaret.

"Cornelius Valerianus reports that a phoenix flew down into Egypt in the consulship of Quintus Plautius and Sextus Papinius (viz. 36 CE); it was even brought to Rome in the Censorship of the Emperor Claudius eight hundred years after the founding of the City and displayed in the Comitium – a fact attested by the Records, although nobody would doubt that this phoenix was a fabrication." (Pliny the Elder, *Natural History*, X, 5; transl. H. Rackham, slightly modified²²)

Although, according to Pliny, no one at the time believed this phoenix to be real, its existence appears to have been taken for granted by later authors.²³ Tacitus reports that the phoenix had appeared under pharaohs Sesosis (probably meaning Sethos I), Amasis II, and Ptolemy III Euergetes, and more recently under Tiberius in 34 CE:

Paulo Fabio L. Vitellio consulibus post longum saeculorum ambitum avis phoenix in Aegyptum venit praebeuitque materiem doctissimis indigenarum et Graecorum multa super eo miraculo disserendi.

"In the consulate of Paulus Fabius and Lucius Vitellius (viz. 34 CE), after a long period of ages, the bird known as the phoenix visited Egypt, and supplied the learned of that country and of Greece with the material for long disquisitions on the miracle." (Tacitus, *Annals* VI, 28; transl. J. Jackson²⁴)

Tacitus adds that the authenticity of this appearance was debated because the time interval from its latest purported appearance under Ptolemy III Euergetes was considered too short:

De numero annorum varia traduntur. Maxime vulgatum quingentorum spatium: sunt qui adseverent mille quadringentos sexaginta unum interici, prioresque alios tres Sesoside primum, post Amaside dominantibus, dein Ptolemaeo, qui ex Macedonibus tertius regnavit, in civitatem, cui Heliopolis nomen, advolavisse, multo ceterarum volucrum comitatu novam faciem mirantium. Sed antiquitas quidem obscura: inter

This is F 15 in Martin, 2006; and F 16 in Mecella, 2013. Notably, neither Mosshammer nor Martin and Mecella accept Dindorf's correction of the number of years, which according to the text of the manuscripts is indicated as 650, but they appear to have been unaware of the parallel with the *Souda*, which strongly supports Dindorf's correction to 654.

²¹ See Van den Broek, 1972 (especially p. 146-232).

²² See Rackham, 1940: 295.

²³ See Van den Broek, 1972: 116.

²⁴ See Jackson, 1937: 201.

Ptolemaeum ac Tiberium minus ducenti quinquaginta anni fuerunt. Unde nonnulli falsum hunc phoenicem.

“As to its term of years, the tradition varies. The generally received number is five hundred; but there are some who assert that its visits fall at intervals of 1461 years, and that it was in the reigns, first of Sesosis, then of Amasis, and finally of Ptolemy (third of the Macedonian dynasty), that the three earlier phoenixes flew to the city called Heliopolis with a great escort of common birds amazed at the novelty of their appearance. But while antiquity is obscure, between Ptolemy and Tiberius there were less than two hundred and fifty years: whence the belief has been held that this was a spurious phoenix.” (Tacitus, *Annals* VI, 28; transl. J. Jackson²⁵)

This passage further illustrates that the duration of the phoenix cycle was a matter of debate among Roman scholars, as was the exact moment of its appearance. Nonetheless, the appearance of a phoenix towards the end of Tiberius’ reign was clearly understood in the Roman empire as a potential sign of epochal change.²⁶ An appearance of the phoenix towards the end of Tiberius’ reign should have announced prosperity under the next emperor, but this did not ensue as Caligula (r. 37-41) proved to be a mad and cruel ruler. It is in this context that Caligula’s successor Claudius exhibited the phoenix on the Roman Forum, hoping to usher in a new Golden Age. Considering the scholarly debates about the date and authenticity of the phoenix’s appearance under Tiberius, it is understandable that later tradition focused on the event of the Roman exhibition during the city of Rome’s 800th anniversary, rather than on the bird’s doubtful appearance.

Although the number 654 has defied explanation until now²⁷, it appears to have been derived by Greco-Roman scholars who calculated the interval between the reign of pharaoh Amasis II, when a previous appearance of the phoenix was supposed to have taken place, and the 6th year of Claudius’ reign. To perform this calculation, they demonstrably used a list of regnal durations that was related to the regnal years in Eusebius’ *Chronicles*: the first year of Claudius’ reign is supposed to have been in *anno Abrahami* 2057 (according to both Jerome’s Latin translation and to the anonymous Armenian translation), and the first year of Amasis II’s reign in *anno Abrahami* 1451 (also according to both translations).²⁸ Now, the subtraction of 1451 from 2057 yields a period of 606 years, to which adding 6 (for the sixth regnal year of Claudius) yields a result of 612 years. This is still 42 years short of the phoenix period, which is exactly the length of Amasis’ reign according to Eusebius. For whatever reason, the authors of the calculation must have assumed that a.A. 2057 was not the beginning but the end of Amasis’

²⁵ See Jackson, 1937: 201.

²⁶ See Van den Broek, 1972: 113 ff.

²⁷ See Van den Broek, 1972: 69.

²⁸ The original Greek text of Eusebius’ chronicle is mostly lost and must be reconstructed by comparing Jerome’s Latin translation and the anonymous Armenian translation. When both agree with each other, this generally indicates that they reflect Eusebius’ original text faithfully. The reference edition of Jerome’s Latin translation is by Helm, 1956; the reference edition of the anonymous Armenian translation is by Karst, 1911. Useful information on how to use Eusebius’ *Chronicle* is given by Mosshammer, 1979; and in Cohen-Skalli, 2020.

reign, and therefore added another 42 years to the 612 years. These arithmetical operations can be conveniently summed up as:

$$2057 \text{ (beginning of Claudius' reign)} - 1451 \text{ ((beginning of) Amasis' reign)} + 42 \text{ (length of Amasis' reign)} + 6 \text{ (for the sixth year of Claudius' reign)} = 654 \text{ years.}$$

This calculation can be described as an attempt by ancient scholars to determine, based on the chronological evidence available to them, the exact duration of the period between two successive appearances of the phoenix (this attempt contrasts with the vague figure of 500 years that was ‘generally received’ according to Tacitus, and with a different attempt at an exact assessment by reinterpreting the so-called Sothis period of 1461 years, which is important in calendar theory, as the Phoenix period). Although it is not possible to divine just how the calculations were conducted and combined, the above reconstruction implies that the 654-year period, explicitly associated in Greco-Roman sources with appearances of the phoenix, cannot have been calculated before the sixth year of Claudius’ reign, i.e. in 47 CE.

In and of itself, it is unlikely that such a large number as 654 would appear in a Late Babylonian tablet, independently from the Greco-Roman tradition, as the period between two instances of an ominous event. It was likely to travel far in as much as it was connected with an event of worldwide significance: the 800th anniversary of the Roman empire. Furthermore, the reference in George Syncellus, by mentioning a local Egyptian tradition in this connection, may bear witness to the intercultural circulation of a 654-year phoenix cycle all around the Mediterranean, although we should be wary of the possibility that this local tradition may have existed only in George’s or Dexippus’ mind. A similar instance of long-distance exchange arguably underlies the comet period of 72 years mentioned by TU 11, which is close to the 70-year comet period referred to in the Babylonian Talmud, *Horayoth* 10a²⁹. Finally, the notion of a phoenix-bird had an analogue in Mesopotamian mythology in the guise of the monstrous storm-bird Anzû, who shares the phoenix’s eagle-like features, mountain origins and connection to flooding³⁰, and has obvious cosmic significance although he does not seem to be otherwise associated with periodic returns.³¹ Under these circumstances, it is reasonable to assume that the 654-year period made its way from Rome to scholars of the cuneiform tradition, perhaps through intermediaries.

Some consequences of dating TU 11 based on the 654-year cycle

²⁹ For a detailed discussion of this parallel, see V. Gysembergh, in press. The story of Gamaliel’s voyage to Rome is generally dated towards the end of the reign of Roman emperor Domitian (r. 81-96). This passage and TU 11 contain the only two quantitative assessments of a comet period known from Antiquity.

³⁰ On the mythology of Anzû see esp. Hruška, 1975. On Anzû and the phoenix’s eagle-like features, compare Hruška, 1975: 251-253 and Van den Broek, 1972: 251-253; on their mountain origins, compare Hruška, 1975: 48-51 Van den Broek, 1972: 166-168 and *passim*; on their connection to flooding, compare SB Anzû, Tablet 1, ll. 50-51 (with Foster, 2003: 555), and van den Broek, 1972: 71-74 and *passim*.

³¹ Indeed, it is possible that a reference to Anzû was made in the *Vorlage* of TU 11 before it was broken (an unfortunate break in the *Vorlage* just after the indication of “654 years” by the *he-pi* notation at the end of TU 11, rev. 28) – but this is a mere guess.

Having made the case for dating TU 11 based on the parallel with the 654-year phoenix cycle known from Greco-Roman sources, let us now move on to considering some consequences of such a dating. Not only does it put the date of TU 11 in or after 47 CE: since the tablet is a copy of a broken *Vorlage*, decades (if not centuries!) likely separate it from its original exemplar, so that the Louvre tablet may have been copied at any time during the second half of the 1st century CE, or even during the 2nd or 3rd century³². Indeed, it is perhaps more likely, on the whole, that the 654-year cycle was borrowed after Roman emperor Trajan's campaign to the East of the Euphrates (115-117 CE).³³ However, it should also be noted that Mediterranean influences were present in Uruk even before Trajan's attempted conquest, as evidenced most clearly by the Greek language and formulary of the inscription from Uruk commemorating the erection of a statue of Artemidoros, son of Diogenes, also called Minnanaios, son of Touphaios, in the temple of the otherwise unknown god Gareus - which inscription dates from 110/111 CE (= 422 SE).³⁴ In any case, a date after 47 CE makes it all the more remarkable that the tablet is well shaped despite its large format, and that it exhibits firing-holes and was probably baked (as noted above), which indicates a deep familiarity with clay as a writing medium. The tablet's well-formed, non-cursive style of writing is also striking, as the latest cuneiform tablets are often characterized by very cursive script.³⁵ Finally, the indentation of overflowing lines (as noted above) may provide further support for a very late date, as in astronomical almanacs where this feature appears only in the latest tablets.³⁶

As a corollary, tablet TU 31 (mentioned above), seemingly written by the brother of the scribe of TU 11, must also be dated to the 1st c. CE or later. These two tablets taken together point to intense activity in the astral sciences and mathematics in Uruk at the time when they were written. Indeed, TU 31 is a highly unusual table of reciprocals that contains entries not usually included in tables of reciprocals³⁷; and TU 11 presents many features in content and language that are unparalleled in extant cuneiform literature³⁸. This suggests that Babylonian science was still alive and continuing to evolve at the time when TU 11 and TU 31 were written. Evidence for such scientific activity also casts a different light on the almanac tablet W 22340a (mentioned above): although the difficulties with its astronomical dating remain, they can of course be due to recording errors and/or scribal mistakes. In a context where Babylonian astral

³² On the first and second centuries CE as the period when Uruk was most populated according to the archeological record, see Oppenheimer, 1983: 337.

³³ It is possible that Uruk was part of the province of Assyria reportedly created by Trajan, as implied by Maricq, 1959 (esp. pp. 257-262). An undated Greek inscription from Uruk may be evidence of support for the Roman empire, on its reading as Κῆσαρ νικᾷ ("hail to the emperor", with iotacistic form of), proposed by Canale di Rossi, 2004: 85, n° 141. However, the existence of this province is disputed, see e.g. Lightfoot, 1990: 121-124.

³⁴ The text of the inscription is given by Oppenheimer, 1983: 335-336; and by Canale di Rossi, 2004: 84-85, n° 140. Both authors consider it unlikely that the "year 422" in the text refers to the Arsacid era, which would make its date 175 CE.

³⁵ For this claim see e.g. Walker, 1987: 18.

³⁶ On indentation as a characteristic of the latest cuneiform tablets from Babylon see Sachs, 1976: 380 and 395.

³⁷ See Ossendrijver, 2019: 191-201.

³⁸ See the comments by Brack-Bernsen and Hunger, 2002 (esp. pp. 17-23).

sciences were still in practice in Uruk, Hunger and De Jong's dating of the tablet to 79-80 CE becomes much more likely.³⁹

The latest currently datable cuneiform tablet from Babylon is an almanac for the years 74/75 CE, and almanacs are also extant for the years 31/32, 36/37, 44/45 and 61/62 CE.⁴⁰ The addition of two or three cuneiform tablets from Uruk datable to the 2nd half of the 1st century CE or later invites the possibility that other undated Late Babylonian cuneiform tablets, especially of astral and mathematical content, were also written later than commonly assumed. The scribes in these times may have had no reason to refer to the Seleucid or Arsacid era or other dating conventions, and they may conceivably have had reason not to. The vast majority of Late Babylonian tablets not being explicitly dated, it is at least theoretically possible that a significant fraction of this material was in fact written in the 1st century CE or later. Next to Babylon and Uruk, other possible sources of tablets from such a late time are Nippur and Sippar, both of which may lie behind the mention of a city called '*Hipparenum*' quoted by Pliny the Elder (*Natural History* VI, 123) next to Babylon and Uruk as one of the three centers of "Chaldean" learning in his time.⁴¹

The survival, and indeed continuing development, of at least some strands of cuneiform culture sheds new light on the so-called 'Graeco-Babyloniaca', a corpus of sixteen clay tablets each bearing an Akkadian text written in both cuneiform and Greek script, and two clay tablets each bearing an Akkadian or Aramaic text written in Greek script.⁴² The date and purpose of these tablets has been the object of much debate. The evidence presented here is consistent with the idea that they were experiments by advanced cuneiform scholars in using a more generally accepted graphic system to couch their ideas in writing. It also supports the possibility that at least some of the 'Graeco-Babyloniaca' were written in the first centuries CE, as is also suggested by paleographic datings (although paleographic parallels with other Greek texts must be considered with caution because these other texts were not written on clay).⁴³

Finally, this opens up the possibility that traces of Mesopotamian influence in texts from other cultures from the first centuries CE may be due to contemporary instances of cultural interaction, and not to the use of older sources. The latest datable instance known to the present author is a report by the Neoplatonist philosopher Damascius of Athens (*ca.* 460 – after 538

³⁹ See Hunger and De Jong, 2014.

⁴⁰ See Sachs, 1976: 1.

⁴¹ On the identification of the city called 'Hipparenum' by Pliny see Oelsner, 1971 and 1982.

⁴² On the Graeco-Babyloniaca see esp. Maul, 1995; Geller, 1997; Westenholz, 2007; and most recently Oelsner, 2014 (with further bibliography).

⁴³ A paleographical dating of the Greek script of HSM 1137 to the first century CE or later was suggested by Herwig Maehler and Walter Cockle *apud* Geller, 1983: 114. A paleographical dating of the Greek script of BM 48863 to the first century CE was suggested by M.J. Geller, 1997: 73; of BM 77229 to the first century CE by Geller 1997: 75; of HSM 1137 to the first century CE "and possibly second cent. or early third cent." by Geller, 1997: 76; of BM 34816 to the first century CE by Geller 1997: 76; of VAT 412 to the reign of Tiberius, by E. Schmidt *apud* E. Sollberger *apud* Geller 1997:78; of BM 38461 to the first or second century CE by Geller 1997: 79; of BM 34798 to the first century CE by Geller 1997: 82. Further consideration of the Graeco-Babylonia by Greek paleographers is highly desirable.

CE) on “Babylonian” theology that gives an interesting variant of the theogony presented at the beginning of *Enūma Eliš*.⁴⁴

Among the Barbarians, the Babylonians seem, on the one hand, to keep silent about the one principle of all things, and on the other hand, to produce two, Tauthe and Apasōn; they make Apasōn the husband of Tauthe and call her the “Mother of gods”. From them was begotten, as an only son, Mōumin, who is, I think, the intelligible cosmos itself, made from the two principles. From these same (*viz.* gods) came forth another generation, Lachê and Lachos; and again, from the same (*viz.* Apasōn and Tauthe), a third (*viz.* generation), Kissarê and Assēros, from whom are born three (*viz.* gods), Anos, Illilos and Aos. From Aos and Dauchê is born a son, Bēlos, who according to them is the demiurge. (Damascius, *De principiis* 3, 165, 6-16 Westerink; my translation).⁴⁵

Differences with the *Enūma eliš*, such as the mention of Enlil, show that Damascius’ source(s) cannot have been the standard Babylonian text (nor does it match any other known cuneiform text relating to the myth). The Babylonian theonyms in Damascius’ report are remarkably accurate – more so than the often Hellenized Babylonian theonyms introduced in the Greek-speaking world by Berossus (e.g. Ταλάτθ for Tiāmtu). This level of accuracy shows that Damascius cannot be relying on his acknowledged source Eudemus of Rhodes (4th c. BCE) for the theonyms: in the centuries separating Damascius from Eudemus, these foreign names would have been corrupted beyond recognition by scribal mistakes, in accordance with a phenomenon that can be observed in the manuscript tradition of countless classical texts. Moreover, Damascius was able to explain the difficult word *mummu* from the Akkadian text by equating it with the Neoplatonic notion of the ‘intelligible cosmos’, echoing one of the possible Akkadian meanings of the word (*viz.* ‘intelligence, wisdom’⁴⁶). Since he had occasion to travel in the Near East and is known to have actively researched foreign theologies, it is plausible that he combined general information from Eudemus with specific details such as theonyms collected during his travels. This implies that traditions pertaining to Babylonian theology were still maintained in the Near East in the sixth century CE.

In summary, the dating of TU 11 to after 47 CE, the similar dating of TU 31, and the astronomical dating of W 22340a, establish that there was a lively community of practitioners of the astral sciences and mathematics in the cuneiform tradition in the second half of the first century CE, and possibly later. This in turn makes it plausible that the culture embedded in cuneiform texts survived and continued to evolve in contact with other cultures during the first

⁴⁴ For an in-depth study of this report, see Gysembergh and Lecerf, 2016.

⁴⁵ Greek text: Τῶν δὲ βαρβάρων εἰκόασι Βαβυλώνιοι μὲν τὴν μίαν τῶν ὄλων ἀρχὴν σιγῆ παριέναι, δύο δὲ ποιεῖν Ταυθὲ καὶ Ἀπασῶν, τὸν μὲν Ἀπασῶν ἄνδρα τῆς Ταυθὲ ποιοῦντες, ταύτην δὲ μητέρα θεῶν ὀνομάζοντες, ἐξ ὧν μονογενῆ παῖδα γεννηθῆναι τὸν Μωϋμίν, αὐτόν, οἶμαι, τὸν νοητὸν κόσμον ἐκ τῶν δυεῖν ἀρχῶν παραγόμενον· ἐκ δὲ τῶν αὐτῶν ἄλλην γενεὰν προελθεῖν, Λαχην καὶ Λαχον, εἶτα αὖ τρίτην ἐκ τῶν αὐτῶν, Κισσαρη καὶ Ασσωρον, ἐξ ὧν γενέσθαι τρεῖς, Ἄνον καὶ Ἰλλίλον καὶ Ἄον· τοῦ δὲ Ἄου καὶ Δαυκης υἱὸν γενέσθαι τὸν Βῆλον, ὃν δημιουργὸν εἶναί φασι.

⁴⁶ On this possible meaning of *mummu* see Lambert, 2013: 219. According to Lambert, the equation of *mummu* with νοητός κόσμος (‘intelligible cosmos’) stems from Eudemus, but this is implausible because the concept is typically Neoplatonic, not Peripatetic.

centuries CE. This makes it highly desirable to continue in future both the search for other tablets datable to the first century CE or later, and the investigation of cultural exchange between the cuneiform and other traditions that may have taken place after the first century CE.

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