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BM 30617: An astronomical diary from the reign of Antiochus and his son Antiochus*

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Abstract
This is the first publication of the astronomical diary BM 30617 from Babylon. This clay tablet shows an example of "preliminary diaries", which record primary observations of the sky and, if any, the Euphrates for one month or less. The cuneiform text of BM 30617 shows the primary day-by-day observations of the sky over the first four days of the Babylonian month IX (Kislīm). The recorded phenomena are dated to an unknown year during the joint kingship of Antiochus and his son (or stepson), also named Antiochus, of the Seleucid dynasty. Some clues in the diary, however, help us to narrow down the candidates for the year to which our month IX belongs.
Keywords: Antiochus, Astronomical diaries, Babylon, Clay tablet, Preliminary diaries, Seleucids

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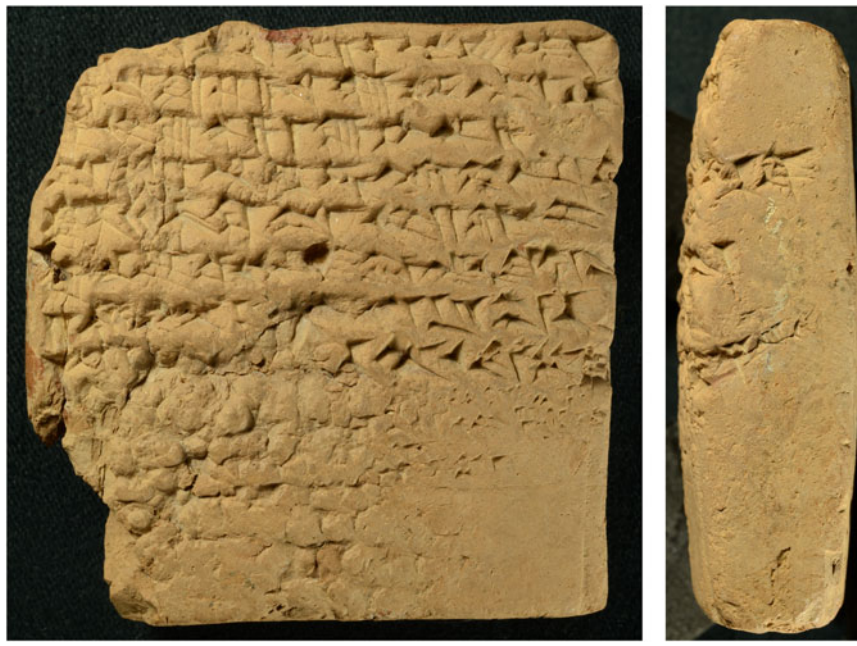
> *ADART* = Abraham J. Sachs and Hermann Hunger, *Astronomical Diaries and Related Texts from Babylonia* (Vienna: VÖAW, 1988–).
> PD = Richard A. Parker and Waldo H. Dubberstein, *Babylonian Chronology: 626 B.C.–A.D. 75* (Providence, RI: Brown University Press, 1956).
> SE = Seleucid Era (its first year, 1 SE, corresponds to the Babylonian calendar year which began in the spring of 311 BC, or of -310 in astronomical year numbering).

Since the greater part of 1 SE falls in the year -310, the diary for 1 SE, if any, should be numbered -310. If two or more diary tablets are preserved for the same year, a capital letter (A, B, etc.) is added to each diary's year number according to chronological order (see *ADART* 1: 37).



Figures 1 and 2. BM 30617 Obv. and Right edge (Photographed by the author, published courtesy of the Trustees of the British Museum)

This paper makes available for the first time the astronomical diary recorded on BM 30617, a square clay tablet in the collections of the British Museum.[1] It belongs to the group of astronomical texts from Babylon in the 1876-11-17 collection.[2] The tablet measures 62 × 62 × 22 mm. The left end of the tablet is now partly lost. The last five lines of the text are also damaged severely, especially on their left half. Lines 1–8 are, however, almost fully preserved. Following a transliteration and translation of the new text, with brief commentary, a discussion of the function of the diary and the date of the recorded phenomena are offered.[3] Photographs and a hand copy of the tablet are shown in Figures 1–3.

1 This tablet was brought to my attention by Christopher Walker and Mathieu Ossendrijver.

2 For this collection, see Govert van Driel, "The British Museum 'Sippar' Collection: Babylonia 1882–1893", *ZA* 79/1, 1989, 106–17.

3 For conventions of the transliterations, translations, and citations of the astronomical diaries and related texts, see *ADART* 1: 36–38. One exception adopted in this paper is to follow *MZL*, instead of Rykle Borger, *Assyrisch-babylonische Zeichenliste* (Kevelaer: Butzon & Bercker, 1978), in transliterating. For logograms, words, and phrases often attested in the astronomical diaries, see *ADART* 1: 20–36.

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BM 30617 (1876-11-17 344)

Transliteration

Obv.

1 [MU nn.]⸢KAM ^{m}*an*⸣ *u* ^{m}*an* A-*šú* LUGAL^{meš} GAN 1
2 [10$^{?}$+]8 *na-su* KUR$_4$ *a-pir ina* (or *u*$^{?}$) DIR *muš ina* GUB IGI
3 [*ka*]*l* GE$_6$ DIR AN ZA 1 DIR SAL AN ZA <*šamáš* TÙR NIGIN> ⸢DIR$^{?}$⸣
4 TA ⸢*še-rì*⸣ EN KIN.SIG *ina lìb-bi* TÙR UŠ-*di*
5 KI ŠÚ *šamáš* AN$^{!!}$ SI GIN GE$_6$ 2 *kal* GE$_6$
6 ⸢DIR⸣ AN DIB ⸢USAN⸣ MURUB$_4$ AN DUL SI GIN
7 2 ⸢DIR SAL⸣ AN ZA *šamáš* ⸢TÙR⸣ NIGIN$^{!!}$ KÁ-*šú*
8 *ana* ⸢ULÙ BAD x⸣ [x x] ŠÚ AN DUL NA$_4$ TUR$^{!!}$ ŠUR-*nun* <*a*->*kam*
9 [x x x x x x x GE$_6$ 3] ⸢SAG⸣ GE$_6$ DIR AN ZA
10 [x x x x x x] ⸢SI$^{?}$⸣ GIN GE$_6$ 4 SAG GE$_6$
11 [x x x x x x x] ⸢x⸣
12 [x x x x x x x x] ⸢x⸣ GIN

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13 [MU nn.KAM$^{?}$ ^{m}*an u* ^{m}]⸢*an* LUGAL⸣$^{<meš>}$

(ca. four lines are left blank)

Lower edge

(Blank)

Rev.

(Blank)

Upper edge

(Blank)

Left edge

(Only the central part is preserved; it is clearly blank)

Translation

Obv.

1 [Year nn], Antiochus and Antiochus, his son, kings. Month IX, the 1st (of which followed the 30th of the preceding month),[4]
2 sunset to moonset,[5] [10$^{?}$+]8°;[6] (though the new moon) was bright, with earthshine, (and) behind / among clouds, (the interval was) measured; it (the new moon) was visible while (the sun) stood there;
3 all night clouds were in the sky. The 1st,[7] thin clouds were in the sky; <the sun was surrounded by a halo, > a cloud$^{?}$
4 remained inside the halo from the morning until the afternoon;

4 For the interpretation of the indication “the 1st” or “the 30th” as the opening of the description of each month in the diaries (see *ADART* 1: 38).
5 Each Babylonian day begins at sunset (see *ADART* 1: 15).
6 This is the length of the interval between the sunset and the moonset. It is measured in UŠ (time degrees). 1 UŠ = 4 minutes (see *ADART* 1: 16).
7 This date just indicates the daytime of the relevant day. It followed the night of the same day.

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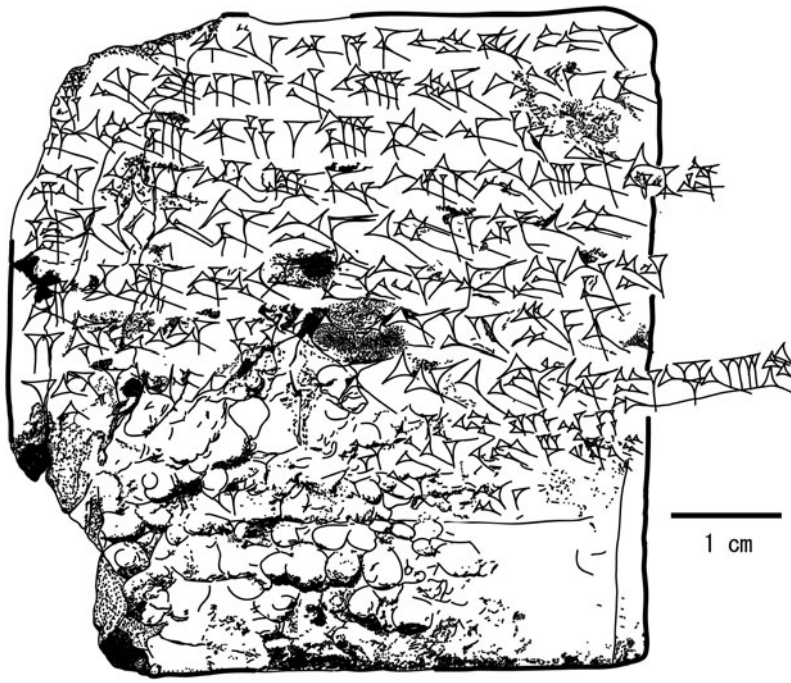

Figure 3. BM 30617 Obv. and Right edge: hand copy (Photographed and traced by the author, published courtesy of the Trustees of the British Museum)

5 at sunset, it rained, the north wind blew. The night of the 2nd, all night
6 clouds crossed the sky; in the first and the middle part of the night, rain DUL,[8] the north wind blew.
7 The 2nd, thin clouds were in the sky; the sun was surrounded by a halo, its door
8 was open to the south; [in ...,] overcast, rain DUL; it (also) rained small hailstones;[9] mist
9 [crossed / covered the sky .... . The night of the 3rd,] in the beginning of the night, clouds were in the sky;
10 [....] the north? wind blew. The night of the 4th, in the beginning of the night,
11 [....] ...
12 [....] ... wind blew.

13 [Year nn?, Antiochus and] Antiochus, kings.

8 The sign DUL seems to represent a verb, but no fitting reading can be suggested. See *ADART* 1: 30; Mathieu Ossendrijver, "Translating Babylonian astronomical diaries and procedure texts", in Annette Warner-Imhausen and Tanja Pommerening (eds), *Translating Writings of Early Scholars in the Ancient Near East, Egypt, Greece and Rome: Methodological Aspects with Examples* (Berlin: De Gruyter, 2016), 155.

9 The word *abnu* expressed by the sign NA_4 means "hailstones" in this context (see *CAD*, s.v. "abnu A 6"). Hailstones are often attested in the diaries (*ADART* 1 -273B Obv.' 29; *ADART* 2 -253A_1 'Rev. 8'; *ADART* 3 -156A 'Obv.' 15', *et passim*).

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Commentary

Obv.

2 The streak before the numeral 8 looked like a part of the numeral 20 at first glance. It is, however, a part of an accidental scratch in ring shape.[10]

The syllabic *muš* is the abbreviation of *mušš*u*ḫ*, "measured" (see *ADART* 6: XII). This abbreviation often follows the description that the new moon was "bright and with earthshine (KUR$_4$ *a-pir*)".[11] Earthshine is "a faint illumination of the dark part of the Moon when it is a thin crescent, caused by sunlight reflected from the Earth".[12] Both strong brightness and earthshine make the appearance of the crescent ambiguous and the observation of its set difficult. The following abbreviation *muš* emphasizes that the interval between the sunset and the moonset was regularly measured under such a difficult condition.

3 The scribe of our diary must have omitted the sentence *šamáš* TÙR NIGIN, "the sun was surrounded by a halo", because the next sentence shows a movement of some object with the halo in the daytime (TA ⌜*še-ri*⌝ EN KIN.SIG, see line 4). The trace at the end of line 3 indicates that the object is DIR, "a cloud". The cloud itself was, however, not able to create the halo. The sun should have been the source of light which made the halo around the bright body. A halo around the sun is usually designated by the sentence *šamáš* TÙR NIGIN in the diaries (*ADART* 2 -182A 'Rev.' 10', -171C Rev. 4, *et passim*).

4 The signs UŠ-*di* represents *irdi*.[13] The verb *redû* is used in the context where a planet follows another planet or a planet pursues a certain course (*CAD*, s.v. "redû A 2c"). In our case, some object (probably a cloud) "followed" the sun and remained inside the halo around it (see also the comment for line 3 above).

5 The second horizontal stroke of the fourth sign, AN, is written slightly above the first one.

7 The eighth sign shown as "NIGIN" looks like ŠANABI; cf., however, LAGAB (KUR$_4$) in line 2.

8 The eleventh sign shown as "TUR" looks like ḪAŠḪUR. Furthermore, its last horizontal stroke goes over the rim of the tablet and continues to the beginning of the last sign *kam* on the right edge. The extension is probably *lapsus calami*.

Function of the diary

The diary only shows the phenomena observed in the sky for the first four days of a certain month IX (Kislīm) of the Babylonian calendar. We expect some

10 Cornelia Wunsch also rejected the possibility that this streak represents the numeral 20 (personal communication, 1 February 2013).

11 *ADART* 2 -175B Obv.' 1; *ADART* 3 -157A Obv. 1, *et passim*. See also *ADART* 6: XII.

12 *Oxford Dictionary of Astronomy*, 2nd revised ed., s.v. "earthshine", accessed 12 May 2013, http://www.oxfordreference.com/view/10.1093/acref/9780199609055.001.0001/acref-9780199609055.

13 The author would not have transliterated these signs without Ulrike Steinert's help (in discussion with the author, January 2013).

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astronomical data on the astronomical diaries, but this diary mainly records the bad weather which prevented astronomical observations. The record is written in a strong script from the beginning towards the end of line 8. The last two signs of this line, however, are written in a shallow script. The shallow script can also be seen on the following five lines. This decrease in sign depth is matched by a decrease in sign size. The signs in the first eight lines are ca. 5 mm high, while those from line 9 onwards are only 2–3 mm high.

The limited content, short period of the record, and change in the script, indicate that the tablet records primary day-by-day observations of the sky. The author has called the tablets of this kind "preliminary diaries" and differentiated them from "short diaries".[14] Each short diary records not only phenomena in the sky and river levels of Euphrates, but also commodity prices and historical events for a certain period of less than two or three months.[15] Its report of phenomena in the sky and river levels was derived from one or more preliminary diaries, which record primary observations of the sky and, if any, the Euphrates for one month or less.[16] This kind of record was made simultaneously with the observations, being updated day by day. Thus, for example, it would have taken four days to write the records for four days' observations. Sometimes the clay tablets became too dry to inscribe clear cuneiform signs over the course of time. The signs on the dried, hard clay are shallow,[17] such as those after line 8 of our tablet. These small signs would have spared the scribe of our diary the effort of scratching large wedges into the hard clay. The lower obverse of our tablet is left blank, and no signs are visible on its lower edge, reverse, upper edge, or left edge. This indicates that the scribe stopped the record on the dried tablet after trying shallow and small wedges for a few lines. The ruling between lines 12 and 13 indicates the end of the observation record on our tablet. The last line is severely damaged, but the remaining traces suggest that the scribe repeated the names of the rulers shown in line 1 at the middle of the last line. This restoration leaves a space at the beginning of the last line, where the author tentatively puts a repeat of the year number shown in the first line.

14 Yasuyuki Mitsuma, "From preliminary diaries to short diaries: the first and second steps in the compilation process of the Late Babylonian astronomical diaries", *SCIAMVS: Sources and Commentaries in Exact Sciences* 16, 2015, 55–9.

15 The period covered by the short diaries is shown in Abraham J. Sachs, "Babylonian observational astronomy", *Philosophical Transactions of the Royal Society of London* A. 276, 1974, 49; Mitsuma, "From preliminary diaries to short diaries", 55. Aside from the short diaries, there are also the tablets called "longer" or "standard diaries". They are thought to be compiled from several short diaries. Each tablet of the longer diaries covers a period around six months. For the longer diaries, see Sachs, "Babylonian observational astronomy", 49; *ADART* 1: 12; Hermann Hunger and David Pingree, *Astral Sciences in Mesopotamia* (Leiden: Brill, 1999), 142–4; Mitsuma, "From preliminary diaries to short diaries", 53–4.

16 *ADART* 2 -193A is the longest preliminary diary known to us. This diary covers one month.

17 For the shallow wedges on clay tablets, see Jon Taylor and Caroline Cartwright, "The making and re-making of clay tablets", *Scienze dell'antichità* 17, 2011, 310–13.

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Date of the phenomena recorded on the tablet

The tablet records sky phenomena which occurred on the first four days of the month IX of a certain year. The year number at the beginning of the text is unfortunately damaged and only a part of the determinative after numerals, KAM, can be seen, but the next part shows the names of the kings who ruled Babylon in that year. They are Antiochus and his son, also Antiochus. Three Seleucid kings, Antiochus I, III, and IV, made a son or stepson of the same name their co-regent. The terms of the co-regencies are 46–51, 102–119, and 137–142 SE.[18] 51 and 142 SE are not appropriate for the date of the phenomena, because Antiochus I died in the month II of 51 SE,[19] and Antiochus, the stepson of Antiochus IV,[20] died in the month V of 142 SE.[21] Therefore, the possible years are 46–50, 102–119, and 137–141 SE.

Apart from the names of the kings, there are two other data available for the dating of our month IX. One is the length of the preceding month VIII, 30 days, shown on line 1 of our diary. We can calculate the lengths of month VIII in the aforementioned years on the basis of the Julian date for the daylight hours of every first day of the Babylonian months from 626 BC to AD 75 provided by PD.[22] The calculation shows that there are 29 days in month VIII of 46, 48, 49, 103, 104, 105, 108, 109, 112, 113, 118, 137, 138, 139, and 141 SE, and 30 days in month VIII of 47, 50, 102, 106, 107, 110, 111, 114, 115, 116, 117, 119, and 140 SE. Our calculation is partly confirmed by *ADART*. On the basis of the data from the diaries published in its volumes 1–3, Hermann Hunger provides the Julian equivalent for almost every day 0 (i.e. the last day of the preceding month) of the months which are completely or partly covered by these diaries. We can find both Julian dates for the days 0, months VIII and IX of 50, 108, 114, 116, 118, 138, and 141 SE in *ADART*[23] and calculate the lengths of month VIII of these years. Every result of this calculation confirms the relevant result on the basis of PD.[24]

However, our calculation is, even confirmed by the Julian equivalents of *ADART*, not always secure and should be substantiated or modified by the

18 Giuseppe F. Del Monte, *Testi dalla Babilonia ellenistica* (Pisa: Istituti editoriali e poligrafici internazionali, 1997), 1: 207–59.

19 BM 35603 Obv. 10. The text was first published in Abraham J. Sachs and Donald J. Wiseman, "A Babylonian king list of the Hellenistic period", *Iraq* 16/2, 1954, 202–12. For the later editions, see A. Kirk Grayson, "Königslisten und Chroniken: B. Akkadisch", in Dietz O. Edzard (ed.), *RlA*, vol. 6, *Klagegesang – Libanon* (Berlin: De Gruyter, 1980–1983), 98–100; Del Monte, *Testi*, 1: 208–211; Jean-Jacques Glassner, *Mesopotamian Chronicles* (Leiden: Brill, 2005), 134–7; "Babylonian king list of the Hellenistic period", Bert van der Spek, accessed 16 February 2013, http://www.livius.org/k/kinglist/babylonian_hellenistic.html.

20 For the relationship between Antiochus IV and his stepson, see John D. Grainger, *A Seleukid Prosopography and Gazetteer* (Leiden: Brill, 1997), 23.

21 BM 35603 Rev. 12.

22 See PD, 27–47.

23 *ADART* 1: 376; *ADART* 2: 206, 254, 268, 290, 436, 464.

24 *ADART* 1: 376 shows "(SE 50) IX 0 = VIII 29". It means that the month VIII of 50 SE has only 29 days. The month has, however, 30 days, judging from the Julian equivalents of VIII 0 and IX 0 shown on the same page.

lengths attested in the diaries and related texts known to us. In fact, the month VIII of 119 SE has only 29 days according to the Jupiter text *ADART* 5 78 ('Obv.' Col. II' 8'), while our calculation suggests 30 days. Other texts attest 29 days in 108 and 113 SE,[25] and 30 days in 114 and 140 SE.[26] Each value of these four attestations is identical with the relevant result of our calculation. In any case, the attestations of 29 days allow us to reject 108, 113, and 119 SE from the candidates for the date of our diary.

Another clue for the dating is the interval between the sunset and the moonset on the first night of our month IX. Line 2 of our diary shows the interval, nn + 8°. Although the scratch before the numeral 8 does not fit well with any cuneiform numerals (see also the comment on line 2 above), there is still enough space for one numeral in the lacuna at the beginning of line 2. The lost numeral is probably 10, judging from the size of the space and the reasonable interval between the new moon and the sun. Unfortunately, we cannot find any congruent interval attested amongst the published diaries and related texts. The diaries *ADART* 2 -197C, -173B, and -170J provide the intervals between the sunset and the moonset on the first night of month IX, 114, 138, and 141 SE. The intervals are 16° 10′ (-197C 'Obv. 5'), 12° (-173B 'Obv.' 6'), and nn + 7° 40′ (-170J 'Obv.' 5'), respectively. The first and the second values are clearly different from nn + 8° in our diary.[27] Therefore we can reject 114 and 138 SE from the candidates for its date. The last one is close to our value, nn + 8°. This, however, does not necessarily back up the possibility of the dating to 141 SE, because the length of the month VIII, 141 SE, is 29 days according to our calculation.

Since we reject 108, 113, 114, 119, and 138 SE from the candidates for the date of the phenomena in our diary, the surviving possibilities are now 46–50, 102–107, 109–112, 115–118, 137, and 139–141 SE.[28] We must wait for new material which shows a parallel to our text and gives us the final answer to our dating.

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25 *ADART* 2 -203 Rev. 9; *ADART* 6 28 'Rev.' II' 5'.

26 *ADART* 2 -197C 'Obv 5'; *ADART* 5 81 'Obv.' Col. II' 24'.

27 In addition to this, there are only 29 days in the month VIII of 138 SE, according to our calculation.

28 The first four days of month IX are partly covered by some diaries for these years (*ADART* 1 -261B 'Obv.' 5'; *ADART* 2 -193C 'Obv. 1'–4', -170J 'Obv.' 5'–6'). Every diary disagrees with BM 30617. This disagreement, however, does not allow us to reject 50, 118, and 141 SE from the candidates for the date of our diary, because it can be caused by two independent observations. The diaries *ADART* 2 -171 D and E show two simultaneous observations of the sky but these disagree with each other in some points (see Hunger and Pingree, *Astral Sciences in Mesopotamia*, 143).

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