

# BABYLONIAN CHRONOLOGY

626 B.C.-A.D. 75

BY

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# I

## THE BABYLONIAN CALENDAR

IN the period covered by this study the Babylonian calendar year was composed of lunar months, which began when the thin crescent of the new moon was first visible in the sky at sunset. Since the lunar year was about eleven days shorter than the solar year, it was necessary at intervals to intercalate a thirteenth month, either a second Ululu (the sixth month) or a second Addaru (the twelfth month) in order that New Year's Day, Nisanu 1, should not fall much before the spring of the year (late March and early April).

It may have been in the reign of Nabonassar, 747 B.C., that Babylonian astronomers began to recognize, as the result of centuries of observation of the heavens, that 235 lunar months have almost exactly the same number of days as nineteen solar years. This meant that seven lunar months must be intercalated over each nineteen-year period.<sup>1</sup>

The specific years in which the intercalations were to be made, however, and whether they should be second Addarus or second Ululus remained to be determined empirically—a process which lasted some centuries. This fact is evident not only from an inspection of the series of attested intercalary months, as shown in Plate I, but from three interesting letters: Clay, *NBLE*, Nos. 15, 115, and 196.

No. 115 is a royal command to Kurbanni-Marduk, an official at the temple of Eanna in Uruk, stating that there would be an intercalated Addaru in the current year 15. The name Kurbanni-Marduk and year 15 make it certain that this order was sent out by Nabunaid during his 15th year. We may assume that the same royal command went out to other temples throughout Babylonia.

No. 15 is another letter sent to administrative officials at the temple of Eanna in Uruk, this time by the officials (*qīpāni*) of Esagila, the great temple in Babylon. This letter states merely that "the month is intercalary." The Eanna official Nabu-ah-iddina functioned according to known texts from the accession year of Cyrus to the 4th year of Cambyses. We cannot fix the date

<sup>1</sup> Against recognition of nineteen-year cycles at that time see Kugler, *SSB* II 362–71 and 422–30. We have followed Sidersky (*ECAB*, p. 38) in taking 747 B.C. as a convenient starting-point for our scheme in Plate I, but that is not to be interpreted as acceptance of that date as the point at which Babylonian astronomers consciously recognized the principle that seven intercalations were regularly needed in each nineteen years.

of this letter more closely. It is highly interesting because it implies that in this particular case the order for the intercalary month was not sent out until presumably in the 6th or 12th month itself, the statement implying that the present Ululu or Addaru was to be followed by an intercalated Ululu or Addaru. Note also that the order was sent out not by the king, as was the previous letter, but by priestly officials at Babylon.

The third letter, No. 196, came from Zerija, probably a priestly official at Babylon, to the same Nabu-ah-iddina and to his colleague Kina at the Uruk temple of Eanna, informing them that the month Ululu was to be intercalary. Possible dates for this letter are year 2 or 9 of Cyrus or year 3 of Cambyses.

The three letters together give the impression that orders for intercalary months were issued by the king in Chaldean Babylonia, then by the priestly officials at Babylon after Persia took over. We do not wish to stress this point. The orders transmitted to the temple officials at Uruk look very much like "form letters," and it seems reasonably certain that they were sent to temple officials throughout Babylonia. These letters also make it clear that no established system which fixed the seven intercalations at definite points within the nineteen-year period existed at the beginning of the Persian period. Letter No. 15 implies that intercalary orders were even issued within a few weeks of the beginning of an intercalary month.

In the fourth century—in 367 B.C. according to our scheme but possibly as early as 383 B.C.—the intercalations became standardized, and the nineteen-year cycle thus came into being.<sup>2</sup> Before 367 B.C. numerous intercalary months are known from contemporary documents. Once they have been placed in a framework of nineteen-year periods, it becomes possible to reconstruct the probable calendar. Pioneer work in collecting and tabulating intercalary months was done by Kugler and Sidersky.<sup>3</sup> Recently discovered months permit an advance on their results, so that, by a judicious use of the known, the unknown can be approximated with a varying degree of probability from 626 to 367 B.C. The result may be seen in Plate I, where the capital letters *U* and *A* represent attested intercalary Ululus and Addarus respectively, the small letters unattested but probable ones. Reconstruction before 626 is much too hazardous at present and must await further additions to our knowledge.

Study of Plate I will reveal many points of interest in the working-out of the intercalary system. In the earlier periods there is a marked preference for

<sup>2</sup> We do not know for certain in just what year the standardization began and any one of the nineteen years after 383 B.C. is a possibility. Plate I will make this clear.

<sup>3</sup> Kugler, *SSB* II 334 f. and 411-22; Sidersky, *ECAB*, pp. 29-33; cf. also F. H. Weissbach in *Hilprecht Anniversary Volume* (1909) pp. 281-90.

second Ululus. A gradual shift from Ululus to Addarus in later periods can be seen. When an Addaru is missed for any reason, as in 538, the year after Cyrus conquered Babylon, an Ululu is often inserted in the following year to bring the calendar up to date more quickly. Especially to be noted is the shift, in Periods 9, 10, and 15 ff., of the month which would have been intercalated in the first year of the period to the last year of the preceding period, with the result that Periods 8 and 14 have eight intercalations each and Period 10 but six.

The major goal toward which this experimentation was striving was apparently a system with the smallest limits of variability in the start of the year. Thus the limits for Nisanu 1 in Period 11 are April 26 in year 6 and March 22 in year 12, ranging over thirty-six days. April 26 was lowered to April 16 in Period 12 by shifting a second Addaru from year 5 to year 6. Similarly, March 22 of Period 11 and March 21 of Period 12 became April 20 in Period 13 by changing the second Ululu of year 12 to a second Addaru in year 11. Eventually the first actual cycle, Period 21, had as the limits for Nisanu 1 March 26 and April 21, involving only twenty-seven days.<sup>4</sup>

We have carried our tables to A.D. 75 as that is the date of the latest cuneiform tablet now known.<sup>5</sup>

It was stated above that observation of the crescent determined the beginning of the month. This was certainly true in the early part of the time here dealt with. It resulted now and then in a twenty-eight day month,<sup>6</sup> when two months of twenty-nine days came together and bad weather conditions resulted in giving thirty days to the first month. Whether for calendrical purposes calculation of the crescent ever replaced observation remains a problem whose solution must await new evidence.

<sup>4</sup> That certain astronomical considerations underlie the nineteen-year cycle has been proposed by O. Neugebauer and A. Sachs. The former has suggested that the intention of the cycle, whose beginning he would place before 450 B.C., was to keep the sun on the first day of Tashritu, month VII, always in the zodiacal sign Libra ("The 'Metonic Cycle' in Babylonian Astronomy", *Studies in Ancient Astronomy*. VI. *Studies and Essays in the History of Science and Learning in Honor of George Sarton* [1946] 435-48). More recently Sachs has proposed instead that it was the heliacal rising of Sirius and the desire to keep that event in month IV which controlled the cycle ("Sirius Dates in Babylonian Astronomical Texts of the Seleucid Period", *JCS* VI [1952] 105-14).

<sup>5</sup> It will be published by Sachs and Schaumberger.

<sup>6</sup> See R. Campbell Thompson, *The Reports of the Magicians and Astrologers of Nineveh and Babylon in the British Museum* (London, 1900) II xliii.

INTERCALARY MONTHS MENTIONED IN UNPUBLISHED  
OR RECENTLY PUBLISHED TEXTS<sup>7</sup>

## ASSUR-NADIN-SHUM

*Addaru II*, 3d year Unpub. text YBC 7162 (Goetze, *JNES* III [1944] 43)

## SHAMASH-SHUM-UKIN

*Ululu II*, 2d year G. R. Driver, *Centenary Supplement to the Journal of the Royal Asiatic Society* (1924) Pl. IV/V

## KANDALANU

*Ululu II*, 19th year Unpub. texts NBC 6144, YBC 11476, 11300, and 11481 (Goetze, *op. cit.* p. 43, and a personal letter which corrects the published attribution of the first two texts to Kandalanu's 9th year)

## NABOPOLASSAR

*Addaru II*, 2d year Unpub. text NCBT 589 (*ibid.*)

*Ululu II*, 5th year Figulla, *UET* IV 202

*Addaru II*, 7th year Unpub. text YBC 3455 (*ibid.*), which corrects our conjectural *Ululu II* based on the damaged month name in Dougherty, *GCCI* II 74)

*Ululu II*, 10th year Dougherty, *GCCI* II 50; unpub. text NBC 6141 (Goetze, *op. cit.* p. 43)

*Addaru II*, 12th year Unpub. economic text (Sachs)

*Ululu II*, 15th year Contenau, *TCL* XII 19;<sup>8</sup> unpub. text NCBT 1175 (Goetze, *op. cit.* p. 43)

*Ululu II*, 19th year<sup>9</sup> Unpub. text NCBT 1156

*Addaru II*, 20th year Dougherty, *GCCI* II 16; Contenau, *TCL* XII 21: unpub. texts YBC 4153 and 11601 (Goetze, *op. cit.* p. 43)

## NEBUCHADNEZZAR

*Ululu II*, 2d year Unpub. text NCBT 114 (*ibid.*); eclipse text BM 38462 described *LBART* No. \*1420

[*Addaru II*, 4th year] *VAS* VI 265<sup>10</sup>

<sup>7</sup> Italics indicate months either unknown to or not used by Kugler and Sidersky in their tables. Brackets ([ ]) indicate months rejected as impossible.

<sup>8</sup> Add here the *Ululu II* of year 15 discussed by Kugler, *SSB* II 418 f. He assigned it to the 15th year of Nebuchadnezzar; but that is disproved by the *Addaru II* listed below for the latter's 14th year. He also suggested Nabopolassar as an alternative.

<sup>9</sup> There remains some question as to whether or not this tablet is correctly placed, as the king's name is not mentioned. According to Goetze, the appearance of the tablet makes it hardly possible to assign it either to Nebuchadnezzar or to Kandalanu. The former is excluded on the basis of the known intercalary months in his 17th and 21st years, but the latter has an *Ululu II* in his 19th year, as is demonstrated above. Provisionally we accept Goetze's decision, but point out that it results in an exceptionally low date of March 6 for Nisanu 1.

<sup>10</sup> A broken text. In lines 1 and 2 "*Addaru II* of year 4" is preserved. Kugler, *SSB* II 418, argued that on the basis of elimination this text probably belongs to Nebuchadnezzar; other possibilities were Xerxes, Artaxerxes I, or Artaxerxes II. Nebuchadnezzar is eliminated by the newly demonstrated intercalations in his 2d and 5th years

Ululu II, 5th year	Unpub. text <i>NCBT</i> 859 (Goetze, <i>op. cit.</i> p. 43); eclipse text BM 38462 described <i>LBART</i> No. *1420
Ululu II, 7th year	Lutz, <i>UCP</i> IX 1, Part II, No. 10
Ululu II, 9th year	Krückmann, <i>NBRVT</i> , No. 197
Addaru II, 11th year	Eclipse text BM 38462 described <i>LBART</i> No. *1420
Addaru II, 14th year	Contenau, <i>TCL</i> XII 35; Moore, <i>NBD</i> , No. 29 (date damaged); unpub. texts <i>YBC</i> 9324, 9375, 9388, and 9528 (Goetze, <i>op. cit.</i> p. 43)
Addaru II, 17th year	Unpub. texts <i>NBC</i> 4633, <i>NCBT</i> 853, <i>YBC</i> 8816 and 11665 ( <i>ibid.</i> )
Ululu II, 21st year	Unpub. texts <i>YBC</i> 4110 and 8860 ( <i>ibid.</i> )
Addaru II, 23d year	Keiser, <i>LCE</i> , No. 126; Dougherty, <i>GCCI</i> I 45
Addaru II, 26th year	Eclipse text BM 38462 described <i>LBART</i> No. *1420
Addaru II, 28th year	Lutz, <i>UCP</i> IX 1, Part I, No. 52
Ululu II, 31st year	Krückmann, <i>NBRVT</i> , No. 20; R. C. Thompson, <i>Catalogue of the Late Babylonian Tablets in the Bodleian Library, Oxford</i> (London, 1927) p. 3, A 91; p. 4, A 95; unpub. texts <i>NCBT</i> 775 and <i>YBC</i> 8819 (Goetze, <i>op. cit.</i> p. 43)
[Ululu II, 32d year] <sup>11</sup>	
Addaru II, 33d year	Dougherty, <i>GCCI</i> I 117 and 125
Addaru II, 36th year	<i>Ibid.</i> Nos. 68, 98, and probably 82 (year 30+x); II 268 (no king given, but tablet apparently belongs here; "36" and "Addaru II" are clear)
Ululu II, 41st year	Krückmann, <i>NBRVT</i> , Nos. 79, 153, 154; Dougherty, <i>GCCI</i> I 231 (year x+11), 248
Addaru II, 42d year	Dougherty, <i>GCCI</i> I 138, 155, 219, 225
NERGAL-SHAR-USUR	
Addaru II, acc. year	Krückmann, <i>NBRVT</i> , No. 129
Addaru II, 3d year	Contenau, <i>TCL</i> XII 70
NABUNAID	
Addaru II, 1st year	Eclipse text BM 32234 described <i>LBART</i> No. *1419

(see above), and intercalation is impossible in the 4th year of either Artaxerxes I or Artaxerxes II. Since the Addaru II attributed to Xerxes' 5th year in our first edition is now known to belong instead to the 5th year of Artaxerxes I (see below), the present text can fit very nicely in the 4th year of Xerxes, and we have transferred it there.

<sup>11</sup> Kugler, *SSB* II 411, uses Strassmaier, *Nabuchodonosor*, No. 249, as proof for an intercalated Ululu in the 32d year of Nebuchadnezzar. The text, as given by Strassmaier, is dated in lines 4 and 5 to Arahsmnu (8th month), 15th day, 32d year (the "32" is damaged slightly) of Nebuchadnezzar. Kugler's date is based on mention of an Ululu II at the end of the last line (line 39) unaccompanied by day, year, or king. Since lines 6, 13, 15, 31 refer to year 30 and line 37 refers to the 25th of Addaru, the Ululu II in line 39 cannot be used to prove an intercalation in year 32. This tablet is a summary, and the various dates within the text all seem to be earlier than year 32. Hence we consider the Ululu II to be that of year 31 (see above).

## PLATE I

Period	I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22												
Year	B.C.		747 728		709 690		671		652 633		614 595		576		557 538		519 500		481		462 443		424 405		386		367 348							
I																																		
II						A		A				A	U	A																				
III								A				A	A	A	a																			
IV								U				A	A	A																				
V									A			A																						
VI																																		
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XV																																		
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XVII																																		
XVIII																																		
XIX																																		

TABLE SHOWING POSITIONS OF BABYLONIAN INTERCALARY MONTHS IN RELATION TO NINETEEN-YEAR PERIODS

- [Addaru II, 2d year]<sup>12</sup>  
 Addaru II, 3d year Pohl, *NBRU* II 8; Dougherty, *REN*, Nos. 13 and 46  
 Addaru II, 6th year Krückmann, *NBRVT*, No. 115  
 Ululu II, 10th year Dougherty, *GCCI* II 291, 305, 338, 354; *idem*, *REN*, Nos. 19, 139, 212  
 Addaru II, 12th year Moore, *NBD*, No. 55; Krückmann, *NBRVT*, No. 209 (broken date read as 11th year by Krückmann, but must be read as 12th on basis of known materials); Dougherty, *REN*, Nos. 152, 165, 175, 191, 203, 206, 210, 214, 223, 230, 235; *idem*, *GCCI* II 371 (no king's name preserved on tablet, but year 12 places it here)  
 Addaru II, 15th year Dougherty, *REN*, No. 224
- CYRUS  
 Addaru II, 6th year<sup>13</sup> Tremayne, *RECC*, No. 47 (year traces fit 6 but not 3)
- CAMBYSES  
 Ululu II, acc. year Tremayne, *RECC*, No. 98; Dougherty, *GCCI* II 116, 117, 118, 218; J. B. Nies and C. E. Keiser, *Historical, Religious and Economic Texts and Antiquities* ("Babylonian Inscriptions in the Collection of James B. Nies" II [New Haven, 1920]) No. 130  
 Ululu II, 3d year Tremayne, *RECC*, No. 155; Krückmann, *NBRVT*, No. 161 (broken date, read as " $x+1$ " by Krückmann, must be read as "3" on basis of known intercalated months); Contenau, *TCL* XIII 155  
 Addaru II, 5th year Pohl, *NBRU* I 77
- DARIUS I  
 Addaru II, acc. year Pohl, *NBRU* II 10 (Pohl's Ululu II should be corrected to read Addaru II; see A. Poebel in *AJSL* LVI [1939] 134, n. 41) and 11  
 Ululu II, 3d year Krückmann, *NBRVT*, No. 165  
 Addaru II, 16th year Contenau, *TCL* XIII 193; unpub. text Persepolis 4303 (on all the Persepolis references under Darius I see R. T. Hallock in *JNES* I [1942] 231, n. 5)  
 Ululu II, 19th year Unpub. texts Persepolis 3158 (Poebel in *AJSL* LV [1938] 136 f.) and 718 (Hallock)  
 Addaru II, 22d year Unpub. texts Persepolis 11424 and (slightly doubtful) 1899, 5968, and 9916 (Hallock)  
 Addaru II, 24th year Unpub. texts Persepolis 5257, 9637, and 10134 (Hallock)

<sup>12</sup> Pohl, *NBRU* I 20, has an Addaru II in the 2d year of Nabunaid. This is impossible, since other texts place an Addaru II in the 1st and 3d years. By addition of one wedge the year may be read either as "3" or as "12"; or by omission of one wedge it may be read as "1." Error of either scribe or copyist is evident. Reading as "3" seems preferable to us.

<sup>13</sup> In C. H. Gordon, *Smith College Tablets . . .* ("Smith College Studies in History" XXXVIII [Northampton, 1952]), No. 84 is dated in Addaru I.



Addaru II, 32d year Cameron, *PTT* 2; eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424

## XERXES

*Uluu II*, 2d year<sup>14</sup> Cameron, *PTT* 10, 11

*Addaru II*, 4th year *VAS* VI 265<sup>15</sup>

[*Addaru II*, 10th year] An intercalary month is proved by eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424, but not whether it is U or A

*Addaru II*, 12th year Cameron, *PTT* 27

*Addaru II*, 15th year Eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424

*Addaru II*, 18th year *Ibid.*

*Uluu II*, 21st year Eclipse text BM 32234 described *LBART* No. \*1419.

## ARTAXERXES I

*Addaru II*, 2d year Venus text *LBART* No. 1387

*Addaru II*, 5th year Cameron, *PTT* 79<sup>16</sup>; eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424; Venus text BM 32299 described *LBART* No. \*1388

*Addaru II*, 10th year Eclipse texts BM 36910+36998+37036 and 37044 described *LBART* Nos. \*1422—\*1424 and \*1425

*Addaru II*, 13th year Eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424; Venus text BM 32299 described *LBART* No. \*1388

*Addaru II*, 16th year Eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424

*Addaru II*, 19th year Unpub. economic text in The Free Library of Philadelphia (Sachs, *JCS* VI [1952] 114, n. 20); supported by Aramaic papyrus Cowley 13 for which see S. H. Horn and L. H. Wood, *JNES* XIII [1954] 11—12

*Addaru II*, 21st year Eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424; Venus text BM 32299 described *LBART* No. \*1388

*Addaru II*, 24th year Eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424; diary BM 33478 described *LBART* No. \*162

*Addaru II*, 29th year Eclipse texts BM 36910+36998+37036 and 37044 described *LBART* Nos. \*1422—\*1424 and \*1425

*Addaru II*, 32d year Eclipse text BM 36910+36998+37036 described *LBART* Nos. \*1422—\*1424

*Addaru II*, 35th year *Ibid.*

*Addaru II*, 38th year Venus text *LBART* No. 1387

<sup>14</sup> For correction of Kugler's tentative reading of year 7 (*op. cit.* p. 413) to year 2 see Cameron in *AJSL* LVIII (1941) 323, n. 40.

<sup>15</sup> See n. 10, p. 4.

<sup>16</sup> This text was first assigned to Xerxes by Dr. Cameron, but after further study he gives it to Artaxerxes I on the basis of content and seal impression.

- Addaru II, 40th year Eclipse text BM 36910+36998+37036 described  
*LBART* Nos. \*1422-\*1424
- DARIUS II**
- Addaru II, 2d year Astronomical text BM 32209+41854, the second part of  
which is published *LBART* No. 1412
- Addaru II, 5th year *Ibid.*; eclipse text BM 36910+36998+37036 described  
*LBART* Nos. \*1422-\*1424; diary *VAT* 4924, see van  
der Waerden, *Afo* 16 [1952-3] 220, Pl. 18
- Addaru II*, 7th year Unpub. economic text BM 47500 (Sachs); eclipse text  
BM 36910+36998+37036 described *LBART* Nos.  
\*1422-\*1424; astronomical text BM 32209+41854, the  
second part of which is published *LBART* No. 1412
- Addaru II, 10th year Eclipse text BM 36910+36998+37036 described  
*LBART* Nos. \*1422-\*1424; astronomical text BM  
32209-41854, the second part of which is published  
*LBART* No. 1412.
- Addaru II*, 13th year Astronomical text BM 32209+41854, the second part of  
which is published *LBART* No. 1412
- Ululu II*, 16th year Eclipse text BM 36910+36998+37036 described  
*LBART* Nos. \*1422-\*1424; this year is to be restored  
in Figulla, *UET* IV 93 (Sachs)
- Addaru II*, 18th year Astronomical text BM 32209+41854, the second part of  
which is published *LBART* No. 1412
- ARTAXERXES II**
- Addaru II*, 2d year *Ibid.*
- Addaru II*, 5th year *Ibid.*; eclipse text BM 36910+36998+37036 described  
*LBART* Nos. \*1422-\*1424
- Addaru II*, 7th year Astronomical text BM 32209+41854, the second part  
of which is published *LBART* No. 1412; eclipse text  
*LBART* No. 1416
- Addaru II*, 10th year Eclipse text BM 36910+36998+37036 described  
*LBART* Nos. \*1422-\*1424
- Ululu II*, 16th year *Ibid.*
- Addaru II, 24th year *Ibid.*
- Addaru II, 26th year Eclipse text *LBART* No. 1415