6. Calendar

General Features

The calendar of the Ancient Near East originates in the rhythm of agricultural and religious activities, which are based on the natural seasons depending on the course of the sun, and on the movement of the moon. Cuneiform sources quote three units: day (Akk. *ūmu*, Sum. U_4), month (*arḫu*, ITI), year (*šattu*, MU).[463] The day starts with sunset and lasts until the next sunset. The names of the 12 months mostly refer to agricultural terms or the cycle of vegetation and festivities. The month starts with the crescent of the new moon, which usually becomes visible in the evening one or two days after the inferior conjunction of sun and moon. Since a synodic month (the interval between conjunctions of the sun and moon) is 29 days 12 hours 44 minutes, a Babylonian lunar month consists of either 29 or 30 days. In Babylonia the year usually started around spring equinox or soon after, whereas in Assyria the beginning of the year took place in autumn.

The Mesopotamian **lunar year**[464] was ca. 354 days (12 × 29.5 days). Economic texts prove that both 30– and 29-day months were used.[465] The civil and religious years were geared to the lunar year.[466] Since Mesopotamians celebrated seasonal agricultural holidays, intercalary months were introduced approximately every third year to keep the lunar year in pace with the seasons of the 365-day solar year. However, regular intercalation is not attested until the 1st millennium. A **norm year** of 360 days containing only 30-day months was created by the end of the 4th millennium and used to the late 3rd and early 2nd millennium (Ur III period) for administrative purposes.[467] It is further attested in MUL.APIN 1 in connection with astronomical theories.[468] The **solar year** consists of 365.2422 days. Since 12 lunar months add up to about 354 days (eleven days shorter than a solar year) events depending on the position of the sun will occur on a later calendar date from one lunar year to the next.[469] For this reason an **intercalary month** was added whenever necessary (decided by observation).[470] Intercalary months are first attested in the time of Uruinimgina of Lagaš of the 24th cent. The agricultural year is oriented after the **solar year**, which means that the lunar year would be one month "ahead" after three years if no intercalary months were inserted.

Intercalary years were inserted irregularly until ca. 500 BC in the Achaemenid period,[471] when, on the basis of astronomical observations, the so-called Babylonian 19-year or Metonic cycle was introduced with 7 intercalary months every 19 years. The intercalary years during the cycle were nos. 1, 3, 6, 9, 12, 14 and 17. The Metonic cycle was a sophisticated mathematical scheme to produce a regular intercalation; it remained in use until the Seleucid and Arsacid periods.

6.1. Babylonian Calendar

The **Babylonian calendar** was based on natural time intervals produced by the motion of the sun and the moon. It was structured by the **solar year,** the **lunar**

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[463] → **Eponyms** for the time unit ***ḫamuštum*** in Old Assyrian texts from Kültepe/Kaniš. The concept of a "week" is not attested as such: see Renger (2002) 13–14.

[464] For the lunar year in Egypt, which was used for agricultural events, religious festivals and tax-gathering see Robins, CANE 3 (1995) 1811.

[465] Nissen has speculated that the number of "37 months" attested in a 4th millennium tablet from Uruk may refer to a time span of 3 years and one additional intercalary month. See Nissen *et al.*, *Archaic Bookkeeping*, Chicago (1993) 36–37.

[466] The Islamic calendar is based on a lunar year without intercalation.

[467] Sallaberger (1999) 233–237, Cancik-Kirschbaum (2001) 281 and Renger (2002) 7 referring to the important study by Englund, *JESHO* 31 (1988) 121–185.

[468] Hunger – Pingree (1989). In Egypt five extra days were added to the end of the year in order to give the nearest approximation as a whole number of days to the length of the Sothic year (= civil calendar). Later, a non-Sothic lunar year was devised that was linked to the civil year: Robins, CANE 3 (1995) 1811. For more details see Barta, *ZÄS* 110 (1983) 16–26 and von Beckerath (1997) 41–54.

[469] For the practical difficulties of the solar calendar see Horowitz (1996) 37–38.

[470] Note that there are no references for intercalary months in Nuzi or Alalaḫ. → below sub **6.2.**

[471] Hunger (1976–1980) 298 (for an overview). On the rules of intercalation in astronomical texts see Hunger – Reiner (1975) 21–28.

month and the **solar day,**[472] the so-called **luni-solar calendar**. The beginning of the year was in spring, on the day of the first new moon after the spring equinox (ideally taking place on the 15th of Adar, the 12th month of the year) in the month Nisannu.[473] Since 12 lunations (29.26 to 29.80 days each) do not divide the solar year evenly nor do solar days divide the lunar month evenly one is confronted with the problem of synchronizing the 12 lunar months with the solar year. There is a difference of approximately 11 days between the two kinds of year. This means that the months occur about eleven days earlier each year (→ below sub **6.4.**), and after three years the calendar year is more than one month out of step with the season. In 32.5 years a given month would pass through the entire cycle of seasons. In order to ensure the correspondence between months and seasons (which is especially crucial for agricultural activities) and maintain the proper position of a month within the solar year, an extra intercalary 13th month was added whenever necessary (usually effected by a royal decree; "ad hoc intercalations" can be observed in royal letters from the reign of Hammu-rāpi' onwards). Intercalation was determined by observation rather than by mathematical calculations (note the modern Jewish calendar).

6.2. Assyrian Calendar

The **Old Assyrian calendar** year can be reconstructed on the basis of 2nd millennium texts from the time of Šamšī-Adad I and earlier (the Kārum Kaniš II texts) and from the later Kültepe Ib and Alişar archives. It had several important differences from the Babylonian calendar. Whereas the start of the year in Babylonia took place in the month Nisannu, which corresponds to March/April in the Julian calendar, in Assyria the year started in late fall (according to Kültepe II texts and the EL), as was true in 3rd millennium Ebla.[474] During Kārum Kaniš level II some kind of solar calendar was in use.[475] Although no intercalary years are attested so far for texts of levels II and Ib, some scholars believe that there must have existed some kind of adjustment between the solar and lunar year, since the designation of *līmu* (**eponyms**) was carried out regularly.[476] The naming of the eponym years, by which the start of the year was identified, indicates that the year always started during the same season. This means that the solar eponym year was somehow coordinated with lunar months. A modified Old Assyrian calendar is first attested during the eponymy of Habil-kēnu (= **KEL G** 110 during Kültepe level Ib according to GÜNBATTI [2008] 128): COHEN (1993) 238–239 referred to it as the "Restored Assyrian calendar". This "Restored Assyrian calendar" offers the order of Assyrian months:[477] it did not coincide with the eponym year starting around the autumnal equinox as the calendar did during the early 2nd millennium (Kārum Kaniš level II texts).

The calendar underwent several modifications;[478] but intercalation seems to be missing from the Kültepe Ib texts, which employ the calendar used in the Middle Assyrian period until Tiglath-pileser I (→ below sub **6.4.**). The lack of intercalation in the Middle Assyrian lunar calendar caused the slipping of seasons backward through the months. This was remedied when the Assyrians adopted the Babylonian calendar ("Standard Mesopotamian calendar"[479]) during the reign of Tiglath-pileser I.

Various regional or **local calendars** (→ below sub **6.5.**) developed simultaneously all over the Ancient Near East.[480] Hammu-rāpi' of the Babylon I dynasty introduced a uniform calendar for Babylonia (the "Babylonian calendar" or "Standard Babylonian/ Mesopotamian calendar"), which was based on the one of Nippur.

Value for Absolute Chronology[481]

6.3. Astronomical Data and Calendar (month-length data)[482]

Month-lengths have played a crucial role in HUBER's *et al.* treatment in OPNE of the astronomical data in connection with the absolute chronology of the late 3rd and the 2nd millennium BC. His approach was to fit the dis-

[472] The Gregorian calendar by contrast is based on a purely solar year, ignoring the lunar month.
[473] On Babylonian month-names see for instance GREENGUS (2001) 257–267.
[474] PETTINATO, *AfO* 25 (1974–1977) 33–35
[475] LARSEN (1976) 193.
[476] Thus LARSEN (1976), citing a purely lunar calendar referred to the months by which the texts were dated, and not to the appointment of eponyms, which must have continued to follow the solar year: see READE (2000) 152. For a possible attestation of intercalation during the Old Assyrian period see VEENHOF (2000) 141–147.
[477] V R 43 (K. 140) and KAV 155 (VAT 9909): see COHEN (1993) 240.
[478] LARSEN (1976) 53 and 193.
[479] COHEN (1993) 237 and 297ff.
[480] HUNGER (1976–1980) 299 sub Monatsnamensysteme.
[481] The issue of coordinating ancient calendars with modern ones (usually the Julian-Gregorian calendar) was briefly treated by CRYER (1995) 652 and 655–656.
[482] HUBER *et al.*, OPNE, HUBER (1999–2000) 287–290. → **Astronomical Data** sub **3.3.**

tribution of 29- and 30-day months to any given chronology drawn from the astronomical observations embedded in EAE (GURZADYAN [2000] 183). Regarding the question of the VT's validity and the four main Venus chronologies proposed from it (the four possibilities for Ammiṣaduqa year 1 are –1701, –1645, –1637, and –1581) HUBER, *High* ... 3, 20–21, commented: "... the last three of them are out: the middle two agree poorly with the Venus data themselves, and all three disagree with the month-length data from contemporary economic texts. The first one [the –1701 chronology] I could not reject, but being the only compatible chronology does not imply that it is right (the Venus tablet may be invalid, after all). ... Now as for testing a chronology by month-lengths: ... When I am testing it [*i.e. –1701 chronology*] against the month-length data and it turns out to agree significantly better than it ought to if it were wrong, then I have to assume it is right... if we test the agreement between observed and calculated month-lengths, we simultaneously also test the reliability of the extrapolation [*which stands in connection with the irregularities in the rotation of the earth*]." According to the statistical study of HUBER *et al.*, OPNE, the **HC** (–1701) has a 93% probability of being correct, **ULC** only 6%, and the rest share the remaining 1%. The Ur III month-length data[483] also support the HC. But Huber pointed out in *High* ... 3, 24: "The main problem with the calculation of month-lengths is this empirical curve determining the visibility of the crescent and there are several such empirical curves in the literature."

The sighting of the lunar crescent depends mainly on the weather: calculations only give approximations valid for the average good weather observing conditions. HUBER *et al.*, OPNE 24 state: "The position of the moon is calculated at the time of sunset for the first few evenings after the new moon." The crescent is supposed to become visible on the first evening for which the altitude of the moon at sunset exceeds a certain value, which depends on the separation between sun and moon and the angle the line joining the sun and the moon makes with the horizon (which in the northern hemisphere is greater in the spring than it is in autumn). On the basis of a calculation for lunar crescents in Babylon HUBER *et al.*, OPNE 7 concluded that there existed no 28-day months, but 29- (46.9%) and 30-day months (53.1%) which followed each other in an irregular sequence,[484] while the occasional 31st day was carried over to the next month.

For Ammiṣaduqa years 1–16 the intercalary months were fixed by the VT and contemporary economic texts. The order of year-names after Ammiṣaduqa's year 16 is unknown. Years 1–16 contain 21 attested 30-day months (HUBER *et al.*, OPNE 137). According to HUBER *et al.* MC and LC can be rejected because of the high number of misses in the calculation of month lengths, while VT data favors the HC. This is of course based on the premise that one of the Venus chronologies must be correct and that the observations are to be associated with Ammiṣaduqa's reign. In response to GASCHE *et al.*'s 1998 book on absolute chronology (month-length data were not considered in this study), HUBER (1999–2000) held to his former method and results and stressed that any attempt to accommodate a lower date for the Babylon I dynasty would do violence to the available astronomical evidence, namely the **VT, OB and Ur III month-length data, Ur III eclipse omens and Akkad eclipse omens**. The VT and OB month-length data are linked to Ammiṣaduqa year 1 and the Ur III month-lengths combined with the eclipse omens are linked to Amar-Sîn year 1.[485] According to the KLs, these two kings ruled about 400 years apart (→ **Babylonia**).

The available Ur III month-length data does not suffice to fix the date of Amar-Sîn, but according to Huber the Ur III month-lengths and the eclipses together determine a unique chronology. He stated that if one calculates backwards with the Venus chronologies by subtracting 400 years from Ammiṣaduqa to Amar-Sîn, the only plausible chronology is again the HC, which offers a convincingly high likelihood of both (VT data and Ur III months alignments). The second choice in statistical terms would be the ULC, which can be ruled out due to the historical evidence (generation lengths in Hittite chronology, etc.).[486] Thus the evidence presented in HUBER *et al.*, OPNE favored the HC with Ammiṣaduqa year 1 = 1702 BC and the most probable first year of Amar-Sîn's reign is –2093. For the last 16 years of Ammiditana (years 22–37) eight intercalations with a sequence of four consecutive intercalary years (25–28) are attested. Within the period of 24 years between Hammu-rāpi' 31 and Samsuiluna year 11, eleven intercalations are

[483] HUBER *et al.*, OPNE 38–39
[484] See also COHEN (1993) 4–5.
[485] See HUBER (1999–2000) 50 for more studies on this issue.
[486] These considerations are all based on the assumed historicity of the lunar eclipses.

known, including four consecutive ones (Hammurāpi' 32, 33, 34, 35, 38, 40 and Samsuiluna 3, 5, 8, 9, 11). There are 54 attested 30-day months, and if one reckons backwards from Ammiṣaduqa 1 = –1701, then Samsuiluna began to rule in –1804 (on the astronomical difficulties with this date see HUBER *et al.*, OPNE 142).

For critical remarks on the use of month-lengths (basically that there are too many discrepancies in Huber's results) and intercalation in the chronological discussion see GURZADYAN (2000) 183–184, SEAL (2001) 171 and TANRET (2004) 5–12 in the chapter on **Astronomical Data** sub **3.2.**

6.4. Assyrian versus Babylonian Calendar

FREYDANK (1991) 16–17 and 81–88 discussed the still unsolved problem of whether the Babylonian or Assyrian calendar was in use in Assyria in the 2nd millennium during the Middle Assyrian period.[487] According to WEIDNER (1935–1936) 27–29 the lunar system was dominant in 2nd millennium Assyria because of the lack of intercalary months. Due to the fact that apparently no correction of the lunar year existed in Assyria, the introduction of Babylonian month names in parallel use with Assyrian month names was the first step in coordinating the dates of the lunar year with the astronomical/solar year, which is attested during the reign of Tiglath-pileser I (1114–1076).[488] So far no 29-day months are attested, since for administrative purposes usually only 30-day months were used. Now, Freydank has proven that there existed a 29 day-month in the Middle Assyrian period (mentioned in the Middle Assyrian ration-list VS 21, 14, 7', 11') for the months *Sîn* and *kalmartu*. This fact proved the existence of a lunar month-system, and with it the changing sequence of 30- and 29-day months, although the evidence is still very scarce. The use of the lunar system is also supported by the "double datings" (Doppeldatierungen) presumably due to the need to link the Assyrian and Babylonian calendars to the solar year eponyms. Only between ca. 1120 and 1090 were texts from Aššur dated by Assyrian and Babylonian month-names simultaneously, which indicates that Assyrian month-names were still revolving around the solar year. The Babylonian months stayed in synchronization with the seasons, because of the insertion of intercalary months.

Because of the lack of evidence for any intercalary months in Assyria, FREYDANK (1991) 17 assumed that the Middle Assyrian eponym years and the reign lengths of the kings in the AKL referred to lunar years. On the other hand, he cited (pp. 188f.) dates for the reign lengths mentioned in the KLs which are based on the solar year (in which the months are bound to certain seasons).[489] Already BRINKMAN, MSKH 32[89] pointed out: "If the Assyrians used a lunar calendar without intercalary months before the calendar reform of Tiglath-pileser I. ..., all Assyrian dates before 1132 would have to be lowered approximately three years per century; and Kassite dates should be set about five years lower than those in the table (e.g., Kurigalzu II at 1327–1303) with a variation of ±7 years."[490]

GASCHE *et al.*, *Dating* ... 61–62 corrected their "base chronology" (based on a solar calendar) against solar dates on the premise that the lunar calendar was used in Assyria until the reign of Tiglath-pileser I. Before 1100 BC 18 years in total may have to be subtracted for the period back to Šamšī-Adad I[491] if the lunar calendar was employed in Assyria until the first half of the reign of Tiglath-pileser I, when the Babylonian solar-based calendar was adopted. As FREYDANK (1991) 16 pointed out, this would imply that the dates around the beginning of the 15th cent. were ca. 13 years lower than by the assump-

487 This important issue was touched upon by RÖLLIG (1965) 382–384.

488 On the "Doppeldatierungen" (dates with both Assyrian and Babylonian month-names) see FREYDANK (1991) 82–83 and 86–88. The exact mode of transition with respect to intercalation and start of the year is unknown. So far one can only detect month-names of the Standard Mesopotamian calendar used during the time of Tiglath-pileser I.

489 Noted by WILHELM (1994) 551 in his review of FREYDANK (1991). In his outline on pp. 16–17 Freydank did not exclude the possibility that a solar calendar like that of Old Assyrian times might have still been used during the Middle Assyrian period. When exactly this change from the Old Assyrian solar-based calendar to the lunar calendar took place is unknown and of course poses difficulties for the calculation of Assyrian reigns throughout the 2nd millennium The title of FREYDANK's 2003 article "Assyrische Zeitrechnung – ein ungewöhnliches System" characterizes our present state of knowledge.

490 This was applied to the Kassite dynasty by BOESE (1982) 15–26. See GASCHE *et al.*, *Dating* ..., and later their revised table in *Akkadica* 108 (1998) based on a correction against solar dates (="lunar reduction").

491 I.e. a reduction of 1 year every 33 years or 3 years per century: see also GASCHE *et al.* (1998a) 3. Note however that this reduction is incompatible with the known **Distanzangaben**, which are therefore (and for other reasons) rejected by the authors.

tion of a solar year-system. Unfortunately, the synchronisms within the period between 1500 and 1085 are not sufficiently precise to solve this vexing problem. Thus, the reduction obviously does not affect the known synchronisms with Babylonia, Egypt or Anatolia. But, it is not clear which system was used before the reign of Tiglath-pileser I.[492] Hopefully, future finds will shed more light on intercalation before Tiglath-pileser I and provide more support for Veenhof's belief that the Assyrians used intercalary months during the Old and Middle Assyrian periods (→ below). While the existence of Middle Assyrian lunar system was taken to be likely by Gasche *et al.*, which resulted in a reduction of 1 year every 33 years, one generally sticks to the solar system, as can be seen from various chronological tables.[493] It is still unknown when a calendar with intercalation was introduced in Assyria. This is especially important for the question of how the AKL and ELs, which are allied, were related to the calendar. For long-term chronology this is of crucial importance since 100 years of the AKL might represent only 97 solar years (i.e. the "lunar reduction").[494]

The earliest Old Assyrian texts of Kārum Kaniš level II demonstrate that the Assyrians were using a solar calendar for the appointment of eponyms.[495] Concerning the eponyms of this period one can observe that there must have existed some kind of coordination between the lunar calendar ("month-calendar") and the solar year based eponym years. This coordination was apparently not in function during Kārum Kaniš level Ib with the result that the lunar months shifted throughout the year.[496] BRINKMAN, PHPKB 383–386 deduced from the "Broken Obelisk", which is tentatively dated to the reign of Aššur-bēl-kala (1073–1056) and uses only standard Babylonian month-names, that a lunar calendar without intercalary months was still in use in Assyria after Tiglath-Pileser I.[497] However, his chronological chart from OPPENHEIM's "*Ancient Mesopotamia*" (1977) is also based on the use of the solar calendar. COHEN (1993) reconsidered the issue and reached the same conclusions as Brinkman. Other scholars, such as LARSEN (1976) and GASCHE *et al.*, argued that the Assyrians employed a purely lunar calendar (whereas eponym years were used only in conjunction with the solar calendar as LARSEN [1976] 193 stressed) between the earliest Old Assyrian texts and the time of Tiglath-Pileser I, during whose reign both Assyrian and Babylonian month names are attested (BRINKMAN, PHPKB 383).

In contrast to GASCHE *et al.*,[498] READE (2000) 151 assumed the use of a solar calendar for all regnal years. He applied a different approach than GASCHE *et al.*, but arrived at the same low absolute chronology (mainly due to a re-interpretation of the **AKL** concerning the period succeeding Šamšī-Adad I). READE (2000) 153 concluded: "So the question is not whether in particular periods the Assyrian months revolved around the seasons, which is perfectly well known, but whether an eponymate or regnal year consisted of twelve lunar months alone or of twelve lunar months plus a periodic adjustment to keep pace with the solar year."

VEENHOF (2000) 141–147 tried to prove that the Assyrians applied intercalary months in Middle

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[492] There are indications for intercalation during the Old Assyrian period. See a previous study by KOCH, *Neue Untersuchungen zur Topographie des babylonischen Fixsternhimmels*, Wiesbaden (1989) 132–141 (also discussed by VEENHOF [2000] 141–142).

[493] See ROWTON (1970) 229. For a reply to GASCHE *et al.*'s proposal see READE (2000) 151–153, who argued for a solar calendar with respect to the eponym year.

[494] GASCHE *et al.*, *Dating* ... 61–62 and READE (2000) 151.

[495] FREYDANK (1991) 16–17, READE (2001) 2, VEENHOF (2000) 146–147. → **KEL**

[496] WEIDNER, *AfO* 5 (1928–1929) 184–185 and (1935–1936) 27–28.

[497] Note that the Middle Assyrian texts texts from Giricano Tepe dated to the reign of Aššur-bēl-kala use Babylonian month-names: RADNER (2004) 80–81.

[498] Latest table with corrected dates can be found in GASCHE *et al.* (1998a) 2–3. Šamšī-Adad I died accordingly in 1688 instead of 1705 (NC: see *Dating* ... 62–63). As the authors themselves pointed out, their older table did not conform to the (important) premise that Šamšī-Adad I is known to have died in year 17 of Hammu-rāpi' (→ **Eponyms**). According to their earlier table in *Dating* ... Šamšī-Adad I died in year 8 of Hammu-rāpi'. Thus, the dates of Šamšī-Adad I were reduced by another nine years (1710–1679 versus 1719–1688). p. 2: "This is easily accomplished by subtracting the required number of years from the reigns of kings 66 and 65, which are hypothetical reconstructions anyway and therefore elastic. Of course, the regnal periods of kings 64–40 must also then be reduced by this magnitude." (→ **AKL**). This can only be done by neglecting the chronological value of **Distanzangaben**. As WILHELM, MDAR 72[9] has pointed out, Gasche *et al.* did not use the lowered Middle Assyrian dates proposed by BOESE – WILHELM (1979), but reached almost equally low dates for the 14th century due to their premise of the existence of a lunar calendar in Assyria. See BOESE (1982) 15–26 for the consequences on the Kassite dates. Note that WALKER's chart of 1995 (MC) and STARKE's chart (LC) of 2002 are based on the assumption that Šamšī-Adad I died in year 12 of Hammu-rāpi'.

Assyrian times (based on VS 19, 73 and 21, 1; see p. 142 following Koch) and even in to the Old Assyrian period.[499] But no direct evidence for this exists so far.[500] Hence Veenhof recommended against adapting the lunar reduction. Thus, the exact time when the Assyrians finally and fully adopted the Babylonian solar calendar with intercalary months remains unknown.

6.5. Local Calendars

Local calendars in the Ancient Near East are attested from the 3rd millennium onwards, each city having its own month names.[501] Month-lengths were determined by weather conditions, (mistaken) observations, etc. Every province had its own system of intercalation. COHEN (1993) 225ff. compiled the most important calendars from the beginning of the 2nd millennium onwards: in southern Mesopotamia the Sumerian (Nippur) calendar continued to be used whereas in the centers of the north "Amorite" calendars[502] were introduced.

According to Charpin's[503] reconstruction, two different systems of month-names were in use in Mari after Šamšī-Adad I[504] during the reign of his son Iasmaḫ-Addu:[505]

- The **"Šamšī-Adad calendar"**, also labelled the "Ekallātum calendar", was used in northern Syria (in Karana, Šaġar Bāzār, Tuttul, Tell ar-Rimāḫ as well as in the letters of the royal family and their officials sent from Šubat-Enlil, Nineveh, Aššur, Ekallātum and other places, esp. the region from where the Šamšī-Adad dynasty originated). It was also in use for a time after the collapse of the empire of Šamšī-Adad by his sons Iasmaḫ-Addu and Išme-Dagān.
- The local **"Mari calendar"** of the Old Babylonian period was in continual use – with an interruption during Šamšī-Adad I – from the end of the Šakkanakku period (roughly contemporary with the Ur III period), through the reign of Iaḫdun-Līm, to the period of Zimri-Līm (also referred to as the "Līm-dynasty" of Mari's Amorite period).

The Šamšī-Adad calendar may have replaced the Old Assyrian calendar in Aššur when Šamšī-Adad I controlled the city, since the "new" calendar can be also found on some tablets from Aššur. It has been speculated that the Šamšī-Adad calendar may have come with him from his town of origin, Ekallātum ("Ekallātum calendar"), but this cannot be confirmed (CHARPIN – ZIEGLER [2003] 156). Other local calendars existed at the beginning of the 2nd millennium in Karkemiš, Terqa[506], Ešnunna[507], and elsewhere. After the Šamšī-Adad dynasty lost power, the Old Assyrian calendar was restored in Aššur: it is labeled the "Restored Assyrian Calendar" by COHEN (1993) 237ff. When Iasmaḫ-Addu was driven out of Mari, the Šamšī-Adad calendar disappeared and the "Mari calendar" was reintroduced. A hiatus of two years took place between the dating by **eponyms** of Šamšī-Adad I[508] and the use of **year-names** by Zimri-Līm following the older Babylonian fashion of dating.[509] For a final

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499 For intercalary months during the reign of Šamšī-Adad and later on in the textual evidence from Mari, Tell ar-Rimāḫ and Tell Leilān see VAN DE MIEROOP (1994) 308–310.

500 Here he also discussed the use of *ša qātē* eponyms (= successor eponyms) in response to LARSEN's (1976) ideas on the use of calendars in Old Assyrian times.

501 For an introduction see COHEN (1993) 8–13 and SALLABERGER (1993) 5–14.

502 COHEN (1993) 248ff. See also GREENGUS, *JAOS* 107 (1987) 229[72] and (2001) 257–267 on the Amorite calendar in Old Babylonian texts from Sippar. These variations of a Semitic calendar, summarized as Amorite calendars, are attested from the late 3rd millennium on to the Old Babylonian period (Samsuiluna). In the Ur III period local calendars were in use ("native calendar"), which show no similarities with one of the Amorite calendars. The "Šamšī-Adad calendar" also belongs to the group of Amorite calendars used thoughout northern Mesopotamia and replaced the earlier Semitic calendars of Ebla, Mari, etc. On this calendar, also termed as "Ekallātum calender", see CHARPIN – ZIEGLER (2003) 155–156. On the relationship of the regional calendars during the Old Babylonian period in Sippar, the Diyala region and Mari see GREENGUS (2001) 259–263 with a chart on p. 267. For other Amorite calendars see COHEN (1993) 248–268.

503 CHARPIN (1985) 244–247 and CHARPIN – ZIEGLER (2003) 155–156.

504 In order to determine the length of this period the correspondence between the two calendars and the order of the known eponyms and year-names had to be determined. For the eponym calendar see CHARPIN – DURAND (1985) 298 and WHITING (1990) 196–197. The Mariotes based their calendar on a solar year with lunar months (luni-solar calendar) starting in fall, thus following the Assyrian tradition of the early 2nd millennium

505 See KREBERNIK (2001) 5 and (2001a) 8 and CHARPIN – ZIEGLER (2003) 155–156.

506 PODANY (2002) 17. Terqa initially used the month names of the "Mari calendar"; but in the Middle and Late Ḫana periods new names were introduced.

507 On the correspondences between the calendar of Mari and Ešnunna see CHARPIN – ZIEGLER (2003) 260–261

508 These are known from the MEC and documents and have been compiled by CHARPIN – ZIEGLER (2003) 156–157.

509 CHARPIN – DURAND (1985) 305. On the year-names of Zimri-Līm see CHARPIN – ZIEGLER (2003) 247–249.

list of the "Šamšī-Adad calendar" and its correspondence with the "Mari calendar", which was used from the reign of Zimri-Līm onwards, see CHARPIN (1985) 246–247 and CHARPIN – ZIEGLER (2003) 156. Niqmum, the first month of the "Šamšī-Adad calendar", corresponds to IGI.KUR, the 6th month of the "Mari calendar".[510] Both calendars share the months Kinūnum and Abum, which was crucial for their reconstruction. For synchronisms between the Mari calendar and that of Babylonia see CHARPIN – ZIEGLER (2003) 261–262. Careful studies of the calendars in use in Mari has resulted in a slightly changed synchronism between Šamšī-Adad and Hammu-rāpi' (see pp. 170–175 for details): Charpin and Ziegler propose that the death of Šamšī-Adad took place in the 18th, not the previously-thought 17th, year of Hammu-rāpi' (→ **10.6.**).

Concluding Remarks

The study of calendar systems forms the basis for the chronology of the Ancient Near East, giving us an idea of how to convert "ancient" calendar dates into "our" Julian calendar. A knowledge of the month-lengths of the Ur III and the Old Babylonian period is necessary for the statistical reduction of the VT and other astronomical data from that period.[511] This procedure is quite common in studies on Egyptian chronology ("synodic month" within the Egyptian year of 365 days[512]), but less used for Mesopotamian studies. So far, this analysis has only been performed by HUBER *et al.*, OPNE, who favored the HC, which is based on a 56/64-year Venus cycle. Month-length data were not included by Gurzadyan in GASCHE *et al.*, *Dating* ... in his study of the astronomical data and Mesopotamian chronology (See also SEAL [2001] 171 who stressed that the month-length discussion certainly deserves more attention in the future. On the other hand TANRET [2004] 5–12 believes Old Babylonian month-lengths are not useful for chronological purposes). → **3.2.** Based on all their other results (especially their computation of eclipse data) and observed synchronisms, Gasche *et al.* date Ammiṣaduqa's year 1 to 1550 (based on an 8-year Venus cycle) and therefore the fall of Babylon to 1499. However, it remains to be seen whether or not the month-lengths can confirm the proposed 8-year Venus cycle, which is supported chronologically by the dating of lunar eclipses.[513] If the eclipse and Venus data are rejected as inaccurate, then month-lengths loose much of their importance chronologically.

The use of different calendars (time of adaptation of the Babylonian calendar in Assyria; the problem of the beginning of intercalation) does not have a very strong impact on absolute chronology in terms of the total time difference or on synchronisms, but is important for an overall understanding and evaluation of Assyrian chronological data (AKL, eponyms, Assyrian Distanzangaben). One needs to be aware of the differences in time reckoning before Tiglath-pileser I. A chart of the reigns of Assyrian rulers recalculated on the assumption that a lunar calendar existed in Assyria before the time of Tiglath-pileser I is presented in *Akkadica* 108 (1998) 3 under the heading "corrected base chronology". The authors reduced Šamšī-Adad's I dates by 18 years (another nine years were subtracted due to the important synchronism with Hammu-rāpi'). The still-open question of the calendar in use in Assyria in the 2nd millennium BC (see READE [2000] 151–153 and [2001] 2–3) may be resolved by new Middle Assyrian texts. The chronological charts in handbooks and encyclopedias following the MC are usually based on the solar calendar[514] and the absolute dates are ultimately based on the evaluation of the VT. The astronomical data is declining in importance in chronological studies as more emphasis is being placed on the Assyrian calendar in combination with results from the natural sciences.

Links

AKL, Astronomical Data, Distanzangaben, Eponyms, Middle Assyrian Period, Old Assyrian Period, Year(-names)

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[510] The "Mari calendar" is also attested in texts from Tuttul: KTT 179–182 (see KREBERNIK [2001a] 190). Two of these texts bear a year-name quoting Zimri-Līm .

[511] Within this analysis month-lengths are the only contemporary data.

[512] VON BECKERATH (1997) 7–9 (on the Egyptian calendar) and 42–45 (on Sothic data).

[513] See GURZADYAN (2000) 184 and sub **Astronomical Data** (3.3.).

[514] These are primarily based on king list data, eponyms, Distanzangaben, etc.