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Mesopotamian chronology (2340-539 BCE) through astronomically dated synchronisms and comparison with carbon-14 dating¹

Gérard Gertoux

Abstract: The 614 Assyrian eponyms between the first year of Šamšî-Adad I and the first year of Tiglath-pileser I (1115-1076) allow us to date the reign of Šamšî-Adad I (1728-1695) approximately. As the Assyrian years were lunar before the reign of Ninurta-apil-Ekur (1192-1179), this makes it possible to slightly correct the reign of Šamšî-Adad I (1712-1680), yet as this Amorite king died in the 17th/18th year of King Hammurabi², so this synchronism fixes the dating of this Babylonian king (1697-1654). This dating does not correspond to the Middle Chronology but, on the other hand, exactly satisfies the astronomical dating of the Ammisaduqa tablet on Venus, according to the Ultra-Low Chronology. In addition, one tablet of astronomical omens (Enuma Anu Enlil 20) mentions a lunar eclipse dated 14 Simanu at the end of the reign of Šulgi (14/III/48, 27 June 1954 BCE), and another (Enuma Anu Enlil 21) mentions a lunar eclipse dated 14 Addaru at the end of the third dynasty Ur, which ended with the reign of Ibbi-Sin (14/XII/24, 6 March 1911 BCE). These two total lunar eclipses are separated by 42 years of reign (= 9 years of Amar-Sin + 9 years of Šu-Sîn + 24 years of Ibbi-Sin) and 9 months (=XII - III). During the period 2200-1850 BCE, there was only one couple of lunar eclipses spaced 42 years and 9 months apart, and visible at Ur, corresponding to the description of the astronomical omens. These two total lunar eclipses confirm the absolute dating of the reign of Hammurabi (1697-1654) and allow to anchor the reign of Sargon of Akkad (2243-2187). Secondly, as there is a synchronism (+/- 10 years) between Neferhotep I (1701-1690)³ and Ibni-Addu (1700-1680), the king of Hazor, and another synchronism between Ibni-Addu and Hammurabi (1697-1654), the king of Babylon, this reign could be determined indirectly by carbon-14 (IntCal20) and is again in perfect agreement with the “Ultra-Low chronology”. Finally, the best confirmation of the accuracy of this absolute chronology is the complete reconstitution from 2040 to 1050 BCE, year by year, of the main Mesopotamian chronologies: Uruk IV, Mari, Gutium, Assyria, Elam, Uruk V, Ur III, Larsa, Isin I, Babylon, Hana, Kassite and Sealand, with their synchronisms as well as their dates anchored on astronomical phenomena such as the total eclipses of the moon (Gertoux, NABU 2021-3, 171-172).

The Mesopotamian chronology of the 1st millennium before the Christian era (BCE) is well established. By contrast, that of the 2nd millennium remains highly controversial⁴, until today, even though the “Middle Chronology”, anchored on the reign of Hammurabi (1793-1750), is favoured by most scholars. In 1998, H. Gasche, J.A. Armstrong and S. W. Cole proposed to anchor the reign of Hammurabi (1697-1654) on two lunar eclipses during the reigns of Dynasty Ur III as well as the Ammisaduqa tablet on Venus. This new Mesopotamian chronology, called “Ultra-Low”, has been strongly contested by scholars (Joannès: 2001, XI, 184-188) who have argued that it is based primarily on the evidence of Babylonian pottery (which is false) and that it should instead be based on statisticians and physicists specializing in carbon-14 dating (Sallaberger, Schrakamp: 2015, 5-11). Paradoxically, these specialists who are highly qualified in their field of expertise (statistics and carbon-14 dating) are significantly less expert in the analysis of historical or astronomical data. For example, every historian knows that a father must be born before his son, that a king reigns during his lifetime, not after his death (some contracts can be dated after the death of a king if his successor has not been announced), that partial solar eclipses (with a magnitude of less than 95%) go unnoticed and cannot therefore be considered as bad omens, and that an astronomical phenomenon can be observed a few days later than the day theoretically calculated, but not a few days in advance (unless the observer has made a prediction). These common-sense remarks (for historians) are not always respected by statisticians or radiocarbonists. It should be noted that the reign of Puzur-Aššur III is currently impossible to calculate: 1587-1563 according to the Middle Chronology, 1491-1467 according to the Assyrian King List (Pruzsinsky: 2009, 42) and 1521-1498 according to some archaeologists (Düring: 2020, XV-XVI).

¹ An abstract of this paper was presented in San Diego, California, at a conference on 21 November 2019 (Session 3B Archaeology and Biblical Studies I), under the supervision of Professor Jonathan Rosenbaum (Gratz College). A short report has been published (<http://www.asor.org/wp-content/uploads/2019/12/2019-ASOR-Program-and-Abstract-Book.pdf> pages 26, 98). A poster of this paper was exhibited at the Collège de France, Paris, during the 65th International Meeting of Assyriology on 8-12 July 2019 at the request of Professor Dominique Charpin (<https://rai2019.digitorient.com/en/posters/>).

² Šamšî-Adad I died at the end of his 33rd year of reign, during the eponymy of ʿAb-silli-Aššur (No. 199), in the 11th month of Hammurabi's 17th year of reign (see Table 26).

³ The reign of Neferhotep I is determined by the durations from the Turin King List combined with the carbon-14 dating of several Egyptian kings. As the Turin King List durations are incomplete and the calibration curve (IntCal20) for the carbon-14 measurements has been revised several times (McAnaney, Baillie: 2019, 99–112), the dating of Neferhotep I's reign has evolved from: 1742-1731 (Ryholt: 1997, 197), 1721-1710 (Hornung, Krauss, Warburton: 2006, 492), to 1710-1693 (Maderna-Sieben: 2018, 94-95).

⁴ Hammurabi is considered as the greatest Babylonian king and the chronology of his reign is well known. However, in 1863, Jules Oppert had Hammurabi's reign begin in 2394 BCE, François Thureau-Dangin, in 1927, lowered this date to 2003 BCE, which was, in 1950, lowered by consensus in 1793 BCE (“Middle Chronology”), between 1849 BCE (“High Chronology”) and 1729 BCE (“Low Chronology”). Finally, Hermann Gasche proposed, in 1998, to lower it again to 1697 BCE (“Ultra-Low Chronology”). Hammurabi has therefore rejuvenated by about 700 years during the 20th century!

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PRELIMINARY NOTICE

Chronological studies involve several specialities, each of which has its own limitations in terms of dating, but the knowledge required for this study is only at first university level. Scientific reasoning demands that the absolute dates used to anchor historical chronologies should be the same for all specialities.

- Carbon-14 dating is not absolute for the following reason: with the ¹⁴C dating calibration curve (IntCal), the calendar age estimate is approximately unimodal (i.e. it has a single large peak). For example, with a confidence interval of 68.2% (1- σ) the date of 3350 \pm 10 BP (Before Present), or 1641 BCE with IntCal13 (2013), extends from 1658 to 1624 calBC (= 1641 BCE \pm 17). However, with IntCal20 (2020), the same ¹⁴C date, the peak is centred around 1625 calBC (1626 BCE \pm 19).
- Statistical dates, which are only average values, are not absolute. These statistical dates only make sense if the chronological data used for the calculations have a confidence interval of at least 95% (2- σ) and if the calculated dates are earlier than the observed dates (otherwise they are prophetic dates!).
- Archaeological dates, obtained from stratigraphy and the style of pottery, are not absolute. For example, the reign of Puzur-Aššur III is currently dated to 1521-1498 BCE (2020) by some archaeologists (but 1579-1555 BCE according to the “Low Middle” Chronology), which contradicts the date of 1491-1467 BCE obtained from the Assyrian King List (AKL) based on the sum of reign lengths.
- Astronomical dates, based on astronomical phenomena such as eclipses, are absolute only if the following condition is met: eclipses mentioned in Chronicles or Annals as signs of bad omens are always total eclipses. The darkening of the sun (metaphorical eclipse) mentioned in the eponym Puzur-Ištar (N°126), the year just after the birth of Šamšī-Adad I, has been interpreted by some Assyriologists as a solar eclipse dated 24/03/-1837* by the astronomer Teije de Jong, but this partial solar eclipse (max mag. 94%) was not visible for a naked-eye observer (< mag. 95%).

Peter J. Huber, a seasoned statistician has noticed that the deviation in days between the calculated and observed value for the rising of Venus in Year 1 of Ammisaduqa is the following for the four chronologies: Ultra-Low (13 days), Low (-5 days), Middle (-6 days) and High (-3 days). He logically concludes that the worst agreement (13 days) is with the Ultra-Low Chronology (Huber: 2000, 159-176). This conclusion is rigorously correct, but the Ultra-Low Chronology is the only one to have a date observed after the calculated date ([1]3 days) while the reverse is true for the other three chronologies (the date was observed before the calculated date!). Similarly, Huber calculates a large number of lunar eclipses in order to verify that they were the ones that best matched the two dated 14 Simanu at the end of the reign of Shulgi (14/III/48) and 14 Addaru at the end of the reign of Ibbi-Sin (14/XII/24), without taking into account two essential data that imposed a unique choice, in perfect agreement with the Ultra-Low chronology: 1) these two lunar eclipses are separated exactly by 42 years and 9 months, according to the Babylonian King lists. Furthermore, as they were bad omens signifying the death of the king, and not a usual astronomical observation, these two lunar eclipses had to be total (partial lunar eclipses are frequent and generally have no particular significance). Similarly, physicists specialising in ¹⁴C dating (naively) write: *The revised tree-ring-sequenced ¹⁴C time-series for Kültepe and Acemhöyük is compatible only with the so-called Middle Chronology and not with the rival High, Low or New Chronologies. This finding provides a robust resolution to a century of uncertainty in Mesopotamian chronology and scholarship, and a secure basis for construction of a coherent timeframe and history across the Near East and East Mediterranean in the earlier second millennium BCE* (Manning, Griggs, Lorentzen, Barjamovic, Bronk Ramsey, Kromer, Wild: 2016, 1-27).

This leads to several difficulties. Firstly, contrary to what the authors of the article assert, the dating of the Middle Chronology depends on several hypothetical and approximate synchronisms. Worse, the defence of the Middle Chronology, which would be the most “robust according to carbon-14 measurements”, is contradicted by their own dating. It reads: *Although this previous date favored the Middle Chronology, it was problematic (sic) as it left the construction of the Sarikaya Palace at Acemhöyük (then given as 1774 +4/-7 BCE) occurring more or less when Šamši-Adad I died (REL 197 = 1776 BCE on the Middle Chronology), which makes no sense* (Šamši-Adad I would have died in the year the Palace was built). In fact, the Sarikaya Palace was constructed in 1774 BCE +4/-7 years and two repair timbers in the Palace were cut in 1767 and 1766. The bulk of the reported 1600 bullae in the Sarikaya Palace should have been deposited there after 1774 BCE and before its destruction by fire or some time after 1766 BCE (Newton, Kuniholm: 2004, 165-176). Consequently, the inscription in the name of Šamši-Adad I, who reigned from 1712 to 1680 BCE according to the Assyrian King List (AKL), was deposited at the beginning of his reign (1712 BCE), 54 years after the repair of the Sarikaya Palace. Secondly the reign of Neferhotep I was measured around 1710-1693 BCE by carbon-14 (Maderna-Sieben: 2018, 94-95), with a precision of +/- 10 years because in Egypt carbonaceous remains are abundant. As there is a synchronism between Neferhotep I (1701-1690) and Ibni-Addu (1700-1680), the king of Hazor, and another synchronism between Ibni-Addu and Hammurabi (1697-1654), the king of Babylon, this reign could be determined indirectly by carbon-14 (IntCal20) and is again in perfect agreement with the Ultra-Low chronology. Finally, contrary to what the authors of the article claim, the calibration of carbon-14 dates by dendrochronology is not yet well established⁵. The reign of Neferhotep I is determined by the durations from the Turin King List combined with the carbon-14 dating of several Egyptian kings. However, as the calibration curve for the ¹⁴C measurements (IntCal20 in 2020) has been revised several times the dating of Neferhotep I's reign has evolved from: 1742-1731 (Ryholt: 1997, 197), 1721-1710 (Hornung, Krauss, Warburton: 2006, 492), to 1710-1693 (Maderna-Sieben: 2018, 94-95).

This preamble is necessary to establish a scientific method to obtain an absolute Mesopotamian chronology that is historically correct. The first step is to establish a relative chronology of the 116 Assyrian kings and the 137 Babylonian and Kassite kings, considering the chronological data from the Assyrian King lists (giving the number of eponymous years) and the Babylonian King lists (giving the number of years of reign). From n°33 onwards the durations of all Assyrian reigns are known (except n°65 and n°66). Likewise, the durations of all Babylonian reigns are known (except n°10 to n°17 and n°63 to n°71 with Samsu-iluna as n°1). The second step is to check all the synchronisms between the Assyrian and Babylonian reigns, so that the exact value of a duration can be chosen in cases where there are variants among several King lists (only four cases). This second step is essential before anchoring this relative chronology on astronomical dates. Some astronomers who claim to distinguish between one of the four chronologies by dating eclipses fail to consider key historical data. For example, Emil Khalisi's article entitled “The Double Eclipse at the Downfall of Old Babylon (2020)” develops technical astronomical calculations without 1) giving the means to verify

⁵ It reads, for example: *The result is that indeed between ca. 3600 and 3500 calBP the calibration curve needs a shift of about 20 BP upwards in ¹⁴C age (...)* In such an instance, it is reasonable to report a single interval—here we obtain a 68.2% (1-σ) interval extending from 1658–1624 calBC (= 1641 BCE +/- 17). However, with IntCal20 the picture is much more complex as our ¹⁴C date of 3350 ± 10 BP hits the plateau in the curve (...) we note that the peak centered around 1625 calBC (1626 BCE +/- 19) carries the largest individual probability (McAneney, Baillie: 2019, 99–112).

them, 2) without linking them to any well-referenced historical event, 3) considering any of the 116 Assyrian reigns, 4) considering the 137 Babylonian and Kassite kings, and 5) proposing a complete chronological reconstruction of all these Mesopotamian reigns. Historians and Assyriologists should not be impressed by the technical aspect of such articles as they have no historical value. The fall of Babylon was a historical event of the first magnitude which occurred exactly in the 41st and last year of the Babylonian king Samsuditana. If this method of calculation is followed, the absolute Mesopotamian chronology is easy to obtain. As a matter of fact, the 614 Assyrian eponyms between the 1st year of the reign of Šamšî-Adad I (Assyrian king n°39) and the 1st year of the reign of Tiglath-pileser I (1115-1076) allow us to date the reign of Šamšî-Adad I (1728-1695) approximately (with 1 eponym = 1 solar year). We know that the temple of the god Aššur, called Ehursagkurkurra, was rebuilt several times. The lengths of time between the several reconstructions being known to be: 159, 434 and 580 years respectively (Pruzsinsky: 2009, 140–143), it is possible to verify (Table 1) whether these durations in eponymous years are equivalent with the sum of the Assyrian reigns between two successive reconstructions:

TABLE 1

n°	ASSYRIAN KING	BCE	Comments on eponyms from Chronicles	Σ eponyms	
33	Ērišu I	1872	Year 1, eponym Šu-Ištar son of Abila (N°1)	40	40
34	Ikunum	1834	Year 1, eponym Iddin-Suen brother of Šuli (N°41)	14	14
35-38				(112)	
39	Šamšî-Adad I	1680	Death of Šamšî-Adad I, eponym Ṭab-šilli-Aššur (N°199)	33	159
40	Išme-Dagan I	1679	(Year 1, eponym Ennam-Aššur N°200)	11	11
41-76				(411)	
77	Shalmaneser I	1259	Year 12 (eponym Ilî-qarrad? N°633)	12	434
		1258		18	18
78-111				(538)	
	Sennacherib	681	Year 24, eponym Nabû-aḥḥē-ēreš	24	580
112	Esarhaddon	680	Year 1, eponym Danânu (N°1213)	1	1
		679	Year 2, eponym Issi-Adad-anênu (N°1214)	11	11

We note that the first period from Iddin-Suen (eponym N°41) to Ṭab-šilli-Aššur (eponym N°199) includes 159 eponyms (= 199 – 41 + 1). The second period from Year 1 of Išme-Dagan I (eponym Ennam-Aššur N°200) to Year 12 of Shalmaneser I (king n°77) has 434 eponyms. The arrangement of the 30 eponyms of the reign of Shalmaneser I (Bloch: 2012, 406-408) makes it possible to fix the eponym of the 12th year of his reign in 1259 BCE. This first calculation shows that the eponymous chronicles are accurate and reliable and that there is a total of 614 eponyms⁶ between the 1st year of the reign of Šamšî-Adad I and the 1st year of the reign of Tiglath-pileser I. The duration of Assyrian reigns comes mainly from the Assyrian King List (AKL). According to the AKL, the reign of Ninurta-apil-Ekur (n°82) had 13 eponyms, while other lists indicate 3 eponyms (Pruzsinsky: 2009, 51-52). There are variants in the reigns (n°82 and others) but the sum of these reigns is known, which implies the following equation:

$$63 = 580 - (\text{sum of the other eponyms without variants})$$

$$63 = 4/3 (\text{Aššur-nâdin-apli n°79}) + 13/3 (\text{Ninurta-apil-Ekur n°82}) + 46/36 (\text{Aššur-dân I n°83})$$

The fact that the sum of the three durations is known (63) imposes a unique set of values: 3, 13 and 46. Changing only one value changes the sum. Most studies on the Assyrian King Lists assume that the Assyrian calendar did not change over time and remained similar to the Babylonian calendar, but this assumption is false. Several researchers have indeed noticed that, before Aššur-dân I (1179-1133), the Assyrian inscriptions never mention intercalary months⁷, unlike the Babylonian calendar. Moreover, before this Assyrian king, the synchronisms between the Assyrian and Babylonian chronologies became approximate, because the number of eponyms sometimes exceeds the duration of the reign (Pruzsinsky: 2009, 42-67). The choice to ignore this change has consequences on the Assyrian chronology as well as on synchronisms with the Babylonian chronology. For example, there are 614 eponyms between the first year of Šamšî-Adad I's reign and the first year of Tiglath-pileser I's reign (1115-1076), which makes it possible to date Šamšî-Adad I's reign (1728-1695) because he died in the 17th year of King Hammurabi. This makes it possible to establish the reign of this Babylonian king as 1712-1669* (or 1697-1654 with lunar years). This dating poses a problem because the reign of Hammurabi is linked to the reign of Ammisaduqa, which is anchored in an astronomical phenomenon (Venus tablet). Astronomy offers four possibilities over this period, but none of them corresponds to the reign calculated with the 614 solar years.

⁶ 614 eponyms = 33 eponyms (Šamšî-Adad I n°39) + 434 eponyms + 30 – 12 (Shalmaneser I n°77) + 37 (Tukultî-Ninurta I n°78) + 4 (Aššur-nâdin-apli n°79) + 6 (Aššur-nêrârî III n°80) + 5 (Enlil-kudurri-ušur n°81) + 13 (Ninurta-apil-Ekur n°82) + 46 (Aššur-dân I n°83) + 0 (n°84) + 0 (n°85) + 18 (Aššur-rêš-iši I n°86).

⁷ An Assyrian copy of a Babylonian scholarly text (VAT 8875) reads: "Intercalary Nisannu, 7th day, eponym Aššur-išmânni" (Jeffers: 2017, 151 n. 7) an eponym dated 1160 BCE during Aššur-dân I's reign (Bloch: 2010c, 43-44).

TABLE 2

Chronology (BCE):	Ultra-Low	Assyrian King List		Low	Middle	High
Fall of Ur	1912	lunar	luni-solar	1944	2008	2064
Reign of Hammurabi	1697-1654	1697-1654	1712-1669*	1729-1686	1793-1750	1849-1806
Reign of Ammisaduqa	1551-1530			1583-1562	1647-1626	1703-1682
Fall of Babylon	1499	(1499)	(1514)	1531	1595	1651

If the Assyrian years were lunar before the reign of Tiglath-pileser I (1115-1076), this makes it possible to slightly correct the reign of Šamšî-Adad I (1712-1680), yet as this Amorite king died in the 17/18th year of King Hammurabi, then this synchronism fixes the dating of this Babylonian king (1697-1654). This dating does not correspond to the “Middle Chronology” but, on the other hand, satisfies the astronomical dating of the Ammisaduqa tablet on Venus⁸, according to the “Ultra-Low Chronology”. In addition, two tablets of astronomical omens (*Enuma Anu Enlil* 20 & 21) mention a lunar eclipse dated 14 Simanu at the end of the reign of Šulgi (14/III/48, total eclipse dated 28 June 1954 BCE), and a lunar eclipse dated 14 Addaru at the end of the third dynasty of Ur, which ended with the reign of Ibbi-Sîn (14/XII/24, total eclipse dated 6 March 1911 BCE). These two total lunar eclipses are separated by 42 years of reign (= 9 years of Amar-Sîn + 9 years of Šu-Sîn + 24 years of Ibbi-Sîn) and 9 months (=XII - III). During the period 2200-1850 BCE, there was only one couple of lunar eclipses spaced 42 years and 9 months apart, and visible at Ur, corresponding to the description of the astronomical omens. These two eclipses confirm the absolute dating of the reign of Hammurabi (1697-1654) and allow one to anchor the reign of Sargon of Akkad (2243-2187). The purpose of this study is to examine how to transform the relative chronology of Mesopotamian reigns from the period 2040-1050 BCE into an absolute chronology (Pruzinsky: 2009, 17–44). In order to obtain it in an unquestionable way, it is imperative that all dates obtained over the entire period be in agreement with: 1) all known durations of the Assyrian and Babylonian reigns, or at least with one of the variants, 2) all known synchronisms between the reigns: Assyrians, Babylonians, Kassites, Isinians and Elamites, 3) all clearly identified astronomical phenomena (with at least one date, region of observation, and at least partial description of the phenomenon) such as eclipses, star-rises and certain astronomical conjunctions. The establishing of the absolute Mesopotamian chronology will take place in seven successive steps:

- 1) The durations of the Babylonian reigns, from Eriša-Marduk (770-761) to Nabonidus (556-539), are all known. The chronology of these Babylonian kings is anchored on the dates set by the astronomy of five precisely described lunar eclipses. The durations of the Assyrian reigns, from Adad-nêrârî II (912-891) to Aššur-uballiṭ II (612-609), are all known. The chronology of these Assyrian kings is anchored on six synchronisms with the Babylonian chronology and by a total solar eclipse, visible in Assyria, dated from the month of Simanu in the 10th year of Aššur-dân III (773-755), in 763 BCE. The synchronism between the Assyrian king Adad-nêrârî II (912-891) and the Babylonian king Šamaš-mudammiq (921-900) makes it possible to fix the Mesopotamian chronology in an absolute way in the period **912-539 BCE** and to note the following points: 1) the chronological data of the eponymous lists are rigorously accurate; 2) the first year of Babylonian reigns (counted by the number of luni-solar years) began in the 1st Nisan, as did Assyrian reigns (counted by the number of eponyms); 3) co-regencies were removed and integrated into the reigns of official kings in order not to modify the chronology.
- 2) The durations of the Babylonian reigns, from Ninurta-nâdin-šumi (1133-1127) to Ninurta-kudurri-ušur II (944-941), are all known. Similarly, the durations of the Assyrian reigns, from Aššur-rêš-iši I (1133-1115) to Adad-nêrârî II (912-891), are all known. The synchronism between Aššur-rêš-iši I (1133-1115) and Ninurta-nâdin-šumi (1133-1127) makes it possible to fix the Mesopotamian chronology in an absolute way in the period **1133-912 BCE** (Pruzinsky: 2009, 43).
- 3) The durations of the Babylonian reigns, from Kadašman-Enlil I (**1375-1360**) to Ninurta-nâdin-šumi (1133-1127), are all known (Joannès: 2001, 164). Similarly, the durations of the Assyrian reigns, from Šalmaneser I (1271-1242) to Aššur-rêš-iši I (1133-1115), are all known. An Assyrian chronicle gives the durations between the different reconstructions of the temple of the god Aššur (called Ehursagkurkurra), that between Year 12 of Šalmaneser I and Year 1 of Esarhaddon (681-669) had 580 eponyms, which makes it possible to determine the three Assyrian durations which have variants since the total of these three durations is known (Pruzinsky: 2009, 51-55,136): **63** = 4/3 (Aššur-nâdin-apli n°79) + **13**/3 (Ninurta-apil-Ekur n°82) + **46**/36 (Aššur-dân I n°83). Only durations in bold type (4, 13 and 46) satisfy this equation. There is a synchronism between Eriša-Adad I and Kadašman-Enlil I (1375-1360), however we note that there are 185 eponyms⁹ between Eriša-Adad I and Aššur-dân I (1179-1133) but only 180 years (= 1360 – 1179 – 1). The simplest way to explain this discrepancy between the number of

⁸ Statistical analysis of the Venus tablet shows that it was transmitted with many errors (De Jong: 2013b, 366-370).

⁹ 185 = 36 (Aššur-uballiṭ I) + 10 (Enlil-nêrârî) + 12 (Arik-dên-ilî) + 32 (Adad-nêrârî I) + 30 (Šalmaneser I) + 37 (Tukulti-Ninurta I) + 4 (Aššur-nâdin-apli) + 6 (Aššur-nêrârî III) + 5 (Enlil-kudurri-ušur) + 13 (Ninurta-apil-Ekur).

Babylonian (luni-solar) years and the number of eponymous years is to assume that the Assyrian years were lunar (and therefore without intercalary months) before Aššur-dân I (1179-1133). As 33 lunisolar years ($33 \times 365.24219 = 12053$ days) are approximately equivalent to 34 lunar years ($34 \times 12 \times 29.530588 = 12048$ days), the 180 lunisolar years correspond to 185 eponyms ($= 180 \times 34/33$).

- 4) According to the Assyrian chronicle that gives the durations between the different reconstructions of the temple of the god Aššur (Ehursagkurkurra), there were 434 eponyms between Year 33 of Šamšî-Adad I and Year 12 of Šalmaneser I (1271–1242), in 1259 BCE, which makes it possible to determine the reign of Šamšî-Adad I (**1712–1680**), because $1680 = (434 \times 33)/34 + 1259$. As this Assyrian king died in Year 17 (month 11) of Hammurabi (**1697–1654**) this synchronism allows us to calculate the reign of the Babylonian king, because $1697 - 17 = 1680$ and $1712 = (1680 + 33 - 33/34)$.
- 5) The durations of the 11 Babylonian reigns before the fall of Babylon, from Sumu-abum to Samsuditana, are all known (Pruzsinsky: 2009, 92). Since the chronology of these reigns is anchored on the reign of Hammurabi (1697-1654), it allows us to calculate the reign of Sumu-abum (**1799–1785**), Ammišaduqa (1551–1530) and Samsuditana (1530–1499). The durations of the 15 Isinian reigns before Hammurabi are all known. The chronology of these kings is anchored on six synchronisms with the Babylonian chronology, which make possible to fix the reign of the first king of Isin: Išbi-Erra (**1923–1890**). The durations of the 5 Sumerian reigns before Išbi-Erra are all known, which make possible to fix the reign of the first king of Ur III: Ur-Namma (**2020–2002**) as well as the last one Ibbi-Sîn (**1936–1912**).
- 6) Current academic studies use astronomical phenomena to anchor Mesopotamian chronology on absolute dates, such as the Ur III eclipses (EAE 20 and 21) at the end of the reigns of Šulgi (2002-1954) and Ibbi-Sîn (1936-1912), as well as the cycle of Venus (EAE 63) during the reign of Ammišaduqa (1551-1530), but these studies do not consider the relative chronology deduced from the Assyrian and Babylonian King lists (Pruzsinsky: 2009, 69-82). However, three astronomical phenomena make it possible to anchor on absolute dates the relative chronology obtained from the Assyrian King List. The informative data recorded for the two lunar eclipses of EAE 20 and 21 can be reduced to six main parameters: 1) the entering and 2) exit positions of the darkening of the lunar disk; 3) the watch-times of the beginning and 4) the end of the eclipse; 5) the day of the eclipses: EAE 20 is dated to 14 Simanu and 6) EAE 21 to 14 Addaru (Gurzadyan: 2000, 175-184). Two additional data make it possible to restrict the dating of these two lunar eclipses¹⁰ to a unique choice: **28 June 1954 BCE & 6 March 1911 BCE**, over the period 2200-1850 BCE because these two lunar eclipses are separated by 42 years of reign ($= 9$ years of Amar-Sîn + 9 years of Šu-Sîn + 24 years of Ibbi-Sîn) and 9 months ($= XII - III$). Moreover, lunar eclipses were always interpreted as a bad omen, usually the death of a king¹¹, when they were total (partial eclipses were too frequent to receive such an interpretation). If one looks for two separate total lunar eclipses of 42 years and 9 months over the period 2200-1850 BCE, there is only one solution, the same as previously. The lunar eclipse dated: *Year 38 that Babylon was resettled (...) Month of Abu (V), Day 10*¹², mentioned in the economic texts from Tell Muhammad (Gasche, Armstrong, Cole: 1998, 86) confirms definitively the Ultra-Low Chronology, because if the fall of Babylon was Year 1 of the “resettlement”, Year 38 was in 1462 BCE, and there was indeed a total lunar eclipse on 14/V/38 (19 July 1462). There is no lunar eclipse on 14/V/38 with the other chronologies, including the Middle Chronology.
- 7) Some absolute dates over the period 2000-1000 BCE have been compared with ¹⁴C dates. For example, the reign of Neferhotep I (1721-1710) has been measured at +/- 20 years by ¹⁴C. As there is a synchronism between Neferhotep I and Ibni-Addu (1700-1680), and another synchronism between Ibni-Addu and Hammurabi (1697-1654), this reign could be determined indirectly by ¹⁴C and is again in perfect agreement with the Ultra-Low chronology. As radiocarbonists claim that ¹⁴C dating is in favour of the Middle Chronology, a detailed part of this article has been devoted to these dates.

CHRONOLOGY OF MESOPOTAMIAN REIGNS OVER THE PERIOD 912–539 BCE

The chronological reliability of the Babylonian King lists can sometimes be misleading, despite their anchoring on astronomical phenomena precisely dated. The Assyrian King lists have the same problem, but they are even more difficult to verify for the following reasons:

- The duration of the Assyrian reigns is not counted in number of years but in number of eponyms (knowing, however, that there is a new eponym each year), which prevents dating an event of the reign,

¹⁰ The first lunar eclipse is dated 14 Simanu at the end of the reign of Šulgi (14/III/48) and the second eclipse is dated 14 Addaru at the end of the third dynasty Ur III, which ended with the reign of Ibbi-Sîn (14/XII/24).

¹¹ The astronomical tablet BM 32234 specifies that King Xerxes died on 14/V/21 (24 August 475 BCE) just after the total lunar eclipse dated 14/III/21 (26 June 475 BCE). Similarly, the astronomical tablet BM 36761 specifies that King Darius III was defeated by Alexander the Great on 24/VI/5 (1 October 331 BCE) just after the total lunar eclipse dated 13/VI/5 (20 September BCE).

¹² The lunar eclipse was total since it is an economic text. Day 10 is a mistake because eclipses occur on the 14th-15th of the month.

unless the eponym of this year is known (in about 1% of cases).

- The Assyrian annals are fragmentary and contain many lacunae.
- The lists of eponymous names are also fragmentary and, therefore, difficult to reconstruct.
- Assyrian inscriptions and records regularly date the reigns according to their military campaigns, knowing that there was one campaign per year (usually between early spring and late autumn). However, there was generally no campaign in the year of accession, and a difficult campaign could be completed the following year.
- If an eponym died during the year of his eponymy, he was replaced by a new eponym who became a canonical eponym, but in this case, there were two eponyms in the same year.

Despite all these limitations, Assyrian chronology may be reconstructed over the period 912–609 BCE using eponyms and can be anchored on the solar eclipse which occurred on [30] Simanu in the eponymy of Bur-Sagale (15 June 763 BCE). The Assyrian period 912–648 BCE is dated owing to its canonical eponyms (Parpola: 2007, 381–430) and the period 648–609 BCE by a prosopography of its eponyms (Parpola: 1998, XVIII–XX), but the ranking of eponyms over this period remains controversial¹³ (Novotny, Jeffers: 2018, 30–32). The chronological reconstruction of the Assyrian reigns based on eponyms is different from that given in the Assyrian King lists (Table 3):

TABLE 3

BCE	n°	ASSYRIAN KING	According to years of reign (AKL)				BABYLONIAN KING
630	112	Aššurbanipal	(669–627)	39			18 Kandalanu
629				40			19
628				41			20
627				42	0		21
626	113	Aššur-etel-ilâni	(627–626)	1	0	0	22
625	114	Sin-šar-iškun	(626–612)	1			1 Nabopolassar
624				2			2

BCE	n°	ASSYRIAN KING	According to eponyms				BABYLONIAN KING
630	112	Aššurbanipal	<i>Salmu-šarri-iqbi?</i>	39	0		18 Kandalanu
629	113	Aššur-etel-ilâni	<i>Nabû-šarru-ušur?</i>	1	[40]		19
628			<i>Nur-salam-sarpi?</i>	2	[41]		20
627			<i>Marduk-šarru-ušur?</i>	3	[42]	0	21
626			<i>Iqbi-ilani? /Marduk-remanni?</i>	4	0	0	[1] Sin-šum-lišir
625	114	Sin-šar-iškun	<i>Sin-šarru-ušur?</i>	1			1 Nabopolassar
624			<i>Kanunai?</i>	2			2

The presence of co-regencies modifies the dating of some synchronisms. For example, in the Assyrian King List (AKL) there is a synchronism between Year 1 of the Assyrian king Aššur-etel-ilâni and Year 22 of the Babylonian king Kandalanu (meaning “Clubfoot”!) in 626 BCE, but in fact this synchronism occurs between Year 1 of Aššur-etel-ilâni and Year 19 of Kandalanu in 629 BCE. Therefore, King lists can be used to date synchronisms if the presence of co-regencies does not modify the chronology of the reigns. Coregencies modify the individual durations of the reigns but not their global duration. Moreover, the dates of several reigns can be anchored by means of eclipses dated by astronomy (Stephenson: 1997, 93–127).

Several parts of these King lists can also be verified by the: 1) lengths of reigns that are known (#); 2) position of eponyms, all known over the period 912–648 BCE; 3) synchronisms between the Assyrian and Babylonian reigns (highlighted in grey); 4) absolute dates calculated by astronomy (highlighted in sky blue). Some reign lengths are different from those indicated by the inscriptions (highlighted in orange).

TABLE 4

n°	ASSYRIAN KING	#	Reign	n°	BABYLONIAN KING	#	Reign
98	Aššur-dân II	23	935-912	58	Šamaš-mudammiq	21	921 -
99	Adad-nêrârî II	21	912-891				-900
100	Tukultî-Ninurta II	7	891-884	59	Nabû-šum-ukîn I	12	900-888
101	Aššurnaširpal II	25	884-859	60	Nabû-apla-iddina	33	888-855
102	Shalmaneser III	35	859-824	61	Marduk-zâkir-šumi I	36	855-819
103	Šamšî-Adad V	13	824 - -811	62	Marduk-balâssu-iqbi	6	819-813
				63	Bâba-ah-iddina	-	813-812
104	Adad-nêrârî III	28	811 -	-	no kings	-	812-801
					5 unknown kings (64-68)	-	801-800
				69	Ninurta-apla-[...]	-	800-790
			-783	70	Marduk-bêl-zêri	-	790-780

¹³ The chronological study of the eponyms over the period 648–609 BCE is still in progress (<http://oracc.org/rinap/rinap5/rinap52/>).

105	Shalmaneser IV	10	783-773	71	Marduk-apla-ušur	-	780-770	
106	Aššur-dân III	18	773-755	72	Erîba-Marduk	9	770-761	
107	Aššur-nêrârî V	10	755-745	73	Nabû-šuma-iškun	13	761-748	
108	Tiglath-pileser III	18	745 -	74	Nabû-našir	14	748-734	
				75	Nabû-nâdin-zêri	2	734-732	
				76	Nabû-šum-ukîn II	0	732-732	
				77	Nabû-mukîn-zêri	3	732-729	BM 35789
			-727	78	Pûlu (Tiglath-pileser III)	2	729-727	
109	Shalmaneser V	5	727-722	79	Ulûlaiu (Shalmaneser V)	5	727-722	
110	Sargon II	17	722 -	80	Merodachbaladan II	12	722-710	Almagest IV:6
			-705	81	Sargon II	5	710-705	
111	Sennacherib	24	705 -	82	Sennacherib	2	705-703	
				83	Marduk-zâkir-šumi II	0	703-703	
				84	Bêl-ibni	3	703-700	
				85	Aššur-nâdin-šumi	6	700-694	
				86	Nergal-ušeziḫ	1	694-693	
				87	Mušeziḫ-Marduk	4	693-689	
			-681	88	Sennacherib	8	689-681	
112	Esarhaddon	12	681-669	89	Esarhaddon	12	681-669	
113	Aššurbanipal	42	669-627	90	Šamaš-šuma-ukîn	20	668-648	BM 45640
114	Aššur-etel-ilâni	1	627-626	91	Kandalanu	22	648-626	
115	Sin-šar-iškun	14	626-612	92	Nabopolassar	21	626 -	Almagest V:14
116	Aššur-uballiḫ II	3	612-609				-605	
				93	Nebuchadnezzar II	43	605-562	VAT 4956
				94	Amel-Marduk	2	562-560	
				95	Neriglissar	4	560-556	
				96	Nabonidus	17	556-539	
					Cyrus II	9	539-530	
					Cambyses II	8	530-522	BM 33066

The Assyrian and Babylonian King lists can be reconstructed chronologically over the period 2020-900 BCE in the same way as those over the period 912-609 BCE but with two (2) additional difficulties: 1) the Assyrian calendar for counting eponyms was different before Tiglath-pileser I (1115-1076); and, 2) the durations of the Babylonian reigns, from Agum II (n°9) to Kurigalzu (n°17), after the first fall of Babylon as well as the durations of the Assyrian reigns during the same period of time of Aššur-rabi I (n°65) and Aššur-nâdin-aḫḫe I (n°66), are not known. The following inscriptions of Tiglath-pileser I with several double dates can be used to synchronize the ancient Assyrian calendar:

I crossed the Euphrates 28 times, 2 times in one year, in pursuit of the Arameans aḫlamû (...) I captured the palaces of Babylon which belonged to Marduk-nadîn-ahhê king of Karduniash (1101-1083), and I burned them. In the eponymy of Aššur-šumu-ereš (and) in the eponymy of Ninuaya, 2 times, I drove a battle of chariots online against Marduk-nadîn-aḫḫê king of Karduniash, and I defeated him (...) Month of Ḫibur, equivalent of the (Babylonian) month of Kislev, 18th day, [eponymy] of Taklak-ana-Aššur; I crossed the Euphrates [26] times, 2 times in one year, in pursuit of the Arameans aḫlamû (...) Month of Kuzallu, 13th day, eponymy of Ninuaya son of Aššur-aplu-lišir (Grayson 1991: 3-45).

Assyrian kings performed a traditional military campaign each year¹⁴. Tiglath-Pileser I (1115-1076) reigned for 28 years and has 28 eponyms, Taklāk-ana-Aššur being the eponym of the 25th regnal year (Nahm: 2022, 238-240). The mention of 28 crossings of the Euphrates, including two in one year (eponymy of Ninuaya?), implies dating this inscription at the end of year 1088 BCE (= 1115 - 27) or shortly after. Thus, at that time, the twelfth months of the Assyrian calendar (Ḫubur) matched the 9th month of the Babylonian calendar (Kislev), which confirms their desynchronization. Consequently, the Babylonian year began on 1st Nisan, or 12 April in 1088 BCE, while the Assyrian year began on 1st Šippu or 13 January¹⁵. The presence of these double dates in the reign of Tiglath-pileser I shows that the new Babylonian calendar adopted by the Assyrian scribes was not yet familiar to them. The main difference between the old Assyrian calendar and the Babylonian calendar adopted by Tiglath-pileser I concerns the length of the year, which was lunisolar in the Babylonian calendar (i.e., an average solar year) but strictly lunar in the old Assyrian calendar (which, therefore, did not have an intercalary year used for the synchronization with the solar cycle)¹⁶.

¹⁴ For reasons of stewardship, the army on campaign had to be fed. In addition, the movements should be done on practicable grounds. Military campaigns took place outside the rainy season between the spring and autumn equinoxes (April-October).

¹⁵ Given that the spring equinox occurred on 31 March in 1090 BCE, the 1st Nisan (1st lunar crescent after spring equinox) has to be dated on 4 April in 1090 BCE, but on 22 April in 1089 BCE, consequently, there was a month Addâru2 in year 25 of Tiglath-pileser.

¹⁶ Since the lunar year lasts 354.36706 days (= 29.530588x12), 10.875 days less than the solar year of 365.24219 days, the two calendars are in phase every 32 solar years, corresponding to 33 lunar years (with an accuracy of 6 days).

The two calendars (Assyrian and Babylonian) used by Tiglath-pileser raise the problem of calendar changes. The presence of several double dates in Tiglath-pileser's reign shows that the new Babylonian calendar (highlighted in grey) adopted by the Assyrians was not yet familiar to them.

TABLE 5

BCE	Babylonian month			Assyrian month	(C)	(Y)	Eponym (King Tiglath-pileser I n°87)	
1092	1	X	Tebētu	<i>xii</i>	Ḫibur		<i>Adad-apla-iddina</i>	
	2	XI	Šabātu	<i>i</i>	Šippu	24		
	3	XII	Addāru	<i>ii</i>	Qarrātu			
	4	I	Nisannu	<i>iii</i>	Kalmartu	***		[23] <i>Aššur-šuma-êriš</i>
	5	II	Ayyaru	<i>iv</i>	^d Sin			(MAR V 43)
	6	III	Simanu	<i>v</i>	Kuzallu			
	7	IV	Du'uzu	<i>vi</i>	Allanātu			
	8	V	Abu	<i>vii</i>	Belêt-ekalli			
	9	VI	Ulûlû	<i>viii</i>	Ša sarrâte			
	10	VII	Tašrîtu	<i>ix</i>	Ša kênâte			
	11	VIII	Araḥsamna	<i>x</i>	Muḥḥur ilâni			
	12	IX	Kisilimu	<i>xi</i>	Abû šarrâni			
1091	1	X	Tebētu	<i>xii</i>	Ḫibur		25th campaign	
	2	XI	Šabātu	<i>i</i>	Šippu	25		
	3	XII	Addāru	<i>ii</i>	Qarrātu			
		XIIa	Addāru2	<i>iii</i>	Kalmartu			
	4	I	Nisannu	<i>iv</i>	^d Sin	***		[24] <i>Ninuaya son of Aššur-aplu-lišir</i>
	5	II	Ayyaru	<i>v</i>	Kuzallu			(RIMA 2, A.0.87.3)
	6	III	Simanu	<i>vi</i>	Allanātu			
	7	IV	Du'uzu	<i>vii</i>	Belêt-ekalli			
	8	V	Abu	<i>viii</i>	Ša sarrâte			
	9	VI	Ulûlû	<i>ix</i>	Ša kênâte			
	10	VII	Tašrîtu	<i>x</i>	Muḥḥur ilâni			
	11	VIII	Araḥsamna	<i>xi</i>	Abû šarrâni			
12	IX	Kisilimu	<i>xii</i>	Ḫibur				
1090	1	X	Tebētu	<i>i</i>	Šippu	26	26th campaign	
	2	XI	Šabātu	<i>ii</i>	Qarrātu			
	3	XII	Addāru	<i>iii</i>	Kalmartu			
	4	I	Nisannu	<i>iv</i>	^d Sin	***		[25] <i>Taklāk -ana-Aššur</i>
	5	II	Ayyaru	<i>v</i>	Kuzallu			
	6	III	Simanu	<i>vi</i>	Allanātu			
	7	IV	Du'uzu	<i>vii</i>	Belêt-ekalli			
	8	V	Abu	<i>viii</i>	Ša sarrâte			
	9	VI	Ulûlû	<i>ix</i>	Ša kênâte			
	10	VII	Tašrîtu	<i>x</i>	Muḥḥur ilâni			
	11	VIII	Araḥsamna	<i>xi</i>	Abû šarrâni			
	12	IX	Kisilimu	<i>xii</i>	Ḫibur			
1089	1	X	Tebētu	<i>i</i>	Šippu	27	27th campaign	
	2	XI	Šabātu	<i>ii</i>	Qarrātu			
	3	XII	Addāru	<i>iii</i>	Kalmartu			
		XIIa	Addāru2	<i>iv</i>	^d Sin			

A study of Tiglath-pileser I's reign (Bloch: 2012, 67-69,342-350,398-413) has confirmed two points: the change of calendar (year beginning on 1st Nisan instead of 1st Šippu) occurred shortly before the reign of Tiglath-pileser I, as it was already in use in his first year of reign —in the month of Ḫibur (which is) the month Abu (V), day 20, the eponymy of Tiglath-pileser, the king of Assyria. Two other studies showed that a non-intercalated calendar was used in Assyria under Tukultî-Ninurta I's reign (Gauthier: 2016, 725-739) and before Aššur-dân I's reign (Jeffers: 2017, 151-191). The eponym marking each new Assyrian year was, therefore, chosen from the month of Nisan and not from the month of Šippu. For practical reasons: military campaigns took place outside the rainy season, between the spring equinox (Babylonian month I) and the autumnal equinox (Babylonian month VII) with the new equivalence: 1 year = 1 eponym (E) = 1 campaign (C). This system of equivalence was approximate because the 26th campaign (C) does not correspond exactly to the 25th reign year (Y) dated from the eponym Taklāk-ana-Aššur (in 1090 BCE).

The beginning of regnal years was different depending on dating systems¹⁷. Although during the period 1500-1150 BCE there is no explicit notation or other inscriptional evidence for intercalary lunar months,

¹⁷ For example, in 1088 BCE, 1st Nisan was 12 April for Babylonians and Judeans (years with accession). 1st Šippu was 13 January for Assyrians (years with accession). 1st Thot was 22 May for Egyptians (years without accession). 1st Tishri was 5 October for Israelites (years without accession). The accession year is the duration between the accession and the 1st year of reign. "year with accession" means that the accession year is reckoned as "year 0" and "year without accession" means that the accession year is reckoned as "year 1". Thus, according to the Assyrian calendar of this period, year 1 of Tiglath-pileser I, based on eponyms, not 1st Šippu, began on 1st Nisan (10 April 1114 BCE) and accession year began after April 1115 BCE.

some scholars postulate a kind of “invisible intercalation” (*sic*): the additional month being indicated through the repetition of a standard month name without any indication (Cancik-Kirschbaum, Johnson: 2011-2012, 125). All the double-dated inscriptions make it possible to reconstruct the Assyrian calendar:

TABLE 6

Text of the inscription	regnal year	Text reference
In the month of Ḫibur (which is) the month Abu, day 20, the eponym year of Tiglath-pileser, the king of Assyria	[1]	MARV I 73
The month of Ša-kênâte (which is) the month Nisannu, day 6, the eponym year of Ḫiyašânu	[5]	MARV I 62
The month of Abû-šarrâni (which is) the month Simânu, day 24, the eponym year of Ḫiyašânu	[5]	MARV V 42
The month of Abû-šarrâni (which is) the month Du'ûzu*, day 28, the eponym year of Ḫiyašânu	[5]	MARV IX 16
The month of Abû-šarrâni which is the month Simânu, the eponym year of Ina-ilîya-allak	[6]	MARV III 84
The month of Kuzallu which is the month Kissilîmu, the eponym year of Šadânâyu	[7]	MARV V 6
The month of Kamaru (which is) the month Nisannu, day 18, the eponym year of Aššur-šuma-êriš	[23]	MARV V 43
Month of Kuzallu, day 13, the eponym year of Ninuaya son of Aššur-aplu-lišir	[24]	RIMA 2, A.0.87.3
The month of Ḫibur, which is during the month Kissilîmu, day 18, the eponym year of Taklâk-ana-Aššur	[25]	RIMA 2, A.0.87.4

Given that the spring equinox occurred on 1 April in 1114 BCE, the 1st Nisan (1st lunar crescent after spring equinox) has to be dated on 29 April and 1st Abu on 25 August. In 1114 BCE one notices that 1st Abu equals 1st Ḫibur. The intercalary Babylonian month (Addarû2) is highlighted in brown and Assyrian month Šippu is highlighted in blue (Mahieu: 2018, 86-91):

TABLE 7

BCE	Babylonian month			Assyrian month		(C)	(Y)	Eponym (King Tiglath-pileser I)
1115	10	VII	Tašrîtu	<i>i</i>	Šippu	1	[0]	<i>Ninurta-nâdin-apli</i>
	11	VIII	Arašsamna	<i>ii</i>	Qarrâtu			
	12	IX	Kisilimu	<i>iii</i>	Kalmartu			
1114	1	X	Tebêtu	<i>iv</i>	^d Sin	2	[1]	<i>Tiglath-pileser</i>
	2	XI	Šabâtu	<i>v</i>	Kuzallu			
	3	XII	Addâru	<i>vi</i>	Allanâtu			
		XIIa	Addârû2	<i>vii</i>	Belêt-ekalli			
	4	I	Nisannu	<i>viii</i>	Ša sarrâte			
	5	II	Ayyaru	<i>ix</i>	Ša kênâte			
	6	III	Simanu	<i>x</i>	Muḫḫur ilâni			
	7	IV	Du'ûzu	<i>xi</i>	Abû šarrâni			
	8	V	Abu	<i>xii</i>	Ḫibur			
	VI	Ulûlû	<i>i</i>	Šippu				
1113	10	VII	Tašrîtu	<i>ii</i>	Qarrâtu	3	[2]	<i>Ištu-Aššur-ašamšu son of Aššur-aḫa-iddina</i>
	11	VIII	Arašsamna	<i>iii</i>	Kalmartu			
	12	IX	Kisilimu	<i>iv</i>	^d Sin			
	1	X	Tebêtu	<i>v</i>	Kuzallu			
	2	XI	Šabâtu	<i>vi</i>	Allanâtu			
	3	XII	Addâru	<i>vii</i>	Belêt-ekalli			
	4	I	Nisannu	<i>viii</i>	Ša sarrâte			
	5	II	Ayyaru	<i>ix</i>	Ša kênâte			
	6	III	Simanu	<i>x</i>	Muḫḫur ilâni			
	7	IV	Du'ûzu	<i>xi</i>	Abû šarrâni			
	8	V	Abu	<i>xii</i>	Ḫibur			
		VI	Ulûlû	<i>i</i>	Šippu			
1112	10	VII	Tašrîtu	<i>ii</i>	Qarrâtu	3	[3]	<i>Aššur-šallimšunu</i>
	11	VIII	Arašsamna	<i>iii</i>	Kalmartu			
	12	IX	Kisilimu	<i>iv</i>	^d Sin			
	1	X	Tebêtu	<i>v</i>	Kuzallu			
	2	XI	Šabâtu	<i>vi</i>	Allanâtu			
	3	XII	Addâru	<i>vii</i>	Belêt-ekalli			
	4	I	Nisannu	<i>viii</i>	Ša sarrâte			
	5	II	Ayyaru	<i>ix</i>	Ša kênâte			
6	III	Simanu	<i>x</i>	Muḫḫur ilâni				
7	IV	Du'ûzu	<i>xi</i>	Abû šarrâni				
8	V	Abu	<i>xii</i>	Ḫibur				

	9	VI	Ulûlû	<i>i</i>	Šippu	4	
	10	VII	Tašrîtu	<i>ii</i>	Qarrātu		
	11	VIII	Arašsamna	<i>iii</i>	Kalmartu		
	12	IX	Kisilimu	<i>iv</i>	^d Sin		
1111	1	X	Tebētu	<i>v</i>	Kuzallu		
	2	XI	Šabātu	<i>vi</i>	Allanātu		
	3	XII	Addâru	<i>vii</i>	Belêt-ekalli		
	4	I	Nisannu	<i>viii</i>	Ša sarrâte	[4]	<i>Šamaš-apla-êriš son of Aššur-šezibanni</i>
	5	II	Ayyaru	<i>ix</i>	Ša kênâte		
	6	III	Simanu	<i>x</i>	Muḥḥur ilâni		
	7	IV	Du'ûzu	<i>xi</i>	Abû šarrâni		
	8	V	Abu	<i>xii</i>	Ḥubur		
	9	VI	Ulûlû	<i>i</i>	Šippu	5	
	10	VII	Tašrîtu	<i>ii</i>	Qarrātu		
	11	VIII	Arašsamna	<i>iii</i>	Kalmartu		
	12	IX	Kisilimu	<i>iv</i>	^d Sin		
1110	1	X	Tebētu	<i>v</i>	Kuzallu		
	2	XI	Šabātu	<i>vi</i>	Allanātu		
	3	XII	Addâru	<i>vii</i>	Belêt-ekalli		
		XIIa	Addâru2	<i>viii</i>	Ša sarrâte		
	4	I	Nisannu	<i>ix</i>	Ša kênâte	[5]	<i>Ḥiyašânu</i>
	5	II	Ayyaru	<i>x</i>	Muḥḥur ilâni		
	6	III	Simanu	<i>xi</i>	Abû šarrâni		
	7	IV	Du'ûzu*	<i>xii</i>	Ḥubur		
	8	V	Abu	<i>i</i>	Šippu	6	
	9	VI	Ulûlû	<i>ii</i>	Qarrātu		
	10	VII	Tašrîtu	<i>iii</i>	Kalmartu		
	11	VIII	Arašsamna	<i>iv</i>	^d Sin		
	12	IX	Kisilimu	<i>v</i>	Kuzallu		
1109	1	X	Tebētu	<i>vi</i>	Allanātu		
	2	XI	Šabātu	<i>vii</i>	Belêt-ekalli		
	3	XII	Addâru	<i>viii</i>	Ša sarrâte		
	4	I	Nisannu	<i>ix</i>	Ša kênâte	[6]	<i>Ina-ilîya-allak (rab šaqe)</i>
	5	II	Ayyaru	<i>x</i>	Muḥḥur ilâni		
	6	III	Simanu	<i>xi</i>	Abû šarrâni		
	7	IV	Du'ûzu	<i>xii</i>	Ḥubur		
	8	V	Abu	<i>i</i>	Šippu	7	
	9	VI	Ulûlû	<i>ii</i>	Qarrātu		
	10	VII	Tašrîtu	<i>iii</i>	Kalmartu		
	11	VIII	Arašsamna	<i>iv</i>	^d Sin		
	12	IX	Kisilimu	<i>v</i>	Kuzallu		
1108	1	X	Tebētu	<i>vi</i>	Allanātu		
	2	XI	Šabātu	<i>vii</i>	Belêt-ekalli		
	3	XII	Addâru	<i>viii</i>	Ša sarrâte		
	4	I	Nisannu	<i>ix</i>	Ša kênâte	[7]	<i>Šadânâyu</i>
	5	II	Ayyaru	<i>x</i>	Muḥḥur ilâni		
	6	III	Simanu	<i>xi</i>	Abû šarrâni		
	7	IV	Du'ûzu	<i>xii</i>	Ḥubur		
	8	V	Abu	<i>i</i>	Šippu	8	
	9	VI	Ulûlû	<i>ii</i>	Qarrātu		
	10	VII	Tašrîtu	<i>iii</i>	Kalmartu		
	11	VIII	Arašsamna	<i>iv</i>	^d Sin		
	12	IX	Kisilimu	<i>v</i>	Kuzallu		
1107	1	X	Tebētu	<i>vi</i>	Allanātu		
	2	XI	Šabātu	<i>vii</i>	Belêt-ekalli		
	3	XII	Addâru	<i>viii</i>	Ša sarrâte		
		XIIa	Addâru2	<i>ix</i>	Ša kênâte		
	4	I	Nisannu	<i>x</i>	Muḥḥur ilâni	[8]	?
	5	II	Ayyaru	<i>xi</i>	Abû šarrâni		
	6	III	Simanu	<i>xii</i>	Ḥubur		
	7	IV	Du'ûzu	<i>i</i>	Šippu	9	
	8	V	Abu	<i>ii</i>	Qarrātu		
	9	VI	Ulûlû	<i>iii</i>	Kalmartu		
	10	VII	Tašrîtu	<i>iv</i>	^d Sin		
	11	VIII	Arašsamna	<i>v</i>	Kuzallu		
	12	IX	Kisilimu	<i>vi</i>	Allanātu		

The concordance of months is excellent between the Babylonian year, which was lunisolar and the Assyrian year, which was lunar. The only discrepancy appears in regnal year 5: *The month of Abû-šarrâni (which is) the month Simânu (instead of Du'ûzu*), day 28, the eponym year of Ḥiyašânu.* The shift of one month is probably due to a miscalculation in the number of campaigns. Complete reconstruction of the first

28 years of the reign of Tiglath-Pileser I, but only the order of the eponyms of years 1 to 7 and 23 to 28 (highlighted in light grey) is confirmed (Mahieu: 2018, 77-82; Nahm: 2022, 238-240):

TABLE 8

BCE	Eponym	son of:	(C)	(Y)	1st Nisan (Babylonian)	Intercalary month	month (Assyrian)
1115	Ninurta-nādin-apli		18th	[0]	10 April	Addar2	Belêt-ekalli
1114	Tiglath-pileser (I)		1st	[1]	29 April		Ša sarrâte
1113	Ištu-Aššur-ašamšu	Aššur-aḥa-iddina	2nd	[2]	17 April		Ša sarrâte
1112	Aššur-šallimšunu		3rd	[3]	6 April		Ša sarrâte
1111	Šamaš-apla-ēriš	Aššur-šezibanni	4th	[4]	27 March	Addar2	Ša sarrâte
1110	Ḫiyašānu		5th	[5]	15 April		Ša kênâte
1109	Ina-ilīya-allak (rab šaqe)		6th	[6]	3 April		Ša kênâte
1108	Šadānāyu		7th	[7]	24 March	Addar2	Ša kênâte
1107	?		8th	[8]	12 April		Muḫḫur ilāni
1106	Aššur-mudammeq		9th	[9]	1 April	Addar2	Muḫḫur ilāni
1105	İbri-šarre		10th	[10]	19 April		Abû šarrāni
1104	Aššur-kētti-šēšši		11th	[11]	8 April	Addar2	Abû šarrāni
1103	Mutakkil-Aššur		12th	[12]	27 April		Ḫubur
1102	Mušeziḫ-Aššur		13th	[13]	16 April		Ḫubur
1101	Ippitte		14th	[14]	4 April	Addar2	Ḫubur
1100	Mudammeq-Bēl		15th	[15]	23 April		Šippu
1099	Aššur-apla-iqīša		16th	[16]	13 April		Šippu
1098	Šahhutu		17th	[17]	3 April	Addar2	Šippu
1097	Bēl-libūr		18th	[18]	21 April		Qarrātu
1096	Nusku-ālik-pānī		19th	[19]	10 April		Qarrātu
1095	Aplaya		20th	[20]	30 March	Addar2	Qarrātu
1094	Ninurta-aha-iddina		21th	[21]	18 April		Kalmartu
			22th				
1093	Adad-apla-iddina		23th	[22]	6 April		Kalmartu
1092	Aššur-šuma-ēriš		24th	[23]	26 March	Addar2	Kalmartu
1091	Ninuaya	Aššur-aplu-lišir	25th	[24]	14 April		^d Sin
1090	Taklāk-ana-Aššur		26th	[25]	4 April	Addar2	^d Sin
1089	Aššur-rā'im-nišēšu		27th	[26]	22 April		Kuzallu
1088	Ilī-iddina		28th	[27]	12 April		Kuzallu
1087	Bunānu		29th	[28]	1 April	Addar2	Kuzallu

Babylonian year (Y) and Assyrian year are an excellent match based on campaigns (C), but there is a shift of one year for the regnal years 25 to 27 (instead of 24 to 26) because the 27th campaign (with a campaign each Assyrian lunar year) corresponds to the 26th Babylonian luni-solar year. Two Assyrian campaigns (based on the lunar year beginning on 1st Šippu) overlapped the 22nd year of reign (based on the lunisolar year linked to eponyms beginning on 1st Nisan). The Assyrian campaigns took place every lunar year, but as there is no eponym for the 22nd campaign in 1093 BCE (because 34 lunar years = 33 lunisolar years), the eponyms were therefore named on the 1st Nisannu, the beginning of the Babylonian year. The eponyms were already named in the 1st Nisannu under Aššur-dān I, because Aššur-išmānī" was an eponym (Jeffers: 2017, 151 n. 7) who is dated in 1160 BCE (Bloch: 2010c, 43-44), a year that should have had two eponyms if they were named in the 1st Šippu (because 1160 BCE = 1092 BCE + 2 x 34 lunar years).

TABLE 9

BCE	ASSYRIAN KING	(C)	(Y)	Month:	Intercalary	Assyrian
1115	Aššur-reš-iši I	18	18/0		Addar2	Belêt-ekalli
1114	Tiglath-pileser I	1st	1		-	Ša sarrâte
1113		2nd	2		-	Ša sarrâte

The previous system of dating was still used during the reign of Aššur-dān I (1179-1133) because his 46th year began on the eponym Pišqīya son of Kaššu (April 1133 BCE), the same as Ninurta-tukultī-Aššur who reigned from the months Ša kênâte to Abu šarrāni (from February to April 1132 BCE). Afterwards, Mutakkil-Nusku reigned briefly (a few days)¹⁸, followed by Aššur-reš-iši I (1133-1115) whose year 1 began

¹⁸ Mutakkil-Nusku's victory over his brother was short-lived. According to one tablet: "(he) held the throne for tuppišu (his tablet), then died," showing that his year of accession was followed by only a small portion of his first year (a few days).

with the eponym *Sîn-šēya*. There is a gap (Bloch: 2010, 1-87; 2012: 307-310,411) between the eponyms that start on 1st Nisan and the Assyrian year beginning on 1st Šippu (June 16 in 1132 BCE). Consequently, during the reign of Aššur-dân I (1179-1133) eponyms still began on 1st Nisan, instead of 1 Šippu, and those Assyrian lunar years without intercalation remain the norm. However, as the Babylonian year began on the 1st Nisan (shortly after the spring equinox) Assyrian years (based on eponyms) thus coincide with Babylonian luni-solar years (with intercalation).

TABLE 10

BCE			Assyrian month	(Y)	ASSYRIAN KING	Eponym	BABYLONIAN KING					
1134	5	II	<i>xii</i>	45	Aššur-dân I n°83	<i>Marduk-aḫa-ēriš</i>	7 Itti-Marduk-balaṭu					
	6	III	<i>i</i>									
	7	IV	<i>ii</i>									
	8	V	<i>iii</i>									
	9	VI	<i>iv</i>					^d Sin				
	10	VII	<i>v</i>					Kuzallu				
	11	VIII	<i>vi</i>					Allanātu				
	12	IX	<i>vii</i>					Belêt-ekalli				
	1133	1	X					<i>viii</i>	46		<i>Pišqīya s. of Kaššu</i>	8
		2	XI					<i>ix</i>				
		3	XII					<i>x</i>				
		4	I					<i>xi</i>				
5		II	<i>xii</i>	Hubur								
6		III	<i>i</i>	Šippu								
7		IV	<i>ii</i>	Qarrātu								
8		V	<i>iii</i>	Kalmartu								
9		VI	<i>iv</i>	^d Sin								
10		VII	<i>v</i>	Kuzallu								
11		VIII	<i>vi</i>	Allanātu								
12		IX	<i>vii</i>	Belêt-ekalli								
1132	1	X	<i>viii</i>	0	Ninurta-tukultî-Aššur n°84	<i>Aššur-šezibanni son of Pa'uzu</i>	0					
	2	XI	<i>ix</i>									
	3	XII	<i>x</i>									
	4	I	<i>xi</i>									
	5	II	<i>xii</i>					Hubur				
	6	III	<i>i</i>					Šippu				
	7	IV	<i>ii</i>					Qarrātu				
	8	V	<i>iii</i>					Kalmartu				
	9	VI	<i>iv</i>					^d Sin				
	10	VII	<i>v</i>					Kuzallu				
	11	VIII	<i>vi</i>					Allanātu				
	12	IX	<i>vii</i>					Belêt-ekalli				
1131	1	X	<i>viii</i>	1	Aššur-reš-iši I n°86	<i>Sîn-šēya son of Urad-ilāne</i>	Ninurta-nâdin-šumi					
	2	XI	<i>ix</i>									
	3	XII	<i>x</i>									
	4	I	<i>xi</i>									
	5	II	<i>xii</i>					Hubur				
	6	III	<i>i</i>					Šippu				
	7	IV	<i>ii</i>					Qarrātu				
	8	V	<i>iii</i>					Kalmartu				
	9	VI	<i>iv</i>					^d Sin				
	10	VII	<i>v</i>					Kuzallu				
	11	VIII	<i>vi</i>					Allanātu				
	12	IX	<i>vii</i>					Belêt-ekalli				
1130	1	X	<i>viii</i>	2	Aššur-reš-iši		2					
	2	XI	<i>ix</i>									
	3	XII	<i>x</i>									
	4	I	<i>xi</i>									
	5	II	<i>xii</i>					Hubur				
	6	III	<i>i</i>					Šippu				
	7	IV	<i>ii</i>					Qarrātu				
	8	V	<i>iii</i>					Kalmartu				
	9	VI	<i>iv</i>					^d Sin				
	10	VII	<i>v</i>					Kuzallu				
	11	VIII	<i>vi</i>					Allanātu				
	12	IX	<i>vii</i>					Belêt-ekalli				

Whereas the eponyms began on the 1st Nisan during the reign of Aššur-dân I (1179-1133), before this king the synchronisms between Assyrian king Tukultî-Ninurta I and Babylonian kings show that Assyrian eponyms started on 1st Šippu, not on 1st Nisan. Actually, the capture of Babylon and the replacement of its king, Kaštiliašu IV, are dated to (Ina)-Aššur-šuma-ašbat (Cancik-Kirschbaum: 1996, 9-18), the 19th eponym of Tukultî-Ninurta I (Freydank: 2005, 45-56), which corresponds to Year 8 of Kaštiliašu IV (1233-1225) dated 1225 BCE. The order of eponyms from the capture of Babylon is uncertain (Bloch: 2010b, 1-35), but the sequence of eponyms in this period is as follows: Ina-Aššur-šuma-ašbat (N°18), Ninu'aju (N°19), Bêr-nâdin-apli (N°20), Abi-ili son of Katiri (N°21), Šalmanu-šuma-ušur (N°22). Counting reigns by Babylonian scribes seems incorrect since Tukultî-Ninurta I regimented Babylonia (not reigned) through three successive Viceroy for 7 years (the first two of whom were killed by the King of Elam), reckoned as 1.5 years, 1.5 years and 6 years giving a total of 9 years (Munn-Rankin: 2000, 287-291). In fact, the system used is the cause of these differences. The 7 years of Tukultî-Ninurta I match the 7 eponyms and the 3 years (= 1.5 + 1.5) of the vassal kings match the 3 eponyms or 2 years reign, because 1.5 years (partial years) has no sense

in the Babylonian system (the Assyrian year started on 1st Šippu or 27 March in 1225 BCE)¹⁹. Consequently, the reign of Tukultî-Ninurta I, which has 37 eponyms, must be dated 1242-1206, because each eponym is equivalent to a lunar year, and not 1243-1206, if each eponym had been equivalent to a solar year.

TABLE 11

BCE	Eponym	son of	(C)	(Y)	BABYLONIAN KING	Year
1242	Ubru		30th	[29]/[0]	Šagarakti-šuriaš	4
1241	Tukultî-Ninurta (I)		1st	[1]		5
1240	Qibi-Aššur	Ibašši-ili	2nd	[2]		6
1239	Mušallim-Adad	Šalmanu-qarrâd	3rd	[3]		7
1238	Adad-bêl-gabbe	King	4th	[4]		8
1237	Šunu-qardû		5th	[5]		9
1236	Libur-zanin-Aššur		6th	[6]		10
1235	Aššur-nâdin-apli	King	7th	[7]		11
1234	Urad-ilani		8th	[8]		12
1233	Adad-uma''i		9th	[9]	Kaštiliašu IV	13/0
1232	Abattu	Adad-šamši	10th	[10]		1
1231	Abattu	Adad-šumu-lêšir	11th	[11]		2
1230	Aššur-da''an		12th	[12]		3
1229	Etel-pî-Aššur	Kurbânu	13th	[13]		4
1228	Ušur-namkûr-šarri		14th	[14]		5
1227	Aššur-bêl-ilâni		15th	[15]		6
1226	Aššur-zera-iddina		16th	[16]		7
1225	Enlil-nâdin-apli (?)		17th	[17]	Enlil-nâdin-šumi	8/0
1224	Ina-Aššur-šuma-ašbat	Aššur-nâdin-šume	18th	[18]/1	Kadašman-Harbe II	1.5/0
1223	Ninu'aju	Aššur-iddin	19th	[19]/2	Adad-šuma-iddina	1.5/0
	Abi-ili		20th	3		
1222	Šalmanu-šuma-ušur	Katiri	21th	[20]/4		1
1221	Bêr-nâdin-apli		22th	[21]/5		2
1220	Adad-šamšî	Mariannu (?)	23th	[22]/6		3
1219	Kaštiliašu (?)		24th	[23]/7		4
1218	Bêr-išmanni (?)		25th	[24]/8		5
1217	Ilî-padâ (?)	Aššur-iddin	26th	[25]/9	Adad-šuma-ušur	6/0
1216	Qarrad-Aššur (?)	Aššur-iddin	27th	[26]		1
1215	Sarniqu (?)		28th	[27]		2
1214	Ninurta-nâdin-apli (?)	Bukruni	29th	[28]		3
1213	Urad-Kube (?)	Aššur-bel-ilani	30th	[29]		4
1212	Mudammiq-Nusku (?)	Ibašši-ili	31th	[30]		5
1211	Kidin-Aššur (?)		32th	[31]		6
1210	Sin-uballiṭ (?)		33th	[32]		7
1209	Nabu-bela-ušur (?)		34th	[33]		8
1208	Riš-Aššur (?)		35th	[34]		9
1207	Aššur-nirari (?)	Šarri	36th	[35]		10
1206	Urad-Kube		37th	[36]/[0]		11
1205	Aššur-nâdin-apli		1st	[1]		12
1204	Erîb-Sîn		2nd	[2]		13

The position of the first 16 eponyms have been confirmed (Llop, 2013, 549-559), but the 17th eponym in year 7 of Kaštiliašu IV could be Enlil-nâdin-apli and Bêr-nâdin-apli the 22th (Nahm, 2020, 43-45). Tukultî-Ninurta I ruled over Babylonia for 7 years (1224-1217) from the 18th to the 26th eponym. Enlil-nâdin-šumi (1225-1225) and Kadašman-Harbe II (1225-1224) each ruled Babylonia for 1.5 years from the 18th to the 20th eponym. The third pro-Assyrian vassal king, Adad-šuma-iddina (1224-1217), was subsequently overthrown by Babylonian officers in the 26th eponym. The Assyrians would have liked to impose their candidate Enlil-kudur-ušur (?), but the Babylonians settled upon Adad-šuma-ušur (1217-1187), freeing themselves from the Assyrian suzerainty. The reckoning of the years of reign, therefore, changed from Aššur-dân I (1179-1133) because, from that king (the eponyms being linked to 1st Nisan, as in the Babylonian year), the total number of eponyms during the reign of an Assyrian king corresponded to a number of luni-solar years, whereas previously the years had a lunar duration. When the number of eponyms does not match the total duration of the reign, it has been underlined:

¹⁹ $N = 1225, (N - 1088) \times 365,24219 = (141) \times 12 \times 29,530588 + 72 \Rightarrow 72 + 13 = 85\text{th day of the year} = 27 \text{ March.}$

n°	ASSYRIAN KING	#	Reign	n°	BABYLONIAN KING	#	Reign
78	Tukultî-Ninurta I	37	1242-1206	27	Šagarakti-šuriaš	13	1246-1233
79	Aššur-nâdin-apli	4	1206-1203	32	Adad-šuma-ušur	30	1217 -
80	Aššur-nêrârî III	6	1203-1197				
81	Enlil-kudurri-ušur	5	1197-1192				-1187

TABLE 12

BCE	Month	Assyrian	[A]	[B]	King / eponym				
1225	1	X <i>x</i>	Muḥḥur ilâni	17	7	[A] Tukultî-Ninurta I Assyrian [B] Kaštiliašu IV Babylonian			
	2	XI <i>xi</i>	Abû šarrâni						
	3	XII <i>xii</i>	Ḫubur						
	4	I <i>i</i>	Šippu	18	8	<i>Ina-Aššur-šuma-ašbat</i>			
	5	II <i>ii</i>	Qarrâtu						
	6	III <i>iii</i>	Kalmartu						
	7	IV <i>iv</i>	^d Sin						
	8	V <i>v</i>	Kuzallu						
	9	VI <i>vi</i>	Allanâtu						
	10	VII <i>vii</i>	Belêt-ekalli						
	11	VIII <i>viii</i>	Ša sarrâte						
	12	IX <i>ix</i>	Ša kênâte						
1224	1	X <i>x</i>	Muḥḥur ilâni				19	1	<i>Ninu'aju son of Aššur-iddin</i>
	2	XI <i>xi</i>	Abû šarrâni						
	3	XII <i>xii</i>	Ḫubur						
	4	I <i>i</i>	Šippu						
	5	II <i>ii</i>	Qarrâtu						
	6	III <i>iii</i>	Kalmartu						
	7	IV <i>iv</i>	^d Sin						
	8	V <i>v</i>	Kuzallu						
	9	VI <i>vi</i>	Allanâtu						
	10	VII <i>vii</i>	Belêt-ekalli						
	11	VIII <i>viii</i>	Ša sarrâte						
	12	IX <i>ix</i>	Ša kênâte						
1223	1	X <i>x</i>	Muḥḥur ilâni	20	1	<i>Abi-ili (?)</i>			
	2	XI <i>xi</i>	Abû šarrâni						
	3	XII <i>xii</i>	Ḫubur						
	4	I <i>i</i>	Šippu						
	5	II <i>ii</i>	Qarrâtu						

CHRONOLOGY OF MESOPOTAMIAN REIGNS OVER THE PERIOD 2020–912 BCE

The chronology of Assyrian reigns can, therefore, be fully reconstructed starting from Aššur-uballit II (612-609) up to Erišu I (n°33), since all the years of reign between these two kings are known, being aware that Assyrian years are solar up to Aššur-dân I (1179-1133) and lunar prior to this king. The durations of four reigns are missing (N° 65, 66, 37, and 38), but they can be calculated through synchronisms from Assyrian annals that indicate the exact length between the reconstruction of some famous temples (Gasche, Armstrong, Cole: 1998, 57-80):

- Shalmaneser I (n°77) states in his inscriptions that the temple of Assur (Ehursagkurkurra) was built by Ušpiya and rebuilt by Erišu I, then 159 years later by Šamšî-Adad I, and 580 years later by himself. Shalmaneser I does not specify the point used to determine these durations, but Esarhaddon gives a figure of 126 years for the duration between Erišu I and Šamšî-Adad I, proving that Shalmaneser I included the 33-year reign of Šamšî-Adad I in his calculation (159 = 126 + 33). The 159 years must, therefore, have started at the end of the reign of Erišu I to the end of the reign of Šamšî-Adad I and 580 years are completed at the beginning of the reign of Shalmaneser I (in 1271 BCE). There are, therefore, 421 lunar years (421 = 580 - 159) between the reigns of Šamšî-Adad I and Shalmaneser I, a duration of 409 solar years, which sets the end of the reign of Šamšî-Adad I in 1680 BCE (= 1271 + 409)
- Tiglath-pileser I (n°87) states in his annals of having rebuilt the temple called Anu-Adad at the beginning of his reign (in 1115 BCE); It was however built 641 years earlier by Šamšî-Adad I. These 641 years (= 68 solar + 573 lunar) correspond to 624 (= 68 + 556) solar years, which dates back the reign of Šamšî-Adad I in 1739 BCE (= 1115 + 624) instead of 1712 BCE. However, the scribe probably used a King list with a reign of 40 years instead of 11 for Išme-Dagan I, since Šamšî-Adad I died in the year 17 of Hammurabi and Išme-Dagan I died in the year 28 of this king (Gasche, Armstrong, Cole: 1998, 52). This data reduces the 641 years to 612 BCE (= 641 - 29), or a duration of 596 solar years, which fixes the beginning of the reign of Samsi-Adad I in 1711 BCE (= 1115 + 596), in good agreement with the previous date of 1712 BCE (= 1680 + 33 - 1).

- Esarhaddon (n°112) also claimed to have rebuilt the temple of Aššur. In an inscription (Assur A) dated eponym Issi-Adad-anīnu (dated 679 BCE), at the beginning of his reign, he claimed that 129 years elapsed between the reconstruction of Erišu I and the one of Šamšī-Adad I. Shalmaneser I rebuilt the temple again 434 years later, then 580 years later Esarhaddon rebuilt the temple for the final time. The information of Esarhaddon seems accurate. Indeed, the first term is correct, because it actually falls in the reign of Shalmaneser I ($679 + 580 = 1259$). With the duration between the beginning of the reign of Esarhaddon and the end of the reign of Šamšī-Adad I being 1014 years ($= 580$ solar + 434 lunar or 1001 solar years), the end of the reign of Šamšī-Adad I can be set at 1680 BCE ($= 679 + 1001$). The reign of this king can, therefore, be set from 1712 to 1680 BCE. His death in the year 17 of Hammurabi allows one to anchor it to the Babylonian chronology (Gasche, Armstrong, Cole, Gruzadyan: 1998, 1-4). After his death the documents dated in different calendars allow some synchronisms (Barreyra Fracaroli: 2011, 185-198).
- The paleo-Assyrian dynasty begins after the fall of Ur (Joannès 2001: 617-621,823) with king Puzur-Aššur I (n°30), which enables us to date the fall of this city around 1913 BCE (the average length of an Assyrian reign is 14 years over all the period).

This chronology obtained from Assyrian king lists is confirmed over the period 1873-1663 (Table 13) from King Erišu I (n°33) to King Aššur-dugul (n°40) owing to lists of 255 eponyms (Barjamovic, Hertel, Larsen: 2012, 3-161; Veenhof, Günbatti, Kryszat: 2008, 10-27, 103-132, 156-171, 195-219) and some comments associated with eponyms allowing one to fix several synchronisms, especially the start and the duration (in Assyrian years) of certain reigns:

TABLE 13

n°	ASSYRIAN KING	Years	Comments on eponyms from Chronicles	Σ eponyms	
33	Ērišu I	40	year 1, eponym Šu-Ištar son of Abila (N°1)	40	40
34	Ikunum	14	year 1, eponym Iddin-Suen brother of Šuli (N°41)	14	14
35	Sargon I	40	year 1, eponym Aššur-malik son of Agatum (N°55)	40	54
36	Puzur-Aššur II	8	year 1, eponym Aššur-nada son of Puzur-Ana (N°95)	8	62
37	Naram-Sîn	[-]4	year 1, eponym Šu-Su'en son of Pappilum (N°103)	54	116
38	Ērišu II	[-]	Šamšī-Adad I conquers Assyria, eponym Ibni-Ištar (N°157)	10	126
39	Šamšī-Adad I	33	Death of Šamšī-Adad I, eponym Ṭab-šilli-Aššur (N°199)	33	159
40	Išme-Dagan I	11	(year 1, eponym Ennam-Aššur N°200)	11	11

The set of two lists of eponyms, the Kültepe Eponym List (KEL) and the Mari Eponym Chronicle (MEC), made it possible to restore the complete list of 255 eponyms²⁰ beginning in Ērišu I's year 1. The MEC has been essential for the establishment of the correct Old Babylonian chronology (Nahm 2018: 109-110). The deficiencies of the KEL (Glassner: 2004, 157-160) have been filled by the MEC. The only difficulty was to connect the five parts of the MEC (noted A, B, C, D, E) because there was no overlap between the end of the MEC D and the beginning of the MEC E (Charpin, Ziegler: 2003, 156-157). For example, the last eponym of the MEC C (N°195) must be Aḥiyaya son of Lā-qēpum (Bloch: 2014, 191-210). However, synchronisms with the Babylonian reigns allowed one to establish that the first two eponymous (illegible) names of the MEC D corresponded to the years 16 and 17 of the reign of Sîn-muballit and the last eponym of this short list corresponded to the year 20, which was also the year Hammurabi's accession (year 0). Neither the accession nor the death of Ērišu II is detailed in the lists, but this reign can be framed by two dates: the first year of Naram-Sîn in 1773 BCE during the eponymy Šu-Suen (N°95) in the beginning of the list MEC A, and the death of Šamšī-Adad during the eponymy of Ṭab-šilli-Aššur in 1680 BCE, after 33 years of reign. Consequently, the death of Erišu II must go back to 1713 BCE ($= 1680 + 33$), end of the list C L2. The eponyms of the list KEL G being completely unreadable over about 16 lines (eponyms N°179 to N°194), they were supplemented by the list MEC E but two eponyms of the overlap are uncertain (Charpin, Ziegler: 2003, 72-73, 134-169). Since the accession of Naram-Sîn was in 1774 BCE and the death of Erišu II was in 1712 BCE, then the two kings ruled a total of 62 solar years ($= 1774 - 1712$), or 64 lunar years (or eponyms). The reign of Naram-Sîn was over 27 years since the list KEL A includes 27* eponyms after his accession. However, according to Assyrian king lists, his reign was [-]4 years, implying a duration of 54 years (Veenhof: 2002, 1-78). Indeed, during the eponymy Ibni-Ištar (eponym N°157) it is stated that "Šamšī-Adad I conquered Assyria," which corresponds to the 1st year of Erišu II, his father Naram-Sîn having died the previous year. This would mean that the Amorite king Šamšī-Adad I conquered Assyria only gradually, starting with the city of Ekallatum at the end of the reign of Naram-Sîn. So, when Erišu II ascended the throne he reigned only over a small part of Assyria and at his death, after 10 years of reign, what was left of Assyria was absorbed by Šamšī-Adad I (who became an Assyrian king).

²⁰ http://cdli.ox.ac.uk/wiki/doku.php?id=list_of_old_assyrian_limmu_officials

TABLE 14

BCE	N°	eponym	son of	Comments in chronicles		
1873				accession of Erišu I (king n°33)	0	
1872	1	Šu-Ištar	Abila	year 1 (beginning of the list KEL A)	1	
1871	2	Šukkuttum	Išuhum		2	
	3	Iddin-ili	Kurub-Ištar		3	
1870	4	Šu-Anum	Isaliya		4	
1869	5	Anah-ilī	Kiki		5	
1868	6	Suetaya	Ir'ibum		6	
1867	7	Daya	Išuhum		7	
1866	8	Ilī-ellītī			8	
1865	9	Šamaš-ṭab			9	
1864	10	Agusa			10	
1863	11	Idnaya	Šudaya		11	
1862	12	Quqādum	Buzu		12	
1861	13	Puzur-Ištar	Bedaki		13	
1860	14	Lā-qēpum	Babidi		14	
1859	15	Šu-Laban	Kurub-Ištar		15	
1858	16	Šu-Bēlum	Išuhum		16	
1857	17	Nabi-Suen	Šu-Ištar		17	
1856	18	Hadaya	Elāli		18	
1855	19	Ennam-Aššur	Begaya		19	
1854	20	Ikūnum	Šudaya		20	
1853	21	Išmid-ilum	Idida		21	
1852	22	Buzutaya	Išuhum		22	
1851	23	Šu-Ištar	Ammaya		23	
1850	24	Iddin-Aššur	<i>i.e. kumrum</i>		24	
1849	25	Puzur-Aššur	I.NUN		25	
1848	26	Quqādum	Buzu		26	
1847	27	Ibni-Adad	Susaya		27	
1846	28	Erišum	Adad-rabi		28	
1845	29	Minānum	Begaya		29	
1844	30	Iddin-Suen	Šalim-ahum		30	
1843	31	Puzur-Aššur	Idnaya		31	
1842	32	Šūli	Uphakum		32	
1841	33	Lā-qēpum	Zukua		33	
1840	34	Puzur-Ištar	Erisua		34	
1839	35	Agua	Adad-rabi		35	
1838	36	Šu-Suen	Šilliya		36	
	37	Ennam-Aššur	Begaya		37	
1837	38	Enna-Suen	Puṣṣānum		38	
1836	39	Ennānum	Uphakum		39	
1835	40	Buzu	Adad-rabi	accession of Ikunum (king n°34)	0	40
1834	41	Iddin-Suen	<i>brother of Šuli</i>	Šuli son of Šalim-ahum, year 1	1	1
1833	42	Ikūnum	Šudaya		2	2
1832	43	Dan-Wēr	Ahuahi		3	3
1831	44	Šu-Anum	Nērabtīm		4	4
1830	45	Ilī-massu	Aššur-ṭab		5	5
1829	46	Šu-Hubur	Šuli		6	6
1828	47	Idua	Šulilī		7	7
1827	48	Lā-qēpum	Puzur-Laba		8	8
1826	49	Šu-Anum	<i>of hapirum</i>		9	9
1825	50	Uku	Bela		10	10
1824	51	Aššur-malik	Panaka		11	11
1823	52	Dan-Aššur	Puzur-Wēr		12	12
1822	53	Šu-Kūbum	Ahuahi		13	13
1821	54	Erišum	Iddin-Aššur	accession of Sargon I (king n°35)	14	14
1820	55	Aššur-malik	Agatum	year 1	15	1
1819	56	Aššur-malik	Ennāniya		16	2
1818	57	Ibisua	Suen-nādā		17	3
1817	58	Baziya	Bal-Tutu		18	4
1816	59	Puzur-Ištar	Sabasiya		19	5
1815	60	Pišaḥ-Ilī	Adin		20	6
1814	61	Asqūdum	Lā-qēpum		21	7

1813	62	Ilī-pilaḥ	Damqum ^{SEP}		22	8	
1812	63	Qulali	[-]		23	9	
1811	64	Susaya ^{SEP}	[-]		24	10	
1810	65	Amaya	<i>the Armourer</i>		25	11	
1809	66	Iḫurum	Ilī-ellat		26	12	
1808	67	Kudānum	Lā-qēpum		27	13	
1807	68	Ilī-bāni	Ikūnum		28	14	
1806	69	Šu-Kūbum	Susaya		29	15	
1805	70	Quqidi	Amur-Aššur		30	16	
	71	Abiya	Nūr-Suen		31	17	
1804	72	Šu-Ištar	Šukkutum		32	18	
1803	73	Baziya	Šēp-Alim		33	19	
1802	74	Šu-Ištar	Ikūnum, <i>the Star</i>		34	20	
1801	75	Abiya	Šu-Dagan		35	21	
1800	76	Salliya	Šabakurā(num)	Babylonian king	36	22	
1799	77	Ibni-Adad	Baqqunum	<i>accession of Sumu-abum</i>	37	23	0
1798	78	Aham-arši	Malkum-išar		38	24	1
1797	79	Sukkaliya	Minanum		39	25	2
1796	80	Iddin-Aššur	Kubidi		40	26	3
1795	81	Šudaya	Ennānum		41	27	4
1794	82	Al-ṭāb	Pilaḥ-Aššur/haya		42	28	5
1793	83	Aššur-damiq	Abarsisum		43	29	6
1792	84	Puzur-Niraḥ	Puzur-Suen		44	30	7
1791	85	Amur-Aššur	Karriya		45	31	8
1790	86	Buzuzu	Ibbi-Suen		46	32	9
1789	87	Šu-Ḫubur	Elāli		47	33	10
1788	88	Ilšu-rabi	Baziya		48	34	11
1787	89	Ali-aḫum	Inaḥ-ilī		49	35	12
1786	90	Ṭāb-Aššur	Suḫarum		50	36	13
1785	91	Elāli	Ikūnum <i>the sangu</i>	<i>accession of Sumu-a-il</i>	51	37	14
1784	92	Iddin-abum	Narbitum		52	38	1
1783	93	Adad-bāni	Iddin-Aššur		53	39	2
1782	94	Aššur-iddin	Šuli	accession of Puzur-Aššur II	54	40	3
1781	95	Aššur-nādā	Puzur-Anna	year 1	55	1	4
1780	96	Kūbiya	Karriya		56	2	5
1779	97	Ilī-dan	Elāli		57	3	6
1778	98	Šilulu	Uku		58	4	7
1777	99	Aššur-nādā	Ilī-binanni		59	5	8
1776	100	Ikūn-pī-Ištar	Ikua		60	6	9
1775	101	Buzutaya	Sulī		61	7	10
1774	102	Innaya	Amuraya	accession of Naram-Sîn	62	8	11
1773	103	Šu-Suen	Pappilum	year 1 (beginning of the list MEC A)	63	1	12
1772	104	Aššur-malik	Ali-aḫum		64	2	13
	105	Aššur-imittī	Ilī-bāni		65	3	
1771	106	Enna-Suen	Šu-Aššur <i>the priest</i>		66	4	14
1770	107	Akutum	Ali-aḫum		67	5	15
1769	108	Mašī-Ilī	Erišum		68	6	16
1768	109	Iddin-aḫum	Kudānum		69	7	17
1767	110	Samaya	Šu-Bēlum	(beginning of the list KEL G)	70	8	18
1766	111	Ilī-ālum	Sukkaliya		71	9	19
1765	112	Ennam-Anum	Aššur-malik		72	10	20
1764	113	Ennum-Aššur	Dunni-Ea		73	11	21
1763	114	Enna-Suen	Šu-Ištar		74	12	22
1762	115	Hanna-Nārum	[-]		75	13	23
1761	116	Dādiya	[-]		76	14	24
1760	117	Kapatiya	[-]		77	15	25
1759	118	Išme-Aššur	Ea-dan		78	16	26
1758	119	Aššur-muttabbil	Azizum		79	17	27
1757	120	Šu-Nirah	Azuzaya		80	18	28
1756	121	Iddin-Abum	[-]		81	19	29
1755	122	Ilī-dan	Azua		82	20	30
1754	123	Aššur-imittī	Iddin-Ištar		83	21	31
1753	124	Bušiya	Abiya		84	22	32
1752	125	Dādiya	Šu-Ilabrat	Birth of Šamšī-Adad I	85	23	33

1751	126	Puzur-Ištar	Nūr-ilīšu	Darkening of the Sun	86	24	34
1750	127	Isaya	Dagan-malkum		87	25	35
1749	128	Abu-šalim	Ili-ālum	accession of Sābium	88	26	36
1748	129	Aššur-rē'ī	Ili-emūqī	(end of the list KEL A)	89	27	1
1747	130	Ṭāb-Aššur	Uzua		90	28	2
1746	131	Šu-Rama	Uzua		91	29	3
1745	132	Suen-išmeanni		(end of the list MEC A)	92	30	4
1744	133	Aššur-malik	Šu-Haniš	(beginning of the list MEC B)	93	31	5
1743	134	Dan-Ea	Abu-waqar		94	32	6
1742	135	Enna-Suen	Iddin-abum		95	33	7
1741	136	Aššur-balaṭi			96	34	8
1740	137	Enna-Suen			97	35	9
1739	138	Iṭūr-Aššur			98	36	10
	139	Šu-Bēlum			99	37	
1738	140	Šarrum-Adad	Buzazu		100	38	11
1737	141	Šu-Laban			101	39	12
1736	142	Aššur-imittī			102	40	13
1735	143	Dadaya		accession of Apil-Sîn	103	41	14
1734	144	Dadaya			104	42	1
1733	145	Ah-šalim			105	43	2
1732	146	Ušur-ša-Ištar			106	44	3
1731	147	Kataya			107	45	4
1730	148	Šu-Suen			108	46	5
1729	149	Abu-šalim			109	47	6
1728	150	Šudaya			110	48	7
1727	151	Šu-Dādum			111	49	8
1726	152	Aššur-tugultī			112	50	9
1725	153	Puzur-Ištar			113	51	10
1724	154	Atanah		Šamšî-Adad I conquered Ekallatum	114	52	11
1723	155	Erišum		Ekallatum	115	53	12
1722	156	Aššur-ennam		Ekallatum (accession of Ērišu II)	116	54	13
1721	157	Ibni-Ištar	Sîn-išme'anni	Šamšî-Adad I conquered Aššur (year 1)	117	1	14
1720	158	Aššur-bēl-malkim	Iddin-abum		118	2	15
1719	159	Bēlānum			119	3	16
1718	160	Sukkallum		Ērišu II	120	4	17
1717	161	Amur-Aššur		Ērišu II accession of Sîn-muballit	121	5	18
1716	162	Aššur-nīšu		Ērišu II (end of the list MEC B)	122	6	1
1715	163	Manawwirum		(beginning of the list C L2)	123	7	2
1714	164	Idnaya	Aššur-imittī		124	8	3
1713	165	Dadaya	Šarrum-Adad?	(end of the list C L2)	125	9	4
1712	166	Puzur-Nirah			126	10	5
1711	167	Abiya		(Assyrian reign year 1 of Šamšî-Adad I)	127	1	6
1710	168	Edīnum	Bēlu-rabi		128	2	7
1709	169	Aššur-taklāku			129	3	8
1708	170	Išim-Suen			130	4	9
1707	171	Adad-bāni			131	5	10
1706	172	Abī-šagiš			132	6	11
	173	Ṭab-šilla-Aššur			133	7	
1705	174	Iddin-Aššur	Abu-šalim?		134	8	12
1704	175	Namiya	Īpid-Adad		135	9	13
1703	176	Ahu-šarri	Ili-ālum		136	10	14
1702	177	Dadaya			137	11	15
1701	178	Ennam-[Aššur?]		(beginning of the list MEC D)	138	12	16
1700	179	[?]-Aššur		(very uncertain reading)	139	13	17
1699	180	Atānum			140	14	18
1698	181	Aššur-taklāku	-		141	15	19
1697	182	Haya-malik	Dudānum	(end of the list MEC D) Hammurabi	142	16	20
1696	183	Šalim-Aššur	Šalim-Anum	(beginning of the list MEC E)	143	17	1
1695	184	Šalim-Aššur	Ušranum		144	18	2
1694	185	Ennam-Aššur			145	19	3
1693	186	Suen-muballit	Aššur-iddinam		146	20	4
1692	187	Rēš-Šamaš	Anum-piša?		147	21	5
1691	188	Ibni-Adad	Aššur-tukultī		148	22	6
1690	189	Aššur-imittī			149	23	7

1689	190	Ilī-ellatī	Aššur-nišu		150	24	8
1688	191	Rigmānum			151	25	9
1687	192	Ikūn-pīya	Šalim-Aššur	(Yasmah-Addu becomes vice-roy of Mari)		26	10
1686	193	Ašqūdum			153	27	11
1685	194	Aššur-malik			154	28	12
1684	195	Ahiyaya*	Lā-qēpum	(end of the list MEC E)	155	29	13
1683	196	Awīliya			156	30	14
1682	197	Nimar-Suen	Aššur-nišu		157	31	15
1681	198	Adad-bāni	Puzur-ilī		158	32	16
1680	199	Tab-šilli-Aššur		death of Šamšī-Adad I	159	33	17
1679	200	Ennam-Aššur	Aššur-taklāku?	(year 1 of Išme-Dagan I king n°40)	1	1	18
1678	201	Aššur-emūqī			2	2	19
1677	202	Abu-šalim			3	3	20
1676	203	Puṣṣānum	Adad-rabi		4	4	21
1675	204	Ikūn-pī-Ištar	Abu-šalim		5	5	22
1674	205	Ahiyaya	Takiki		6	6	23
1673	206	Bēliya	Enna-Suen		7	7	24
	207	Ilī-bāni			8	8	
1672	208	Aššur-taklāku			9	9	25
1671	208	Sassāpum	Aššur-malik		10	10	26
1670	209	Ahu-waqar		(accession of Aššur-dugul king n°41)	11	11	27
1669	210	Kizurum			12	1	28
1668	211	Dādiya	Iddin-Suen?		13	2	29
1667	212	Yam-aha?			14	3	30
1666	213	Adad-bāni			15	4	31
1665	214	Ennam-Aššur	Aššur-taklāku		16	5	32
1664	215	Attaya	Šamaya	(accession of 6 consecutive Assyrian kings)	6	33	
1663	216	Ayā		(year 1 of Bēlu-bāni king n°48)	18	1	34

This list of eponyms (N°1 to N°216) used for reconstituting Assyrian reigns (n°33 to n°40) contains the following difficulties:

- The Assyrian king list compiled under Šamšī-Adad I states that the eponyms from Sulili (=Zariqum?) to Il-šumma, Kings n°27 to n°32, were lost, suggesting a beginning of Assyrian eponyms only from Sulili (1954-1940) and a compilation from Erišu I (1873-1835).
- After the accession of King Ikunum, some lists give Šuli as eponym before Iddin-Suen brother of Šuli (eponym N°41 in KEL A). A canonical eponym replacing a non-canonical eponym (died or removed during the year of his eponymy) is likely, because a comment on Buzu in KEL A states that he was the eponym during the accession of Ikunum. As a result, Šuli must be removed from the list of eponyms.
- The darkening of the sun mentioned during the Puzur-Ištar eponym (N°126), the year just after the birth of Šamšī-Adad I, has been interpreted by some as a solar eclipse (Michel, Rocher: 2000, 111-126), but there was no total solar eclipse visible in Assyria (between Ashur and Nineveh) over the period 1800-1700 BCE²¹. Moreover, the term used *na'duru* "darkened, obscured, eclipsed" means an eclipse in a metaphorical way and is different from the usual *antallū* "eclipse" used in Mari (Pruzsinsky: 2009, 75). In addition, for a real solar eclipse, the name of the month is indicated (Simanu for the 763 BCE eclipse), which is not the case for this darkening²². Consequently, for the Assyrian copyist of that time, the birth of Šamšī-Adad I marked the end, or the "eclipse", of the authentic Assyrian dynasty.
- The alliance with Qatna under the eponymy of Ikun-piya (N°192) coincides with the installation of Yasmah-Addu (1687-1680) as king of Mari, by Šamšī-Adad I (Charpin: 1997, 15-16).

The complete reconstruction of all the Assyrian reigns from Erišu I (king n°33), according to the number of eponyms, and of all the synchronisms with the Babylonian reigns, according to the number of luni-solar years, makes it possible to verify the rigorous accuracy of the Assyrian King List (AKL). The years highlighted in orange indicate a discrepancy between Assyrian lunar years (with an eponymous) and Babylonian lunar-solar years (34 lunar years = 33 solar years).

²¹ There were only two partial eclipses slightly visible on 10 October -1736* (mag 0.92) and that on 8 September -1790* (mag 0.92). The two authors of the article retained the hybrid eclipse of 19 November -1794* (mag. 1.01), but this eclipse was not visible in Assyria and by setting the Assyrian chronology on this eclipse the new reign of Šamšī-Adad I (1758-1725) contradicts that obtained by the Middle Chronology (1809-1776)!

²² As the sentence: "on the 26th day of the month Sivan, in the 7th year [of Simbar-šipak], the day turned to night," did not describe a solar eclipse, because a solar eclipse always coincides with the last day of the lunar month (29 or 30). Consequently, the two comments have been added later in the list of eponyms, because Šamšī-Adad I was initially an Amorite king who became part of the Assyrian dynasty only at the end of his glorious reign.

TABLE 15

BCE	Eponym	son of	(C)	(Y)	BABYLONIAN KING	Year
1681	Adad-bāni	Puzur-ilī	32	158		16
1680	(death of Šamši-Adad I	Ṭab-šilli-Aššur)	33	159	Hammurabi	17
1679	Ennam-Aššur	Aššur-taklāku?	1	1		18
1678	Aššur-emūqī		2	2		19
1677	Abu-šalim		3	3		20
1676	Puṣṣānum	Adad-rabi	4	4		21
1675	Ikūn-pī-Ištar	Abu-šalim	5	5		22
1674	Ahiyaya	Takiki	6	6		23
1673	Bēliya	Enna-Suen	7	7		24
	Bēliya	Enna-Suen	8	8		
1672	Ilī-bāni		9	9		25
1671	Aššur-taklāku		10	10		26
1670	(death of Išme-Dagan I	Sassāpum)	11	11		27
1669	Kizurum		1	12		28
1668	Dādiya	Iddin-Suen?	2	13		29
1271	(death of Adad-nêrârī I)	(king n°76)	32	422	[0] Kadašman-Turgu	11
1270	Shalmaneser (I)	(king n°77)	1	423	[1]	12
1269	Mušabši'ū-Sebettu		2	424	[2]	13
1268	Šerrīya		3	425	[3]	14
1267	Aššur-kâšid		4	426	[4]	15
1266	Aššur-mušabši	Iddin-Mêr	5	427	[5]	16
1265	Aššur-mušabši	Anu-mušallim	6	428	[6]	17
1264	Qibi-Aššur	Šamaš-aḥa-iddina	7	429	[7] Kadašman-Enlil II	18/0
1263	Aššur-nâdin-šumê	Aššur-lê'i	8	430	[8]	1
1262	Abī-ilī	Aššur-šumu-lêšer	9	431	[9]	2
1261	Aššur-âlik-pâni		10	432	[10]	3
1260	Mušallim-Aššur	Aššur'-mušabši	11	433	[11]	4
1259	Ilī-qarrad (?)		12	434	[12]	5
1258	Qibi-Aššur	Šilli-Marduk	13	1	[13]	6
1257	Ina-pī-Aššur-lišlim	Bābu-aḥa-iddina	14	2	[14]	7
1256	Adad-šamši	Adad-šumu-lêšer	15	3	[15]	8
1255	Kidin-Sîn	Adad-têya	16	4	[16] Kudur-Enlil	9/0
1254	Bêr-šumu-lêšir		17	5	[17]	1
	Aššur-dammeq	Abī-ilī	18	6		
1253	Ištar-êriš	Salmanu-qarrād	19	7	[18]	2
1252	Bêr-bêl-lîte		20	8	[19]	3
1251	Lullāyu	Adad-šumu-iddina	21	9	[20]	4
1250	Aššur-da'issunu	Lullāyu	22	10	[21]	5
1249	Riš-Adad	Nabû-[-]?	23	11	[22]	6
1248	Aššur-kettī-îde	Abī-ilī	24	12	[23]	7
1247	Ekaltāyu	Abī-ilī	25	13	[24]	8
1246	Nabû-bêla-ušur		26	14	[25] Šagarakti-šuriaš	9/0
1245	Usât-Marduk		27	15	[26]	1
1244	Ellil-ašared		28	16	[27]	2
1243	Ittabši-dên-Aššur		29	17	[28]	3
1242	Ubru		30	18	[29]/[0]	4
1241	Tukultī-Ninurta (I)	(king n°78)	1	19	[1]	5
1240	Qibi-Aššur	Ibašši-ili	2	20	[2]	6

BCE	ASSYRIAN KING	Eponym	(C)	(Y)	BABYLONIAN KING	Year
682	Sennacherib (n°111)	Nabû-šarru-ušur	23	579	23 Sennacherib	7
681		Nabû-aḥḥē-ēreš	24	580	24	8
680	Esarhaddon (n°112)	Danānu	1	1	1 Esarhaddon	1
679		Issi-Adad-anênu	2	2	2	2
678		Nergal-šarru-ušur	3	3	3	3
677		Abī-rāmu	4	4	4	4
676		Banbâ	5	5	5	5
675		Nabû-aḥḥē-iddin	6	6	6	6
674		Šarru-nûrī	7	7	7	7
673		Atar-ilu	8	8	8	8

672		Nabû-bêlu-ušur	9	9	9		9
671		Kanûnâyu	10	10	10		10
670		Šulmu-bêli-lašme	11	11	11		11
669		Šamash-kâšid-ayâbi	12	12	12		12
668	Aššurbanipal (n°113)	Marlarim	1	13	1	Aššurbanipal	1

This reconstruction of the list of eponyms confirms the reliability of the Assyrian king lists²³ (Assyrian scribes could easily date a past event by virtue of “1 eponym = 1 Assyrian year”). The parallelization of all the synchronisms between the Assyrian and Babylonian reigns makes it possible to fix the unmentioned duration of some reigns. For example:

- *Duration of reigns with a null value.* The duration between the 41st Assyrian king, Aššur-dugul (1670-1664), and the 48th king, Bêlu-bâni (1664-1654), is only indicated by the expression *bāb tuppi-šu* which literally means “part of his tablet”, which is not clear. However, since the total duration of these six kings (1664-1664) was not considered in the sum of the eponyms, this implies that these kings reigned briefly during the 6th and last year of King Aššur-dugul and that this short duration was included in the last year of this king. This way of counting the years of Assyrian reigns is confirmed by the reigns of Ninurta-tukultî-Aššur (n°84) and Mutakkil-Nusku (n°85), because these two kings reigned respectively 2 months and 1 month at the end of the 46th and last year of Aššur-dân I (1179-1133). Therefore, the expression *bāb tuppi-šu* means that the king reigned but that there is no eponym associated with his reign (*bāb tuppi-šu* = 0 eponym).
- *Duration of reigns can be replaced by an average value.* The durations of the Assyrian reigns n°65 and n°66 are not known, but as the reign n°64 of Aššur-šadûni (1443-1443), just before, and the reign n°67 of Enlil-našir II (1424-1418), just after, are known, it is possible to deduce the total duration of 20 years (= 1443 - 1424 + 1) for these two reigns, which allows the duration of these two reigns to be replaced by an average value of 10 years (figures in italics). The absence of values for these two successive reigns (a unique case in the Assyrian King List) could explain an error in an inscription by Tiglath-pileser I (1115-1076) who claims to have rebuilt in his 6th year of reign, in 1109 BCE, the temple of the gods Anu and Adad that had been built by Šamšî-Adad I, 641 years earlier, but the chronological interpretation of this inscription is controversial (Pruzsinsky: 2009, 138-140). The 641 Assyrian years correspond to 641 eponyms between the first eponym of the reign of Šamšî-Adad I (1712-1680), in 1712 BCE, and the 6th eponym of the reign of Tiglath-pileser I (1115-1076), in 1109 BCE, which corresponds to a total of 623 solar years (= 640 x 33/34). According to this count, the reign of Šamšî-Adad I would have begun in 1732 BCE (= 1109 + 623), 20 years earlier than expected. This discrepancy could be explained by an error of the scribe which would have affected the 20 eponyms between kings n°64 and n°67 to each of kings n°65 and n°66, because the exact total of eponyms is 621 (= 641 - 20), not 641. The synchronism between the 3rd king of Ur III, Amar-Sîn (1954-1945), and the 27th Assyrian king, Sulili (= Zariqum), makes it possible to calculate the average value of Assyrian reigns before Erišu I (1873-1835), the 33rd Assyrian king. This average duration for the 6 Assyrian kings between Sulili and Erišu I is approximately 14 years = (1954 - 1873)/6.
- *Duration of reigns which is rounded out.* Several inscriptions that deal with the building activities of the Ištar temple derive from the time of Tukultî-Ninurta I (1242–1206), who stated that the Ištar temple was founded by Ilušuma (c.1886–1873) 720 years before he restored it at the beginning of his reign. This figure cannot be based on an eponymous list for two reasons: 1) the number of eponyms from the reign of Ilušuma has been lost and therefore could not be used; 2) the total duration of the 45 Assyrian kings between Ilušuma and Tukultî-Ninurta I is exactly 720 years which implies an average duration of exactly 16 years (= 720/45). This same 16-year average was used to date the total duration of 576 years (= 36 x 16) of the 36 Kassite reigns (Pruzsinsky: 2009, 145-147). As there are approximately 660 (= 60 x 11) eponyms between Ilušuma and Tukultî-Ninurta I, it is possible that this number has been replaced by 720 (= 60 x 12) for symbolic reasons.

The synchronisms between the Assyrian and Babylonian reigns over the period from the dynasty of Ur III to Kadašman-Enlil I can be established precisely because all the durations of the Babylonian reigns are known (Pruzsinsky: 2009, 194-199). The durations of the Babylonian reigns, from Kadašman-Enlil I (1375–1360) to Ninurta-nâdin-šumi (1133–1127), are all known (Joannès: 2001, 164).

²³ From Year 1 of Išme-Dagan I (1679–1670), in 1679 BCE, to year 12 of Shalmaneser I (1271–1242), in 1259 BCE, there are 421 solar years (= 1679 - 1259 + 1) or **153.767 days** (= 421 x 365.24219), there are also 434 eponyms, which correspond to 434 lunar years or **153.794 days** (= 12 x 29.530588 x 434). Between Year 12 of Shalmaneser I, in 1259 BCE, and year 1 of Esarhaddon (681–669), in 680 BCE, there are 578 solar years (= 1259 - 681) or **211.110 days** (= 578 x 365.24219), there are also 580 eponyms, which correspond to 71 lunar years, until year 1 of Ninurta-apil-Ekur (1192–1179), in 1191 BCE, then 509 solar years (= 580 - 71) to year 1 of Esarhaddon, or a total of **211.068 days** (= 71 x 12 x 29.530588 days + 509 x 365.24219 days).

CHRONOLOGY OF KASSITE, SEALAND I AND HITTITE REIGNS OVER THE PERIOD 1750–1350 BCE

Among the 36 Kassite kings (Grayson: 2000, 156-170), only the duration of 13 reigns, from n°5 to n°17, is missing (Brinkman: 1976, 128). The order of succession of the kings is not completely certain between n°4 and n°17 (Pruzinsky: 2009, 42,99-101), but synchronisms (highlighted in grey) between Assyrian and Kassite kings, as well as between Kassite and Babylonian kings, make it possible to fix the chronological placement of subsequent Kassite kings:

- Alliance between Assyrian king Aššur-bêl-nišešu (1411-1403) and Kassite king Kara-indaš.
- Alliance between Assyrian king Puzur-Aššur III (1491-1467) and Kassite king Burna-Buriaš I. This alliance was likely concluded at the beginning of the reign of Puzur-Aššur III (c. 1490 BCE).
- *Ea-gamil, king of the Sealand, fled to Elam. After he had gone, Ulam-Buriaš, brother of Kaštiliašu (III), mustered his army and marched to the Sealand. He was the master of the land* (Grayson: 2000, 156). However, Kassite King Ulam-Buriaš officially became King of Babylon after the resettlement of Babylon in 1459 BCE (“Year 41 that Babylon was resettled”).
- A Babylonian chronicle mentions an assault by Kassite troops led by the first Kassite king, Gandaš, in Year 9 of Samsu-iluna (1654-1616) (Goetze: 1964, 97).
- A tablet (VAT 1429) describes the Kassite king Agum II as *bukašu* “Duke” of Babylon, who was the first Kassite king of Babylon (Freu, Mazoyer: 2007, 114) after Samsuditana's death in 1499 BCE.
- Evidence of Kaštiliašu's kingship is somewhat circumstantial. He may be the person indicated on line 21' of the SKL and is preceded by a lacuna (Ur[...]iaš ?) and superseded by a poorly preserved name. Two passages in the Chronicle of Early Kings mention Kaštiliašu (III): “Ulam-Buriaš, brother of Kaštiliašu, the Kassite” and “Agum, the son of Kaštiliašu”.

A study has reconstructed the complete list of the 36 Kassite kings, the Synchronistic King List (ScKL), from the existing royal lists of the Kassite kings (Table 16), all of which are damaged and therefore very incomplete. For example, the badly damaged names of kings Ĥarba-Šipak (n°7) and Tiptakzi (n°8) are currently read Ĥurbaḥ and Šipta-ulzi (Chen: 2020, 1-29,47-49). A second study (Mahieu: 2021, 98) corrected the spelling of these two names and exchanged kings Abi-Rattaš (n°4) and Kaštiliašu II (n°3) because the name Ušši, which appears in a royal list: Gandaš (n°1), Agum I (n°2), Kaštiliašu I (n°3), Ušši (n°4), Abi-Rattaš (n°5), must have been a distortion of [Kaštilia]šu (II) rather than of Abi-Rattaš (Chen: 2020, 48). As Kara-indaš was a contemporary of the Assyrian king Aššur-bêl-nišešu (1411-1403), he should be placed in 16th position instead of 15th for chronological reasons.

Putting all these synchronisms (highlighted in grey) in parallel makes it possible to calculate the average duration of the 13 Kassite kings between Abi-Rattaš (n°5) and Kadašman-Enlil I (n°18), this average duration being 16 years = (1583 - 1375)/13. This average duration of 16 years is in perfect agreement with that of the 36 Kassite reigns (16 = 576/36).

TABLE 16

n°	CHEN (2020)	MAHIEU (2021)	KASSITE KING	reign	#	synchronism with	
1	Gandaš	Gandaš	Gandaš	1661-1635	26	Samsu-iluna	1654-1645
2	Agum I	Agum I	Agum I	1635-1613	22		
3	Kaštiliašu I	Kaštiliašu I	Kaštiliašu I	1613-1591	22		
4	Abi-Rattaš	Kaštiliašu II (Ušši)	Kaštiliašu II	1591-1583	8		
5	Kaštiliašu II	Abi-Rattaš	Abi-Rattaš	1583-1567	16		
6	Urzigurumaš	Urzigurumaš	Urzigurumaš	1567-1551	16		
7	Ĥarba-Šipak*	Ĥurbaḥ	Ĥurbaḥ	1551-1535	16		
8	Tiptakzi*	Šipta-ulzi	Šipta-ulzi	1535-1519	16		
9	Agum II	Agum II	Agum II	1519-1503	16	Samsuditana	1530-1499
10	Burna-Buriaš I	Burna-Buriaš I	Burna-Buriaš I	1503-1487	16	Puzur-Aššur III	1491-1467
11	[...]	Ur[...]iaš	Ur[...]-Bur]iaš	1487-1471	16		
12	Kaštiliašu III	Kaštiliašu III	Kaštiliašu III	1471-1455	16	<i>after Year 41 of Babylon</i>	
13	Ulam-Buriaš	Ulam-Buriaš	Ulam-Buriaš	1455-1439	16	<i>resettlement</i>	1459-1443
14	Agum III	Agum III	Agum III	1439-1423	16		
15	Kara-indaš	Kadašman-Saḥ	Kadašman-Harbe I	1423-1407	16		
16	Kadašman-Harbe I	Kara-indaš	Kara-indaš	1407-1391	16	Aššur-bêl-nišešu	1411-1403
17	Kurikalzu I	Kadašman-Harbe I	Kurikalzu I	1391-1375	16		
18	Kadašman-Enlil I	Nazi-Bugaš	Kadašman-Enlil I	1375-1360	15	Erība-Adad I	1385-1358
19	Burna-Buriaš II	Kurikalzu I	Burna-Buriaš II	1360-1333	27		
20	Kara-ḥardaš	Kadašman-Enlil I	Kara-ḥardaš	1333-1333	0		
21	Nazi-Bugaš	Burna-Buriaš II	Nazi-Bugaš	1333-1333	0		
22	Kurikalzu II	Kurikalzu II	Kurikalzu II	1333-1308	25		
23	Nazi-Maruttaš	Nazi-Maruttaš	Nazi-Maruttaš	1308-1282	26		

A second study (Mahieu: 2021, 121-123) confirmed the order of Kaštiliašu I (n°3), Kaštiliašu II (n°4), Abi-Rattaš (n°5) and assumed that the illegible name of the 11th king (ScKL) should be read Ur[...]iaš (Urzi-Buriaš?). However, Bieke Mahieu replaced Kadašman-Harbe I (n°15) with Kadašman-Saḥ, eliminated Kara-ḥardaš (1333-1333) and completely rearranged the order of the next five kings (numbers 17 to 21). The synchronism between Kadašman-Enlil I (1375-1360) and Erība-Adad I (1385-1358) prevents the order of kings²⁴ from being modified from Kurigalzu I (1391-1375). The inscription that revealed the existence of the kings Kadašman-Saḥ and Ur[...]iaš is the following (Bartelmus, Sternitzke: 2017, 75):

TABLE 17

LIST OF KINGS IN THE TABLET			n°	KASSITE KING	reign	
1	Agum (II)	son of Uršigurumaš (n°6 !)	9	Agum II	1519-1503	
2	Burna-Burariaš (I)	son of Agum (?)	1499 -	10	Burna-Buriaš I	1503-1487
		resettlement of Babylon		11		1487-1471
3	Kaštiliašu (III)	son of Burna-Burariaš	-1462	12	Kaštiliašu III	1471-1455
		Sealand is conquered		13	Ulam-Buriaš	1455-1439
4	Agum (III)	son of Kaštiliašu		14	Agum III	1439-1423
5/6	Kadašman-Saḥ	son of ...		15	(Kadašman-Harbe I)	1423-1407
6/5	Ur[...]iaš	son of ...			Ur[...]iaš	

The order of the Kassite kings on this tablet is slightly different from that of the ScKL, which led to the assumption that the anonymous 11th king corresponded to the last king named Ur[...]iaš. King Kadašman-Saḥ either had a form of co-ruling with Agum III (Beaulieu: 2018, 131-132), or, more likely because of his chronological position, was the successor of Agum III (with a birth name instead of a throne name?).

TABLE 18

n°	KASSITE KING	reign	#	BABYLONIAN	reign	#	ASSYRIAN	reign
				Sîn-muballit	1717-1697	20	Šamšî-Adad I (n°39)	1712 -
				Hammurabi	1697-1680	17		-1680
					1680 -	26	Išme-Dagan I	1680-1670
					-1654		Bêlu-bâni	1664-1654
1	Gandaš	1661 -	26	Samsu-iluna	1654-1645	9	Libbaya	1654 -
		-1635			1645 -	29		-1638
2	Agum I	1635 -	22		-1616		Šarma-Adad I	1638-1626
		-1613					Puzur-Sîn	1626-1615
3	Kaštiliašu I	1613-1591	22	Abi-ešuḥ	1616-1588	28	Bazaya	1615-1588
4	Kaštiliašu II	1591-1583	8	Ammiditana	1588 -	37	Lullaya	1588-1582
5	Abi-Rattaš	1583 -	[20]				Šû-Ninûa	1582-1568
		-1563					Šarma-Adad II	1568-1565
6	Urzigurumaš	1563-1543	[20]		-1551		Ērišu III	1565-1553
7	Ḥurbaḥ	1543 -	[16]	Ammišaduqa	1551 -	21	Šamšî-Adad II	1553-1547
		-1527			-1530		Išme-Dagan II	1547-1531
8	Šipta-ulzi	1527-1511	[16]	Samsuditana	1530 -	31	Šamšî-Adad III	1531-1516
9	Agum II	1511-1495	[16]		-1499		Aššur-nêrârî I	1516-1491
10	Burna-Buriaš I	1495-1479	[16]	resettlement of	1499 -	41	Puzur-Aššur III	1491 -
11	Ur[...-Bur]iaš	1479-1463	[16]	Babylon	-1462		(n°61)	-1467
12	Kaštiliašu III	1463-1451	[12]	Years 38-41	1462-1459		Enlil-nâšir I	1467-1455
13	Ulam-Buriaš	1451 -	[12]				Nûr-ili	1455-1443
		-1439					Aššur-šadûni	1443-1443
							Aššur-rabi I	1443-1433
14	Agum III	1439-1423	[16]				Aššur-nâdin-aḥḥe I	1433-1424
15	Kadašman-Harbe I (=Kadašman-Saḥ ?)	1423 -	[16]				Enlil-našir II	1424-1418
		-1407					Aššur-nêrârî II	1418-1411
16	Kara-indaš	1407 -	[16]				Aššur-bêl-nišešu	1411-1403
		-1391					Aššur-rê'im-nišešu	1403-1395
17	Kurigalzu I	1391 -	[16]				Aššur-nâdin-aḥḥe II	1395-1385
		-1375					Erība-Adad I (n°72)	1385 -
18	Kadašman-Enlil I	1375-1360	15					-1358
19	Burna-Buriaš II	1360-1333	27				Aššur-uballit I (n°73)	1358 -
20	Kara-ḥardaš	1333-1333	0					-1323
21	Nazi-Bugaš	1333-1333	0					
22	Kurigalzu II	1333-1308	25				Enlil-nêrârî (n°74)	1323-1313

²⁴ For example, King Nazi-Bugaš (1333-1333) is placed in 18th position, among the 36 reigns (instead of 21st position), with a reign of about 2 years, which contradicts the king lists (Joannès: 2001, 164). Similarly, she attributes a reign of about 30 years to Kadašman-Saḥ and places him in 15th position, but this king does not appear in the king lists.

The average duration (16 years = 576 years/36) of four Kassite reigns (numbers 5,6,12,13) has been slightly modified for the following reasons: the first four kings (numbers 1 to 4) reigned on average 20 years (= [26+22+22+8]/4) which allows to assume that the next two kings (numbers 5 and 6) also reigned 20 years. This increase of 8 years (= $2x[20 - 16]$) in the length of the reigns makes it necessary to decrease two other reigns by the same amount of 8 years (= $2x[16 - 12]$) in order to keep an overall average of 16 years. As Ulam-Buriaš succeeded his brother Kaštiliašu III, and not according to the usual father/son pattern, their respective reigns had to be reduced by about half ($12 \approx 20/2$). This slight chronological change in the reign of Agum II (1511-1495 instead of 1519-1503) is consistent with the fact that he was retrospectively considered the first “Duke” of Babylon after the fall of that kingdom in 1499 BCE.

We can note that the synchronism between Year 9 of Samsu-iluna (1654–1616), in 1645 BCE, and Gandaš's reign (1661-1635) is verified. The Kassite chronology is also verified by synchronisms with the Sealand chronology, which is itself anchored on several synchronisms with the Babylonian chronology (Grayson: 2000, 156). The chronology of the 11 kings of Sealand Dynasty has several unresolved issues, but all synchronisms are in accordance with the “Ultra Low” chronology (Boivin: 2018, 72-85). Bieke Mahieu solved all the difficulties of the chronology of the kings of the Sealand by assuming that this dynasty which lasted 368 years was divided into two parallel dynasties of 184 years (= $368/2$). The regnal years presented in Table 19 are those commonly proposed for the Sealand I, except for Damiq-ilišu II, who is given '39' instead of 16, 26, 36, or 46 years²⁵, in order to make the total duration of this dynasty 184 years (1648-1464). That Babylon I ends 35 years before the Sealand I does, is suggested by the era of the resettlement of Babylon. This era likely begins at the conquest of Babylon (in 1499 BCE) and is attested from year 36 until year 41 (1463-1459). The first attestation, in year 36, points to a time span of 35 years (from year 1 until year 36), i.e. a period which lasts as long as the 28+7 and 26+9 years of the late Sealand I. If these periods correspond, then the era was applied for the first time at the end of the Sealand I (when the 28+7 = 26+9 years end), and Babylon was conquered 35 years earlier (when the era begins in 1499 BCE = Year 1), i.e. at the end of the reigns of Gulkišar and Pešgaldarameš. In the Epic of Gulkišar, Gulkišar is said to have campaigned against Samsuditana (1530-1499), the last king of Babylon I. This campaign might have brought both Gulkišar's and Samsuditana's reigns to an end: in the present reconstruction, Babylon (I) ends at the same time as Gulkišar's reign (BM 120960). In addition to this synchronism between Gulkišar and Samsuditana, two more synchronisms exist between the Sealand I and Babylon I: Ili-ma-ilu is contemporary with Samsuiluna (1654-1616) and Abi-ešuh (1616-1588); in his regnal year 37 (1551 BCE), Ammiditana “destroyed the wall of Udim which (the people/troops of) Damiq-ilišu (II) had built” (Mahieu: 2022, 131-135). Finally, Ea-gamil, the ultimate king of the dynasty, fled to Elam ahead of an invading horde led by Kassite chief Ulam-Buriaš, brother of the king of Babylon Kaštiliašu III, who conquered the Sealand, incorporated it into Babylonia and “made himself master of the land²⁶”. Agum III, successor to Ulam-Buriaš, is also described as attacking Sealand and destroying a temple in “Dūr-Enlil” (Grayson: 2000, 156). As the resettlement of Babylon ended in its year 36 (1464 BCE), which corresponds to the beginning of the reign of Kaštiliašu III (1463-1451), it seems logical to attribute to him the end of the short reign of Ea-gamil (1473-1464).

TABLE 19

BABYLONIAN	reign	#	ISIN I	reign	#			
Sābium	1749 -	14	Zambīya	1742-1739	3			
	-1735		Itēr-pīša	1739-1735	4			
			Urdukuša	1735-1731	4			
Apil-Sîn	1735-1717	18	Sîn-māgir	1731-1720	11			
Sîn-muballiṭ	1717- 1697	20	Damiq-ilišu I	1720- 1697	23			
Hammurabi	1697 -1654	43						
Samsu-iluna	1654 -	38	SEALAND I	reign	#	SEALAND IBIS	reign	#
	-1616		Ilu-ma-ilu	1648 -	60	Itti-ili-nibi	1648 -	55
				-1588			-1593	
Abi-ešuh	1616-1588	28	Damiq-ilišu II	1588 -	'39'	Iškibal	1593-1578	15
Ammiditana	1588 -	37		-1549		Šušši	1578-1554	24
	-1551					Gulkišar	1554 -	55
Ammišaduqa	1551-1530	21	Pešgaldarameš	1549 -	50			
Samsuditana	1530-1499	31		-1499			-1499	
<i>Resettling of Babylon</i>	1499 -		Ayadaragalama	1499-1471	28	Akurduana	1499-1473	26
Year 36	-1464		Melamkura	1471- 1464	7	Ea-gamil	1473- 1464	9
Years 37-41	1463-1459					(in Elam)	-1459	?

²⁵ Both the decade and the digit of Dam(i)q-ilišu's years in BKL.A i.6 are unclear. If one opts for the (generally preferred) decade of 30 and if one adds a row of three wedges to the digit of 6, one obtains 39. If Dam(i)q-ilišu reigns 39 years, he reigns as many years as his two contemporaries, Iškibal (15) and Šušši (24), together do ($15+24 = 39$ years).

²⁶ The transition period during the Babylonian resettlement (1499-1459) between the Kassite king Agum II (1511-1495) and the king of the Sealand, Ea-gamil (1473-1464), is difficult to reconstruct (Bartelmus, Sternitzke: 2017, 74-77).

The synchronisms of the reigns with the Babylonian kings, as well as the number of years of reign (#) that are known (Boivin: 2018, 74-75, 241-250), make it possible to specify the duration of the Kassite reigns (figures in brackets). The chronology of the Isin I dynasty is based on the lengths of the reigns (#) combined with the synchronisms²⁷ with the Larsa dynasty (Pruzsinsky: 2009, 194–198).

TABLE 20

(GUTIUM)	reign	#	BABYLONIAN	reign	#			
(vassal of ELAM)	2024 -		Ur-Namma	2020-2002	18			
			Šulgi	2002-1954	48			
			Amar-Sîn	1954-1945	9			
			Šū-Sîn	1945-1936	9			
			Ibbi-Sîn	1936 -	24	ISIN I	reign	#
	-1912			-1912		Išbi-Erra	1923-1890	33
						Šū-ilīšu	1890-1880	10
						Iddin-Dagān	1880-1859	21
						Išme-Dagān	1859-1840	19
						Lipit-Eštar	1840-1829	11
						Ur-Ninurta	1829-1801	28
			Sumu-abum	1799-1785	14	Būr-Sîn	1801-1779	22
			Sumu-la-Il	1785 -	36	Lipit-Enlil	1779-1774	5
				-1749		Erra-imittī	1774-1766	8
			Sābium	1749 -	14	Enlil-Bāni	1766-1742	24
				-1735		Zambīya	1742-1739	3
						Itēr-pīša	1739-1735	4
			Apil-Sîn	1735-1717	18	Urdukuga	1735-1731	4
			Sîn-muballit	1717-1697	20	Sîn-māgir	1731-1720	11
						Damiq-ilišu I	1720-1697	23
KASSITE	reign	#	Hammurabi	1697 -	43			
1	Gandaš	1661 -		-1654		SEALAND I	reign	#
		-1635	Samsu-iluna	1654 -	38	Ilu-ma-ilu	1648 -	60
2	Agum I	1635-1613		-1616			-1588	
3	Kaštiliašu I	1613-1591	Abi-ešuḥ	1616-1588	28			
4	Kaštiliašu II	1591-1583	Ammiditana	1588 -	37	Damiq-ilišu II	1588 -	[39]
5	Abi-Rattaš	1583-1563					-1549	
6	Urzigurumaš	1563 -		-1551				
		-1543	Ammišaduqa	1551 -	21	Pešgaldarameš	1549 -	50
7	Ḫurbah	1543-1527		-1530				
8	Šipta-ulzi	1527-1511	Samsuditana	1530 -	31			
9	Agum II	1511-1495		-1499		SEALAND IBIS	-1499	
10	Burna-Buriaš I	1495-1479	<i>resettlement of</i>	1499 -		Akurduana	1499-1473	26
11	Ur[.-Bur]iaš	1479 -	<i>Babylon</i>	-1464		Ea-gamil	1473 -	9
		-1463	<i>Year 36</i>				-1464	
12	Kaštiliašu III	1463-1451	<i>Years 37-41</i>	1463-1459				
13	Ulam-Buriaš	1451-1439						
14	Agum III	1439-1423						
15	Kadašman-Harbe I	1423-1407						
16	Kara-indaš	1407-1391						
17	Kurigalzu I	1391-1375						
18	Kadašman-Enlil I	1375-1360						
19	Burna-Buriaš II	1360-1333						
20	Kara-ḫardaš	1333-1333						
21	Nazi-Bugaš	1333-1333						
22	Kurigalzu II	1333-1308						
23	Nazi-Maruttaš	1308-1282						
24	Kadašman-Turgu	1282-1264						

Most Hittitologists reject this chronology because they consider it to be about a century too short compared to their own and because there would have been “too many” kings of Hana during the period 1600-1500 BCE called « Dark Ages » (Freu, Mazoyer: 2007, 111-117). The traditional chronology of the 29 Hittite kings is divided into three periods: Old Kingdom (nos. 1 to 9); Middle Kingdom (nos. 10 to 20); New Kingdom (nos. 21 to 29), which are preceded by the Hattian kings (pre-Hittites).

²⁷ Only 18 year-names are attested for Išme-Dagān and only three year-names are known for Itēr-pīša from the Ur-Isin King List. However the following synchronisms, between the Isin I Dynasty and the Larsa Dynasty, confirm the number of years of reign: Išbi-Erra Y. 1 = Naplānum Y. 9; Lipit-Eštar Y. 11 = Gungunum Y. 9 = Ur-Ninurta Y. 0; Zambīya Y. 1 = Sîn-iqīšam Y. 5.

It is interesting to note that the ¹⁴C dating (IntCal04) of the strata corresponding to the period of the Old Hittite Kingdom gives a date of 1600-1500 BCE (Gorny: 2006-2007, 18-33) instead of 1670-1530 BCE proposed by Hittitologists (Freu, Mazoyer: 2007, 25).

All specialists agree that the origins of Hittite history are still full of darkness and many uncertainties remain (Margueron, Pfirsich: 2012, 212). For example, Naram-Sîn of Akkad (2163-2126) marched against a coalition of 17 kings including Pamba king of Hatti, and Zipani king of Kanesh, but it is difficult to date the reign of these Hittite kings. The triple synchronism between kings Agum II (Kassite), Kirta (Mitanni) and Thutmose I around 1500 BCE (De Martino: 2004, 40), requires the setting of the reign of those kings over a period covering the reign of Agum II (c.1511-1495). Recent archaeological discoveries have shown that the synchronisms with the Kassite kings fit only with the Ultra-Low chronology (Podany: 2014, 51-73; 2016, 69-98). The oldest Hittian king²⁸, Ḫurmeli, who appears in the Assyrian documents of Mari was, therefore, a contemporary of the oldest list of eponyms MEC A (1775-1745). Several synchronisms with the Babylonian kings and Kassite kings make it possible to fix the Hittite chronology:

- Hittites from the period 2000-1700 BCE are known mainly through letters of Assyrian merchants (written in Paleo-Assyrian). These merchants lived temporarily in towns near the road linking Kanesh to Assyria but traded with the inhabitants in the south of Anatolia (Joannès: 2001, 440-441) where there were major Hittite commercial counters such as those in Mama, Zalpa and Urshum, near Carchemish.
- Anitta's reign was interrupted by an attack in the 23rd year of Samsu-iluna (Veenhof, Eidem: 2008, 143-146), which is dated 1631 BCE. Given that there was a period of about 120 years between the beginning of Ḫurmeli's reign c. 1750 BCE and the end of Anitta's reign c. 1630 BCE, the average duration of the reigns must have been around 20 years (= 120/6).
- The Hurrians were enemies of the Hittite kings Ḫattušili I and Muršili I, and their strength is shown by records of their conquest of much of the Hittite kingdom in the time of Ḫattušili I who seems to have retaliated late in his career, attacking Aleppo (Halab). However, Kuwari, a king of Hana, managed to defeat an attack led by the warriors of Hatti (Ḫatte). Conceivably, the Hittite expedition of Muršili I arose from an alliance between the Hittites and the Kassites, for the Hittites, the motivation was the rich spoils of Babylon, and for the Kassites, the prospect of creating a new ruling dynasty in Babylonia (Bryce: 2005, 99-100). The period after the fall of Babylon, in 1499 BCE, is poorly documented and therefore difficult to reconstruct. The kingdom of Karduniaš of the Kassite kings to the north-east of Babylon will first encompass the remains of the Babylonian kingdom, and then after the resettlement of Babylon, in 1464 BCE, the kingdom of Sealand to the south-east of Babylon, the new kingdom formed being called Karduniaš. During this period the kingdom of Mittani would encompass the kingdom of Hana around the city of Mari (Sauvage: 2020, 90-93).
- The chronological reconstruction of the 17 Hittite kings between Muršili I (no. 4), who destroyed Babylon in 1499 BCE, and Šuppiluliuma I (1353-1322) is uncertain because there is no dated synchronism with other Mesopotamian chronologies. The existence of kings before Labarna (no. 2) is highly controversial, likewise the duration of several Hittite kings, Zidanta I (no. 6), Ḫuzziya II (no. 8) and Taḫurwaili I (no. 12), was brief and is ignored by some authors (Freu, Mazoyer: 2007, 25-26).
- The succession of the kings between Tuḫaliya I (no. 16) and Šuppiluliuma I (no. 21) is controversial (Bryce: 2005, 121-153; Freu, Mazoyer: 2007b, 75-116; Miller: 2020, 191-2), but the transition between Muwatalli I (no. 15) and Tuḫaliya I is dated to c. 1400 BCE (Bryce: 2012, 310) thanks to the similarity

²⁸ The existence of the Hittite homeland is very old, but this Hittite kingdom of Pamba is doubly paradoxical: it only covered a small part of Hatti (a region around the city of Hattusa) and the Hittite language was not used. They spoke Nesite (or Neseli). The two most important city-states of this time in the Land of Hatti were Kaniš (former Nesa) and Mama (Michel: 2001, 105, 117-130). The Hattians were an ancient people who inhabited the land of Hatti (Bryce: 2005, 11-20). Consequently, the use of the word "Proto-Hittite" to refer to Hattians is inaccurate (Freu, Mazoyer: 2007, 15-16). According to later Hittite documents, Sargon of Akkad (2243-2187) had fought with the Luwian king Nurdaggal of Burushanda. The group was documented at least as early as the empire of Sargon of Akkad, until it was gradually absorbed c. 2000-1700 BCE by the Indo-European Hittites, who became identified with the "land of Hatti". The oldest name for central Anatolia, "land of Hatti", was found on Mesopotamian cuneiform tablets from the period of Sargon of Akkad: on those tablets Assyrian-Akkadian traders implored King Sargon for help. This appellation continued to exist for about 1500 years until 630 BCE, as stated in Assyrian chronicles. The Hattians spoke Hattic, a non-Indo-European language of uncertain affiliation. The few texts that have survived are predominantly religious or cultic in character. Hittite, also called Nesite because it was spoken in Nesa/Kanesh, is an Indo-European language, linguistically distinct from the Hattians. The Hittites continued to use the term Land of Hatti for their new kingdom and they always called themselves "people of the land of Hatti (Heth)". The Hattians eventually merged with people who spoke Indo-European languages such as Hittite, Luwian and Palaic and were organized in feudal city-states and small kingdoms or principalities (perhaps up to six). These cities were well organized and ruled as theocratic principalities. Nesite was the official language of the Hittite kingdom and was mainly spoken by its ruling class. Primarily for this reason Nesite (Hittite) continued to be used as the official chancellery language in Hattusa when the Hittite kingdom was established, and as the language of written communications between the royal court and the various peoples of Anatolia, particularly in the west. Those who occupied the throne frequently proclaimed their genealogical links with their earliest known predecessors (as in Genesis 23:2-10). These links helped substantiate their claims to the throne.

of the seals of the Hana kings (Podany: 2014, 56-57) with the Kassite king Kara-indaš (1407-1391). The average length of the reigns of the 5 Hittite kings over the period 1400-1350 BCE was thus 10 years. The similarity of the seals of the Hittite kings with those of the Kassite kings and the kings of Hana, made it possible to lower the reign of Muršili I, conventionally dated from c.1620-1590 BCE to c.1580-1560 BCE (Bilgin: 2018, 13-22), which eliminates the synchronism with the fall of Babylon in 1595 BCE (Middle Chronology). Consequently, the average length of the 8 non-negligible reigns between Ḫantili I, who reigned after 1499 BCE, and Tuḫaliya I (c.1400-1390), was about 12 years (= [1499 - 1403]/8).

The precise synchronisms between the kings Anitta (c.1650-1630) and Samsu-iluna (1654-1616), as well as between the kings Muršili I (c.1520-1499) and Samsuditana (1530-1499), confirm the “Ultra-Low” chronology. The precise synchronisms between the kings of Mari who were under the control of the Assyrian kings from Yahdun-Lîm (1716-1699) also confirm the “Ultra-Low” chronology. After the reign of Išme-Dagan I (1680-1670) the kings of Mari were replaced by the kings of Mari and the land of Hana (whose Mari and Terqa were the main cities), expression abbreviated in kings of Hana. The chronology of these 21 kings of Hana, who had no year of reign, can only be reconstructed from the synchronisms with the Hittite and Kassite kings. The period following the collapse of the Babylonian kingdom, in 1499 BCE, allowed the immediate emergence around 1500 BCE of Mitanni²⁹ whose first king was called Kirta (Novák: 2007, 389-401). This period is difficult to reconstruct because the first three kings of Mitanni placed the kings of Hana (nos. 12-14) under the control of the Mitannian kings.

- The first kings of Hana are well identified, and it is known that in Year 28 of his reign (1626 BCE), Samsu-iluna (1654-1616) ended the reign of Yadiḫ-Abu and replaced him with Zimri-Lim II (Charpin: 2022, 365-386). As Kaštiliašu (1613-1591) succeeded Zimri-Lim II (1626-1613), the Hana kings who succeeded Zimri-Lim I (1680-1667) had an average reign length of 13 years (= [1680 - 1613]/5).
- Kaštiliašu (no. 5), a contemporary of Abi-ešuḫ (1616-1588), thus corresponds to the Kassite king of the same name. The seven kings of Hana who succeeded him, before the takeover of the Mitanni c. 1500 BCE (Podany: 2014, 51-73; 2016, 69-98), thus reigned for an average of 15 years (= [1591 - 1500]/7).

TABLE 21

n° HATTI	reign	#	n° MARI & HANA	reign	#	ASSYRIA	reign	#
1 Ḫurmeli (¹⁴ C)	1750-1730 [20]					(MEC A)	1775-1745	
2 Ḫarpatiwa	1730-1710 [20]					Erišu II (n°38)	1722-1712	10
3 Inar	1710 - [20]		1 Yahdun-Lîm	1716-1699	17	Samsî-Adad I	1712	33
	-1690		2 Sumu-Yamam	1699-1697	2			
4 Waršama	1690 - [20]		3 Samsî-Addu	1697-1687	10		-1680	
	-1670		4 Yasmah-Addu	1687-1680	7			
			5 Zimri-Lim I	1680-1667	13	Išme-Dagan I	1680-1670	10
5 Piṭḫana	1670-1650 [20]		1 Yâpaḫ-Sumu-Abu	1667-1654	13	BABYLONIA	reign	
6 Anitta	1650 - [20]		2 Iši-Sumu-Abu	1654-1641	13	Samsu-iluna	1654	38
	-1630		3 Yadiḫ-Abu	1641-1626	15		-1626	
7 Zûzu	1630-1610 [20]		4 Zimri-Lim II	1626	13			
							-1616	
HITTITE	reign	#						
1 Ḫuzziya I (¹⁴ C)	1610-1590 [20]		5 Kaštiliašu (I)	1613-1591	22	Abi-ešuḫ	1616-1588	28
- Tuḫaliya?	1590-1570 [20]		6 Šunuḫru-Ammu	1591-1576 [15]		Ammiditana	1588	37
- PU-Šarruma?	1570-1550 [20]		7 Ammi-madar	1576-1561 [15]			-1551	
2 Labarna	1550 - [15]		8 Idi-Abu	1561-1546 [15]		Ammišaduqa	1551	21
	-1535		9 Zimri-Lim III	1546-1535 [15]			-1530	
3 Ḫattušili I	1535-1520 [15]		10 Kasapan	1535-1520 [15]		Samsuditana	1530	31
4 Muršili I	1520 - [21]		11 Kuari	1520-1505 [15]				
	-1499		12 Hanaya /Ya'usa	1505 - [15]			-1499	
5 Ḫantili I	1499 - [12]		MITANNI			KASSITE	reign	
						Agum II (n°9)	1511-1495	16
	-1487					Burna-Buriaš I	1495-1479	16

²⁹ The historical narratives of the kings of the Old Hittite Kingdom frequently speak of the Hurrians, but they never mention Mitanni before 1500 BCE. These sources show that Ḫattušili I and Muršili I encountered a whole host of polities during their military campaigns to Syria, the main ones being Uršum, Haššum, Hahhum. These potentates were supported by Aleppo (Ebla) as well as by the Hurrians. The Hurrians that are mentioned as adversaries of the Hittites. The Hurrians are mentioned among the allies of Uršum in the Old Hittite narrative on the siege of Uršum, the Annals of Ḫattušili I report a Hurrian attack that had occurred when the king of Hatti was fighting in western Anatolia. The Hurrians were a threat and were also opposed to the Hittite advance in Syria during the kingdom of Muršili I (who was responsible for the end of Ebla in 1499 BCE). In any case, these Hittite sources never give the impression that the Hittites were facing a unified Hurrian front. Consequently, the birth of the Mitanni state is linked to its military expansion over large parts of Syria which was favoured by the political vacuum that the Hittites created in Syria. The adoption of the title “King of the Hurrian troops” by the sovereigns of Mitanni is a clear indication of the importance of military power in the political structures of this state. The first Mitannian king known to us who bears a name of Indo-Aryan origin is Šuttarna whose name (Saitarna is a variant) is only attested on a seal impression dating to the reign of Sauštatar (De Martino: 2014, 61-74).

The probable succession of the kings of Hana (Podany: 2014, 51-73; 2016, 69-98) under the control of the Mitanni kings (hatched areas) is: Hanaya (no. 12) & Ya’usa, Siniya (no. 13) & Sausadatra (= Šauštatar), and Qiš-Addu (no. 14) & Sausadatra, Qiš-Addu & Sa’itarna (= Šuttarna I), Qiš-Addu & Parattarna (= Parattarna I). Despite these uncertainties it is possible to determine the approximate chronology of the kings of Hana and Mitanni through the following synchronisms:

- The synchronism between the reigns of Kirta and Muršili I is dated stratigraphically around 1500 BCE just before the reign of Thutmose I (Novák: 2007, 389-401).
- There was synchronism 1) between Šauštatar II (no. 6) and Tuḫaliya I (no. 16) dated around 1400 BCE (Bryce: 2012, 310), 2) between Artatama I and Thutmose IV (1392-1383, see Table 47), 3) between Šuttarna II and Amenhotep III's year 10 (1383-1345), in 1373 BCE, and 4) between Tušratta and Šuppiluliuma I (1353-1322). Šattuara II disappeared in 1265 BCE. The name Kirta, unattested, means “famed” (Mladjov: 2019, 33-37) corresponds to king Šauštatar (0)
- The Mitanni was attacked from Year 22 of Adad-nêrârî I (in 1280 BCE) and was definitively defeated in Year 7 of Shalmaneser I, in 1264 BCE, therefore the last king of Hana, Pagiru (no. 21), ended at this date, but around 1258 BCE according to the Middle Chronology (Frey: 2003, 177-219).

The Hittite chronology between the kings Tuḫaliya I (no. 16) and Šuppiluliuma I (no. 21) is very problematic and can only be accurately reconstructed based on synchronisms with the kings of Egypt (EA means El-Amarna letter), Assyria and Babylon (Stiebing, Helft: 2023, 282-283). The reign of Tuḫaliya I has been dated to around 1400 BCE, thanks to synchronism with Kara-indaš (1407-1391). A total solar eclipse (“solar omen”) is mentioned in a text dating to the reign of Muršili II (1322-1295). The text records that in the 10th year of Muršili's reign (in 1312 BCE), “the Sun gave a sign”, just as the king was about to launch a campaign against the Kingdom of Azzi-Hayasa in north-eastern Anatolia. The 1312 BCE eclipse occurred over northern Anatolia in the early afternoon, and its effects would have been quite spectacular for Muršili II and his men on campaign: 24 June 1312 BCE (-1311*)³⁰.

TABLE 22

BCE	EGYPT	MITANNI		HATTI
1358	Amenhotep III			Tuḫaliya III
1357	27	<i>P. Berlin 9784</i>	Šuttarna II	
1356	28	Amenhotep IV	Artašumara	
1355	29	2		
1354	30	3	Tušratta	
1353	31	4	[1]	Šuppiluliuma I
1352	32 (EA 254)	5	[2]	1st attack
1351	33	[6]	EA 17, EA 18	1 2
1350	34	[7]	<i>EA 19, EA 20</i>	2 3
1349	35	8	<i>EA 21, EA 22</i>	3 4
1348	36 (EA 75)	9	EA 23, EA 24	4 ‘1-year War’
1347	37 (EA 106)	[10]	<i>EA 25</i>	5 6/1
1346	38	[11]	EA 26	2
1345	Akhenaten	12 (EA 116)	EA 27	1 3
1344	[2]	[13]		2 4
1343	[3]	14	<i>EA 28</i>	3 5
1342	[4]	[15]		4 6
1341	5	16	EA 29	7
1340	6	17		8
1339	[-]	Semenkhkare	[15]	9 (EA 41)
1338	*8*	2	(EA 43)	10
1337		-Ankhkheperure		11
1336	<i>Akhetaten abandoned</i>	Tutankhamun	(EA 9)	24 12
1335		2		25 13
1334		3		26 14
1333		3	(Burna-Buriaš II)	27 15
1332		5	(Kurigalzu II)	1 16
1331		6		2 17
1330		7		18
1329		8		19
1328		9	CARCHEMISH	20
1327		10		0 ‘6-year War’
1326		Ay	Šarri-Kušuh	1 2
1325		2		2 3

³⁰ <https://eclipse.gsfc.nasa.gov/SEAtlas/SEAtlas-2/SEAtlas-1319.GIF>

1324		3		3	4
1323		4		4	5
1322		Horemheb		5	Arnuwanda II
1321		2		6	Muršili II
1320		3		7	2
1319		4		8	3
1318		5		9	4
1317		6		10	5
1316		7		11	6
1315		8		12	7
1314		9		13	8
1313		10		14	9
1312		11		15	10
1311		12		16	11
1310		13	Šahurunuwa	1	12

The average length of the eight effective reigns (greater than or equal to one year) between Muršili I (1520-1499) and Tuḫaliya I (c. 1400 BCE) is approximately 12 years (= [1499 - 1400]/8) and the average length of the five reigns between Tuḫaliya I (1403-?) and Šuppiluliuma I (1353-1322) is approximately 10 years (= [1403 - 1353]/5). Amélie Kuhrt used the Middle Chronology (MC) to establish her chronology of the Hittite kings from no. 16 to no. 23 (Kuhrt: 2020, 230).

TABLE 23

n°	MC (Kuhrt)	#	HATTI	reign	#	n°	KASSITE	reign	#
4	1620 - [30]		Muršili I	1520 - [21]		8	Šipta-ulzi	1527-1511 [16]	
	-1590			-1499		9	Agum II	1511 - [16]	
5	1590 - [30]		Ḫantili I	1499 - [12]		10	Burna-Burias I	1495 - [16]	
	-1560			-1487					
6	1560-1550 [10]		Zidanta I	1487-1487 <1					
7	1550 - [20]		Ammuna	1487 - [12]		11	Ur[.-Bur]ias	1479 - [16]	
	-1530			-1475					
8	1530-1525 [5]		Ḫuzziya II	1475-1475 <1					
9	1525-1500 [25]		Telipinu	1475-1463 [12]					
10	1500-1500 <1		Taḫurwaili I	1463-1463 <1					
11	1500-1490 [10]		Alluwamna	1463-1451 [12]		12	Kaštiliašu III	1463-1451 [12]	
12	1490-1480 [10]		Ḫantili II	1451-1439 [12]		13	Ulam-Burias	1451-1439 [12]	
13	1480-1470 [10]		Zidanza (II)	1439-1427 [12]		14	Agum III	1439 - [16]	
14	1470-1460 [10]		Ḫuzziya III	1427-1415 [12]					
15	1460-1420 [40]		Muwatalli I	1415-1403 [12]		15	Kadašman-Harbe I	1423-1407 [16]	
16	1400-1390 [10]		Tuḫaliya I	1403 - [10]		16	Kara-indaš	1407-1391 [16]	
17	1420-1400 [20]		Ḫattušili II*			17	Kurigalzu I	1391 - [16]	
18	1380-1370 [10]		Tuḫaliya II*						
19	1390-1380 [10]		Arnuwanda I*			18	Kadašman-Enlil I	1375-1360 15	
20	1370-1370 <1		Tuḫaliya III*	-1353 [10]		19	Burna-Burias II	1360 - 27	
21	1370-1330 [40]		Šuppiluliuma I	1353-1322 31					
22	1330-1330 <1		Arnuwanda II	1322-1322 <1		22	Kurigalzu II	1333 - 25	
23	1330 - 35		Muršili II	1322 - 27					
	-1295			-1295		23	Nazi-Maruttaš	1308 - 26	
24	1295 - 13		Muwatalli II	1295 - 20					
	-1282			-1275		24	Kadašman-Turgu	1282 - 18	
25	1282-1275 7		Urhi-Teshub	1275-1268 7					
26	1275 - 30		Ḫattušili III	1268 - 27		25	Kadašman-Enlil II	1264-1255 9	
	-1245			-1241		26	Kudur-Enlil	1255-1246 9	

The succession of Hittite kings after Tuḫaliya I is controversial; some hittitologists placed the reign of Ḫattušili II (which is attested only once) after that of Arnuwanda I and merged the reigns of Tuḫaliya I and Tuḫaliya II into a single Tuḫaliya I/II (Freu, Mazoyer: 2007b, 18-20). Some Hittitologists have deleted the reign of Ḫattušili II from the list of Hittite kings (Wilhelm: 2004, 76), others place it before Tuḫaliya I (Kuhrt: 2020, 230). However, a recent study confirms the existence of a Tuḫaliya I (son of Kantuzzili) who reigned before a Tuḫaliya II (husband of Nikkal-madi). Tuḫaliya III is not, however, unequivocally attested as having reigned at the same time as his parents Arnuwanda and Ašmu-Nikkal. Arnuwanda himself is clearly attested alongside his own father, Tuḫaliya I, as co-regent, so Arnuwanda was certainly aware of the institution of co-regency, **and** may therefore have regarded it as an opportune measure for the reign of his

own son, Tuḫaliya III (Miller: 2020, 191-192). Ḫattušili II is only mentioned in the Talmi-Šarruma treaty (CTH 75) in the succession: Ḫattušili (I), Muṣili (I), Tuḫaliya (I), Ḫattušili (II) and Šuppiluliuma. The existence of Ḫattušili II (as King not as Great King) is therefore problematic; it is possible that his reign was brief, around 2 years?, which would be in line with the average length of 12 years of previous reigns (or perhaps he was only co-regent because he did not have the title of Great King).

TABLE 24

Amenhotep II	1418 - 1392	15	Muwatalli I	1415-1403 [12]	15	Kadašman-Harbe I	1423-1407 [16]	
			16 Tuḫaliya I	1403-1391 [12]	16	Kara-indaš	1407-1391 [16]	
Thutmose IV	1392-1383	17	[Ḫattušili II*?]	1391-1389 [2]	17	Kurigalzu I	1391 - [16]	
Amenhotep III	1383 -	18	Tuḫaliya II	1389-1377 [12]			-1375	
		19	Arnuwanda I	1377-1365 [12]	18	Kadašman-Enlil I	1375-1360	15
Amenhotep IV	1356-1345	20	Tuḫaliya III	1365-1353 [12]	19	Burna-Buriaš II	1360 -	27
	-1340	21	Šuppiluliuma I	1353 - 31			-1333	
Tutankhamun	1337-1327			-1322	22	Kurigalzu II	1333 -	25
Aḫ	1327-1323	22	Arnuwanda II	1322-1322 <1				
Horemheb	1323 -	23	Muṣili II	1322 -			-1308	
	-1295			-1295	23	Nazi-Maruttaš	1308-1282	26

Placing the chronologies of Hatti, Hana and Mitanni in parallel, with their synchronisms (highlighted in grey), makes it possible to reconstruct approximate reign lengths (number in brackets) whose average values are 23 years for the last 10 kings of Hana (nos. 12 to 21) and 14 years for the 17 kings of Mitanni.

TABLE 25

HATTI	reign	n°	HANA	reign	#	n°	MITANNI	reign	#
Muṣili I	1520-1499	11	Kuari	1520-1505 [15]					
Ḫantili I	1499-1487	12	Hanaya <Ya`usa	1505-1495 [10]		1	(Kirta) Šauštatar 0	1500 -	[10]
Zidanta I	1487-1487	13	Siniya <	1495-1485 [10]				-1490	
Ammuna	1487 -	14	Qiš-Addu <	1485 - [30]		2	Šuttarna I	1490-1480 [10]	
	-1475					3	Parattarna I	1480 -	[25]
Ḫuzziya II	1475-1475								
Telipinu	1475-1463								
Taḫurwaili I	1463-1463								
Alluwamna	1463 -			-1455				-1455	
	-1451	15	Iddin-Kakka	1455 - [25]		4	Šauštatar I	1455-1435 [20]	
Ḫantili II	1451-1439					5	Paršatatar	1435 -	[10]
Zidanza II	1439-1427			-1430				-1425	
Ḫuzziya III	1427-1415	16	Išar-Lim	1430 - [25]		6	Šauštatar II	1425 -	[30]
Muwatalli I	1415-1403			-1405					
Tuḫaliya I	1403-1391	17	Iggid-Lim	1405 - [25]				-1395	
[Ḫattušili II* ?]	1391-1389			-1380		7	Parattarna II	1395-1387 [8]	
Tuḫaliya II	1389-1377	18	Iših-Dagan	1380 - [25]		8	Artatama I	1387-1372 [15]	
Arnuwanda I	1377-1365					9	Šutarna II	1372-1357 [15]	
Tuḫaliya III	1365-1353			-1355		10	Artašumara	1357-1355 [2]	
Šuppiluliuma I	1353 -	19	Ahuni	1355 - [25]		11	Tušratta	1355-1340 [15]	
		20	Hammurapi	-1330 [25]		12	Artatama II	1340 - [15]	
	-1322					13	Šutarna III	-1325 [25]	
Arnuwanda II	1322-1322					14	Šattiwaza	1339-1325	
Muṣili II	1322-1295			-1305				-1300	
Muwatalli II	1295 -	21	Pagiru	1305-1280 [25]	15	Šattuara I	1300-1285 [15]		
	-1275		Mitanni attacked	1280 - [25]	16	Wašašatta	1285-1275 [10]		
Urhi-Teshub	1275-1268		Collapse	-1265	17	Šattuara II	1275-1265 [10]		

The complete reconstruction (Table 26) of the chronologies of the Hittite, Assyrian, Babylonian, Kassite and Hana (and Mitanni) kings, as well as the parallelism of all their synchronisms, confirms the total coherence of these chronological data.

TABLE 26

n°	HATTI	reign	#	n°	MARI & HANA	reign	#	ASSYRIA	reign	#
1	Ḫurmeli (¹⁴ C)	1750-1730 [20]						(MEC A)	1775-1745	
2	Ḫarpatiwa	1730-1710 [20]						Ērišu II (n°38)	1722-1712	10
3	Inar	1710 -	[20]	1	Yahdun-Lîm	1716-1699	17	Šamšî-Adad I	1712 -	33
		-1690		2	Sumu-Yamam	1699-1697	2			
				3	Samsî-Addu	1697-1687	10			
4	Waršama	1690 -	[20]	4	Yasmah-Addu	1687-1680	7		-1680	

		-1670		5	Zimri-Lim I	1680-1667	13	Išme-Dagan I	1680-1670	10
5	Pithana	1670-1650	[20]	1	Yâpaḥ-Šumu-Abu	1667-1654	13	BABYLONIA	reign	
6	Anitta	1650 -	[20]	2	Iši-Šumu-Abu	1654-1641	13	Samsu-iluna	1654 -	38
		-1630		3	Yadiḥ-Abu	1641-1626	15		-1626	
7	Zûzu	1630-1610	[20]	4	Zimri-Lim II	1626 -	13		-1616	
	HITTITE	reign	#							
1	Ḫuzziya I (¹⁴ C	1610-1590	[20]	5	Kaštiliašu (I)	1613-1591	22	Abi-ešuḥ	1616-1588	28
-	Tudḫaliya?	1590-1570	[20]	6	Šunuḫru-Ammu	1591-1576	[15]	Ammiditana	1588 -	37
-	PU-Šarruma?	1570-1550	[20]	7	Ammi-madar	1576-1561	[15]		-1551	
2	Labarna	1550 -	[15]	8	Idi-Abu	1561-1546	[15]	Ammišaduqa	1551 -	21
		-1535		9	Zimri-Lim III	1546-1535	[15]		-1530	
3	Ḫattušili I	1535-1520	[15]	10	Kasapan	1535-1520	[15]	Samsuditana	1530 -	31
4	Muršili I	1520 -	[21]	11	Kuari	1520-1505	[15]		-1499	
		-1499		12	Hanaya /Ya'usa	1505 -	[10]			
5	Ḫantili I	1499 -	[12]		MITANNI			KASSITE	reign	
		-1487						Agum II (n°9)	1511-1495	16
		-1487		13	Siniya /	1495 -	[10]	Burna-Buriaš I	1495 -	16
6	Zidanta I	1487-1487	<1			-1485				
7	Ammuna	1487 -	[12]	14	Qiš-Addu	1485 -	[30]		-1479	
		-1475						Ur[...]iaš	1479 -	16
8	Ḫuzziya II	1475-1475	<1						-1463	
9	Telipinu	1475-1463	[12]							
10	Taḫurwaili I	1463-1463	<1							
11	Alluwamna	1463 -	[12]			-1455		Kaštiliašu III	1463 -	12
		-1451							-1451	
12	Ḫantili II	1451-1439	[12]	15	Iddin-Kakka	1455 -	[25]	Ulam-Buriaš	1451-1439	12
13	Zidanza (II)	1439-1427	[12]			-1430		Agum III	1439 -	16
14	Ḫuzziya III	1427-1415	[12]	16	Išar-Lim	1430 -	[25]		-1423	
15	Muwatalli I	1415-1403	[12]			-1405		Kadašman-Har.	1423-1407	16
16	Tudḫaliya I	1403-1391	[12]	17	Iggid-Lim	1405 -	[25]	Kara-indaš	1407-1391	16
17	[Ḫattušili II ?]	1391-1389	[2]			-1380		Kurigalzu I	1391 -	16
18	Tudḫaliya II	1389-1377	[12]	18	Iših-Dagan	1380 -	[25]		-1375	
19	Arnuwanda I	1377-1365	[12]					Kadašman-Enl.	1375-1360	15
20	Tudḫaliya III	1365-1353	[12]			-1355		Burna-Buriaš II	1360 -	27
21	Šuppiluliuma I	1353-1322	31	19	Ahuni	1355-1330	[25]		-1333	
22	Arnuwanda II	1322-1322	<1	20	Hammurapi	1330 -	[25]			
23	Muršili II	1322-1295	27			-1305		ASSYRIA		
24	Muwatalli II	1295-1275	20	21	Pagiru	1305-1280	[25]	Adad-nêrârî I	1302 -	31
25	Urhi-Teshub	1275-1268	7		Mitanni attacked	1280 -	15		-1271	
26	Ḫattušili III	1268-1241	27		Collapse	-1265		Shalmaneser I	1271-1242	29
27	Tudḫaliya IV	1241-1209	32					Tukultî-Ninurta I	1242-1206	36

REIGN OF HAMMURABI ACCORDING TO ASSYRIAN KING LIST (AKL)

The Assyrian King List allows us to date the reign of Šamšî-Adad I (1712-1680) and the synchronism with Hammurabi (1697-1654) allows us to date the reigns of Šulgi, Ibbi-Sîn and Ammišaduqa, three reigns (highlighted in sky blue) which are based on astronomical phenomena. According to the Babylonian King List C (BKL C), Marduk-kabit-aḫḫešu, the first king of Isin II had a reign of 18 years (1159-1141), as he started to rule from Zababa-šuma-iddina (Chen: 2020, 76,202-206; Radner, Moeller, Potts: 2023, 524-527).

TABLE 27

n°	ASSYRIAN KING	#	#	Reign	n°	BABYLONIAN KING	#	Reign	
23	Yakmeni		14	2010-1996	1	Ur-Namma (UR III)	18	2020-2002	
24	Yazkur-El		14	1996-1982	2	Šulgi	48	2002 -	
25	Ila-kakkabû		14	1982-1968				-1954	
26	Amînum		14	1968-1954					
27	Sulili (= Zariqum)		14	1954-1940	3	Amar-Sîn	9	1954-1945	
28	Kikkia		14	1940-1927	4	Šu-Sîn	9	1945-1936	
29	Akia		14	1927-1913	1	5	Ibbi-Sîn	24	1936-1912
30	Puzur-Aššur I		14	1913-1900			33	1923 -	
31	Šalim-ahum		14	1900-1886				-1890	
32	Ilu-šumma		14	1886-1873	2	Šû-ilîšu	10	1890-1880	
33	Erišu I	40	40	1873 -	3	Iddin-Dagân	21	1880-1859	

			-1834	4		Išme-Dagân	19	1859-1840
34	Ikunum	159	14 1834-1821	5		Lipit-Eštar	11	1840-1829
35	Sargon I		40 1821 -	6		Ur-Ninurta	28	1829- 1801
			-1782	7	1	Sumu-abum	14	1799 -1785
36	Puzur-Aššur II		8 1782-1774	8	2	Sumu-la-II	36	1785 -
37	Naram-Sîn		54 1774 -	9				
				10				-1749
				11	3	Sâbium	14	1749 -
				12				
			-1722	13				-1735
38	Ērišu II		10 1722-1712	14	4	Apil-Sîn	18	1735-1717
39	Šamšî-Adad I		33 1712 -	15	5	Sîn-muballiṭ	20	1717-1697
			-1680		6	Hammurabi	17	1697- 1680
40	Išme-Dagan I	434	11 1680 -1670				26	1680 -
41	Aššur-dugul		6 1670-1664					
42	Aššur-apla-idi		0 1664-1664					
43	Nâšir-Sîn		0 1664-1664					
44	Sîn-namir		0 1664-1664					
45	Ipqi-Ištar		0 1664-1664					
46	Adad-šalûlu		0 1664-1664					
47	Adasi		0 1664-1664					
48	Bêlu-bâni		10 1664-1654					-1654
49	Libbaya		17 1654-1638	1	7	Samsu-iluna	38	1654 -
50	Šarma-Adad I		12 1638-1626	2				
51	Puzur-Sîn		12 1626-1615					-1616
52	Bazaya		28 1615-1588	3	8	Abi-ešuḥ	28	1616-1588
53	Lullaya		6 1588-1582	4	9	Ammiditana	37	1588 -
54	Šû-Ninûa		14 1582-1568	5				
55	Šarma-Adad II		3 1568-1565	6				
56	Ērišu III		13 1565-1553					-1551
57	Šamšî-Adad II		6 1553-1547	7	10	Ammișaduqa	21	1551 -
58	Išme-Dagan II		16 1547-1531					-1530
59	Šamšî-Adad III		16 1531-1516	8	11	Samsuditana	31	1530 -
60	Aššur-nêrârî I		26 1516-1491	9		<i>Fall of Babylon</i>		-1499
61	Puzur-Aššur III		24 1491 -			Agum II (KASSITE)	16	1511-1495
			-1467	10		Burna-Buriaš I	16	1495-1479
62	Enlil-nâšir I		13 1467-1455	11		Ur[...]iaš	16	1479-1463
63	Nûr-ili		12 1455-1443	12		Kaštiliašu III	12	1463-1451
64	Aššur-šadûni		0 1443-1443	13		Ulam-Buriaš	12	1451-1439
65	Aššur-rabi I		10 1443-1433	14		Agum III	16	1439 -
66	Aššur-nâdin-aḥḫe I		10 1433-1424					-1423
67	Enlil-našir II		6 1424-1418	15		Kadašman-Harbe I	16	1423 -
68	Aššur-nêrârî II		7 1418-1411					-1407
69	Aššur-bêl-nišešu		9 1411-1403	16		Kara-indaš	16	1407 -
70	Aššur-rê'im-nišešu		8 1403-1395					-1391
71	Aššur-nâdin-aḥḫe II		10 1395-1385	17		Kurigalzu I	16	1391 -
72	Erîba-Adad I		27 1385 -					-1375
			-1358	18		Kadašman-Enlil I	15	1375 -1360
73	Aššur-uballiṭ I		36 1358 -	19		Burna-Buriaš II	27	1360-1333
				20		Kara-ḫardaš	0	1333-1333
			-1323	21		Nazi-Bugaš	0	1333-1333
74	Enlil-nêrârî		10 1323-1313	22		Kurigalzu II	25	1333 -
75	Arik-dên-ili		12 1313-1302					-1308
76	Adad-nêrârî I		32 1302-1271	23		Nazi-Maruttaš	26	1308-1282
77	Shalmaneser I		12 1271- 1259	24		Kadašman-Turgu	18	1282-1264
		580	18 1259 -	25		Kadašman-Enlil II	9	1264-1255
			-1242	26		Kudur-Enlil	9	1255-1246
78	Tukultî-Ninurta I		37 1242 -	27		Šagarakti-šuriaš	13	1246-1233
				28		Kaštiliašu IV	8	1233-1225
				29		Enlil-nâdin-šumi	1	1225-1224
				30		Kadašman-Harbe II	1	1224-1223
			-1206	31		Adad-šuma-iddina	6	1223-1217
79	Aššur-nâdin-apli		4 1206-1203	32		Adad-šuma-ušur	30	1217 -
80	Aššur-nêrârî III		6 1203-1197					

	93	Nebuchadnezzar II	43	605-562
	94	Amel-Marduk	2	562-560
	95	Neriglissar	4	560-556
	96	Nabonidus	17	556-539

The paleo-Assyrian (or Amorite) calendar was lunar while the calendar of Mari was lunisolar like the calendar of Babylon. The day 30 could be 29 or 1 (Sasson: 1984, 246-252). Synchronization among various calendars of the past is made difficult by these changing paradigms (unreported). For instance, on the death of Šamši-Adad I it is possible to get the following synchronisms among months of several different calendars³¹ (Charpin, Ziegler: 2003, 134-176, 260-262): the end of Šamši-Adad I's reign is dated³² 20 February 1679 BCE because this king died on 14/xii°/33. Consequently, the month VI in Mari coincides with the Assyrian month i* (because months VI to XII are dated “after the eponym Țab-šilla-Aššur”)³³.

TABLE 28

	BABYLONIAN	JULIAN		MARIOTE		AMORRITE	PALEO-ASSYRIAN	
X	Tebētu	1	January (<i>winter</i>)	xi°	<i>Abum (IV)</i>	xi*	<i>Abum</i>	<i>Ab šarrāni (v*)</i>
XI	Šabātu	2	February	xii°	<i>Hibirtum (V)</i>	xii*	<i>Tīrum</i>	<i>Hubur (vi*)</i>
XII	Addāru	3	March	i°	<i>Hubur (Hilib)</i>	i*	<i>Niqmum</i>	<i>Šip'im (vii*)</i>
I	Nisannu	4	April (<i>spring</i>)	ii°	<i>Kinūnum (VII)</i>	ii*	<i>Kinūnum</i>	<i>Qarrātim (viii*)</i>
II	Ayyaru	5	May	iii°	<i>Dagan (VIII)</i>	iii*	<i>Tamhīrum</i>	<i>Kanwarta (ix*)</i>
III	Simanu	6	June	iv°	<i>Līliatum (IX)</i>	iv*	<i>Nabrūm</i>	<i>Te'inātim (x*)</i>
IV	Du'ūzu	7	July (<i>summer</i>)	v°	<i>Bēlet-bīri (X)</i>	v*	<i>Mammītum</i>	<i>Kuzallu (xi*)</i>
V	Abu	8	August	vi°	<i>Kiskissum (XI)</i>	vi*	<i>Mana</i>	<i>Allanātim (xii*)</i>
VI	Ulūlū	9	September	vii°	<i>Ebūrum (XII)</i>	vii*	<i>Ayyarum</i>	<i>Bēlti-ekallim (i*)</i>
VII	Tašrītu	10	October (<i>autumn</i>)	viii°	<i>Urāḥum (I)</i>	viii*	<i>Niggalum</i>	<i>Ša sarratim (ii*)</i>
VIII	Araḥsamna	11	November	ix°	<i>Malkānum (II)</i>	ix*	<i>Maqrānum</i>	<i>Narmak Aššur (iii*)</i>
IX	Kisilimu	12	December	x°	<i>Laḥḥum (III)</i>	x*	<i>Du'uzum</i>	<i>Maḥḥurili (iv*)</i>

The Table 28 shows that: 1) the year of the Babylonian calendar was luni-solar and began on the 1st Nisannu; 2) the year of the Mariote calendar was also luni-solar but began on the 1st Urāḥum; 3) the year of the Amorrite calendar was lunar and began on the 1st Niqumum; 4) the year of the paleo-Assyrian calendar was also lunar but began on the 1st Šip'im. The presence or the absence of intercalation further complicates synchronizations among calendars³⁴. Mesopotamian chronologies are anchored by numerous synchronisms (highlighted and framed) and dated by astronomical phenomena. Despite some uncertainties, Hammurabi's reign can be anchored precisely in Šamši-Adad I's reign (1712–1680). Before King Ninurta-apil-Ekur (1192–1179), Assyrian eponyms started on 1st Šippu and from Ninurta-apil-Ekur they started on 1st Nisannu³⁵.

Δ = year (BCE) – 1088 (for example in 1679 BCE: $\Delta = 1679 - 1088 = 591$)

Julian day = $\Delta \times 365.2422 - [[\Delta \times 1.0307]] \times 354.36 + 13 + \text{Assyrian day}$

[[figure]] = figure without its decimal value. For example [[3.17]] = 3

1 solar year = 365.24219 days; 1 lunar year = 354.36706 (=12 \times 29.530588) days

1.0307 = (1 solar year)/(1 lunar year)

Julian day = day ranked inside the Julian year. For example: 3 March = (31) + (28) + 3 = 62

Assyrian day = day ranked inside the Assyrian year: 1 Kalmartu = (29.5) + (29.5) + 1 = 60

For example, if we want to know which day was the 1st Šippu in the year 1679 BCE:

$\Delta = 1679 - 1088 = 591$; $\Delta \times 1.0307 = 609.14$; $[[\Delta \times 1.0307]] = 609$; Assyrian day = 1.

Julian day = $\Delta \times 365.2422 - [[\Delta \times 1.0307]] \times 354.36 + 13 + \text{Assyrian day}$

Julian day = $52.9 + 13 + 1 = 67 = (31) + (28) + 8 = 8$ March (3rd month).

Consequently: 1 Šippu = 8 March in 1679 BCE (-1678*), or 7 March according to astronomy³⁶.

³¹ The Šamši-Adad calendar seems to have been imposed on Upper Mesopotamia by this king after his successful conquests (2021: Ziegler, 117-130).

³² An exorcist priest (*wašipum*) is consulted on 11/xii°/33 and the oil for the offering king's burial came on 16/xii°/33. In 1679 BCE, 1st Nisan is dated April 5, 1st Tishri on September 30 and 1st Šip'im March 7. It is interesting to note that the year 33 of Šamši-Adad I started with a total lunar eclipse (bad omen).

³³ The fall of Larsa is dated [1-6]/XII/30 of Hammurabi and matches the [1-6]/VII/60 of Rim-Sin I, because Zimri-Lim congratulated Hammurabi for his having taken Larsa in his letter dated 7/VII/12 (*ARM XXV 9*).

³⁴ For instance, the year 1 of Zimri-Lim has an intercalary month (*xii°b*) but other years are strangely irregular: 2:*xii°b*; 5:*ii°b*, *iii°b*, *v°b*; 8:*i°b*; 10:*v°b*; 11:*v°b* (Heimpel: 2003, 54-56). On the other hand, the feast of Ištar seems to be celebrated without intercalation because it is celebrated month *xi* in year 1 of Zimri-Lim, month *ix* in years 6-8 and month *viii* in year 12, which implies a lag of about 3 months on 12 years, indicating a lack of intercalation (at least in one of the two calendars).

³⁵ In 1192 BCE the 1st Šippu corresponded exactly to the 1st Nisannu, which prompted King Ninurta-apil-Ekur to start the eponyms on the 1st Nisannu (like the Babylonians) after his coming from Babylon and his conquest of Assyria (Grayson: 2000, 162).

³⁶ <https://promenade.imcce.fr/fr/pages4/441.html> (1st astronomical lunar crescent = 1st day after the new moon).

TABLE 29

BCE	month	Assyrian	[A]	[B]	[C]	[D]	King / eponym
1680	1	IV xi° X	6	32	16	46	Adad-bāni
	2	V xii° XI					
	3	VI i° XII		33			Tab-šilli-Aššur (N°199)
	4	VII ii° I			17	47	
	5	VIII iii° II					
	6	IX iv° III					
	7	X v° IV					
	8	XI vi° V					
	9	XII vii° VI					
	10	I viii° VII	7				
	11	II ix° VIII					[A] Yasmah-Addu king of Mari
	12	III x° IX					[B] Šamšî-Adad I king of Assyria (n°39)
1679	1	IV xi° X					[C] Hammurabi king of Babylon
	2	V xii° XI		0			[D] Rîm-Sîn I king of Larsa
	3	VI i° XII		1			after Tab-šilli-Aššur
	4	VII ii° I			18	48	
	5	VIII iii° II					
	6	IX iv° III					
	7	X v° IV					
	8	XI vi° V					[A] Zimri-Lim king of Mari
	9	XII vii° VI					[B] Išme-Dagan I king of Assyria (n°40)
	10	I viii° VII	1				Ennam-Aššur (N°200)
	11	II ix° VIII					
	12	III x° IX					
1678	1	IV xi° X					(Feast of Ištar in month xi° Ab Šarrani)
	2	V xii° XI					
	3	VI i° XII		2			
	4	VII ii° I			19	49	Aššur-emūqī (N°201)
	5	VIII iii° II					

If we compare the reign of Šamšî-Adad I (1712-1680), obtained from the Assyrian King List, with that calculated from the reign of Ammisaduqa, and compare the difference (#) between the value given by the four chronologies in accordance with the Venus cycle, we can see that the agreement is perfect with the Ultra-Low Chronology, but there is a 96-year disagreement with the Middle Chronology.

Chronology (BCE):	AKL	Ultra-Low	#	Low	#	Middle	#	High	#
Fall of Ur		1912		1944		2008		2064	
Reign of Šamšî-Adad I	1712-1680	1712-1680	0	1745-1712	32	1809-1776	96	1865-1832	152
Reign of Hammurabi		1697-1654		1729-1686		1793-1750		1849-1806	
Reign of Ammisaduqa		1551-1530		1583-1562		1647-1626		1703-1682	
Fall of Babylon		1499		1531		1595		1651	

HOW TO ASTRONOMICALLY DATE THE FIRST FALL OF BABYLON: 1595 OR 1499 BCE?

The astronomical tablet: *Enuma Anu Enlil 63* (Reiner, Pingree: 1975, 17-62), copied in 7th century BCE, describes the setting and rising of Venus during the 21-year reign of Ammisaduqa:

Year 1 inferior Venus sets on Šabatu 15 and after 3 days rises on Šabatu 18
Year 2 superior Venus vanishes E. on Arahsamnu 21 and after 1 month 25 days appears W. on Tebetu 16
Year 3 inferior Venus sets on Ululu 29 and after 16 days rises on Tashritu 15
Year 4 superior Venus vanishes E. on Dumuzi 3 and after 2 months 6 days appears W. on Ululu 9
Year 5 inferior Venus sets on Nisan 29 and after 12 days rises on Ayar 11
Year 5 superior Venus vanishes E. on Kislimu 27 and after 2 months 3 days appears W. on Šabatu 30
Year 6 inferior Venus sets on Arahsamnu 28 and after 3 days rises on Kislimu 1
Year 7 superior Venus vanishes E. on Abu 30 and after 2 months appears W. on Tashritu 30
Year 8 inferior Venus sets on Dumuzi 9 and after 17 days rises on Dumuzi 26
Year 8 superior Venus vanishes E. on Adar 27 and after 2 months 16 days appears W. on Simanu 13
Year 9 inferior Venus sets on Adar 12 and after 2 days rises on Adar 14
Year 10 superior Venus vanishes E. on Arahsamnu 17 and after 1 month 25 days appears W. on Tebetu 12
Year 11 inferior Venus sets on Ululu 25 and after 16 days rises on II Ululu 11
Year 12 superior Venus vanishes E. on Ayar 29 and after 2 months 6 days appears W. on Abu 5
Year 13 inferior Venus sets on Nisan 25 and after 12 days rises on Ayar 7
Year 13 superior Venus vanishes E. on Tebetu 23 and after 2 months 3 days appears W. on Adar 26
Year 14 inferior Venus sets on Arahsamnu 24 and after 3 days rises on Arahsamnu 27
Year 15 superior Venus vanishes E. on Abu 26 and after 2 months appears W. on Tashritu 26
Year 16 inferior Venus sets on Dumuzi 5 and after 16 days rises on Dumuzi 21

Year 16 superior Venus vanishes E. on Adar 24 and after 2 months 15 days appears W. on Simanu 9
Year 17 inferior Venus sets on Adar 8 and after 3 days rises on Adar 11
Year 18 superior Venus vanishes E. on Arahsammu 13 and after 1 month 25 days appears W. on Tebetu 8
Year 19 inferior Venus sets on II Ululu 20 and after 17 days rises on Tashritu 8
Year 20 superior Venus vanishes E. on Simanu 25 and after 2 months 6 days appears W. on Ululu 1
Year 21 inferior Venus sets on Nisan 22 and after 11 days rises on Ayar 3
Year 21 superior Venus vanishes E. on Tebetu 19 and after 2 months 3 days appears W. on Adar 22

Although the interpretation of this astronomical tablet is difficult (Gurzadyan: 2003, 13-17), because much data appears to have been poorly copied, the fall of Babylon can be dated to the period 1500-1700 BCE only according to four possibilities (Gurzadyan: 2000, 175-184). If we compare the observation date of the rising of Venus in Year 1 of Ammisaduqa (18 Shabatu) with the value given by astronomy, there is a difference of several days, from 13 days (ULC) to 3 days (HC), but the observed date is after the calculated date only for the Ultra-Low Chronology (the observed date cannot be before the calculated date).

Chronology (BCE):	ULC	#	LC	#	MC	#	HC	#
Fall of Ur	1912		1944		2008		2064	
Reign of Hammurabi	1697-1654		1729-1686		1793-1750		1849-1806	
Reign of Ammisaduqa	1551-1530		1583-1562		1647-1626		1703-1682	
Venus rises Year 1 (<i>calculated</i>)	14-Feb 1549	0	24-Feb 1581	0	14-Mar 1645	0	31-Mar 1701	0
Shabatu 18 Year 1 (<i>observed</i>)	27-Feb 1549	+13	19-Feb 1581	-5	9-Mar 1645	-6	28-Mar 1701	-3
Fall of Babylon	1499		1531		1595		1651	

Despite the excellent agreement (18 Shabatu is to be replaced by 8 Shabatu) with the fall of Babylon in 1499 BCE (Gasche: 2003, 205-221) the ULC chronology was rejected. It is possible to reconstruct the 25 months of the astronomical tablet and to compare them with those of the inscription. Unfortunately, no solution, depending on the selected year, gives a perfect fit. Consequently, the dating method based on the Venus cycle is used. Indeed, we can see that years 5, 13 and 21 (with a periodicity of 8 years) give the same values with a 4-day shift, which comes from the cycles of the moon and Venus. If an astronomical phenomenon occurs at the same time each year it will be noted with an advance of 2 days³⁷ at the end of an 8-year cycle. The same pattern repeats a 1-day shift every 8 years because 8 sidereal orbital periods of the Earth (365.25636 days - slightly longer than the tropical year) is 2922.06 days, and 13 sidereal orbital periods of Venus (224.701 days) is 2921.11 days. Thus, after this period both Venus and Earth have returned to very nearly the same point (1 day) in each of their respective orbits. If the Sun and Venus are perfectly aligned (Transit of Venus), the heliacal rising and setting of Venus occur on the same dates shifted by 2 or 3 days every 8 years. A transit of Venus³⁸ across the Sun takes place when this planet passes directly between the Sun and Earth (or another planet), becoming visible against (and hence obscuring a small portion of) the solar disk. During a transit, Venus can be seen from Earth as a small black disk moving across the face of the Sun. The duration of such transits is usually measured in hours (the transit of 2012 lasted 6 hours and 40 minutes). A transit is like a solar eclipse by the Moon. While the diameter of Venus is more than 3 times that of the Moon, Venus appears smaller, and travels more slowly across the face of the Sun, because it is much farther away from Earth. Transits of Venus are among the rarest of predictable astronomical phenomena. They occur in a pattern that repeats itself every 243 years, with pairs of transits 8 years apart separated by long gaps of 121.5 years and 105.5 years³⁹. Given that the astronomical data during Ammisaduqa's 21-year reign over the period of 8 years are shifted 4 days, instead of 2 or 3 when the transit of Venus exactly occurs, it means that it was close to this transit. Transits of Venus are as follows⁴⁰ (1550-1529* = 1551-1530 BCE):

Date*	greatest (UT)	Ammisaduqa	Date*	greatest (UT)	Ammisaduqa
-1892* May 21	19:26		-1528* Nov 23	12:51	1550-1529* (ULC)
-1884* May 19	12:30		-1520* Nov 20	23:44	
-1763* Nov 20	22:56		-1512* Nov 18	12:51	
-1755* Nov 18	12:18		-1406* May 23	05:57	
-1649* May 23	00:45		-1398* May 20	23:03	
-1641* May 20	18:02	1646-1625* (MC)	-1277* Nov 22	00:09	

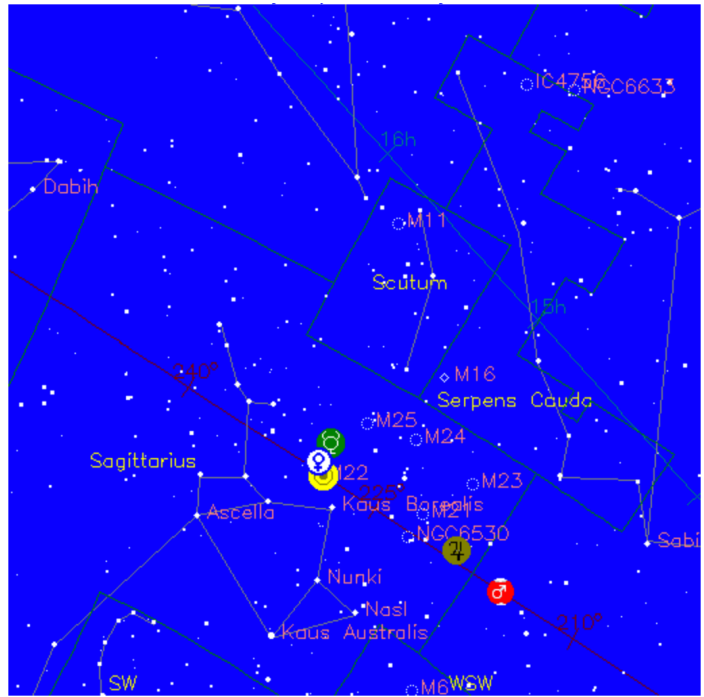
³⁷ 2 days = 8 x 365.24519 days - (8 x 12 + 3) x 29.530588 days (= -1.6 days)

³⁸ http://en.wikipedia.org/wiki/Transit_of_Venus

³⁹ Venus, with an orbit inclined by 3.4° relative to the Earth's, usually appears to pass under (or over) the Sun at inferior conjunction. A transit occurs when Venus reaches conjunction with the Sun at or near one of its nodes—the longitude where Venus passes through the Earth's orbital plane (the ecliptic)—and appears to pass directly across the Sun. Although the inclination between these two orbital planes is only 3.4°, Venus can be as far as 9.6° from the Sun when viewed from the Earth at inferior conjunction. Since the angular diameter of the Sun is about 0.5° degree, Venus may appear to pass above or below the Sun by more than 18 solar diameters during an ordinary conjunction.

⁴⁰ <http://eclipse.gsfc.nasa.gov/transit/catalog/VenusCatalog.html>

The best fit is with the Middle chronology, but it contradicts the chronology obtained from the Assyrian King List. The fit with the Ultra-Low Chronology is good because there is only a shift of an 8-year cycle (-1528* Nov 23 instead of -1520* Nov 20). We can check the deviation of alignment between Venus and the sun with respect to its position during the transit of Venus in -1528*, when this planet “crossed through the sun” (see image opposite). The observations were performed in Babylon⁴¹. Teije de Jong regards Šamši-Adad I's death, dated 1776 BCE +/- 10 years indirectly by dendrochronology, instead of 1680 BCE, as an absolute date (De Jong: 2013, 147-163; 2013b, 366-370; 2017, 127-143). In fact, dendrochronological dating of the Acemhöyük palace (near Kaniš) requires locating the death of Šamši-Adad I after 1752 BCE (Michel, Rocher: 2000, 111-126) eliminating the Middle Chronology which dates this reign 1809-1776 BCE, at least 24 years too early (in 1776 BCE). Actually, the best way for dating the fall of Babylon is to use a couple of well identified lunar eclipses (Banjević: 2006, 251-257).



A tablet of astronomical omens (Enuma Anu Enlil 20) mentions a lunar eclipse, dated 14 Simanu (month III), at the end of the reign of Šulgi⁴² (14/III/48) and another (Enuma Anu Enlil 21) mentions a (total) lunar eclipse⁴³, dated 14 Addaru (month XII), at the end of the Ur III dynasty which ended with the reign of Ibbi-Sîn (14/XII/24). These two lunar eclipses were separated by 42 years of reign (= 9 years of Amar-Sîn + 9 years of Šu-Sîn + 24 years of Ibbi-Sîn) and 9 months (= month XII – month III). Over the period 2200-1850 there was only one pair of eclipses⁴⁴, spaced by 42 years and 9 months, matching the description of astronomical omens (Huber: 2000, 159-176).

TABLE 30

BCE	month		King
1954	1	X	47 Šulgi (Ur III n°2) (1/I/48 = 7 April)
	2	XI	
	3	XII	
	4	I	48 Total lunar eclipse dated 14/III/48 (28 June)
	5	II	
	6	III	
	7	IV	0 Amar-Sîn (Ur III n°3)
	8	V	
	9	VI	
	10	VII	
	11	VIII	
	12	IX	
1953	1	X	1
	2	XI	
	3	XII	
	4	I	
	5	II	
	6	III	
	7	IV	
	8	V	

BCE	month		King	
1912	1	X	23 Ibbi-Sîn (Ur III n°5)	
	2	XI		
	3	XII		
	4	I	24 (1/I/24 = 2 April)	
	5	II		
	6	III		
	7	IV		
	8	V		
	9	VI		
	1911	10	VII	Total lunar eclipse dated 14/XII/24 (6 March)
		11	VIII	
		12	IX	
1		X		
2		XI	25 Fall of Ur (see SKL IB)	
3		XII		
4		I		
5		II		
6	III	12 Išbi-Erra (Isin I n°1)		
7	IV			
8	V			

⁴¹ <http://www.fourmilab.ch/cgi-bin/Yourhorizon>

latitude 32°33' North; longitude 44°26' East; Universal Time (UT): -1528-11-23 12:51; Azimuth: 240°; Field of view: 45°. We notice that on 23 November 1529 BCE the planets Venus and Mars were aligned.

⁴² The name of this king of Ur does not appear in the tablet (Rochberg-Halton: 1988, 189,248) but the description of the lunar eclipse allows to identify Šulgi (Banjević: 2006, 253).

⁴³ The series was probably compiled in its canonical form during the Kassite period but there was certainly some form of prototype in the Old Babylonian period. Only total eclipses of the moon were perceived as bad omens for 2 reasons: total darkness and dark red color were symbols of death. Total sun eclipses at a given location are rare (on average 1 per century).

⁴⁴ http://xjubier.free.fr/en/site_pages/lunar_eclipses/5MCLE/xLE_Five_Millennium_Canon.html

Before 2000 BCE: <http://www.eclipsewise.com/lunar/LEcatalog/LEcatalog.html>

Duration (LT) = TD of greatest eclipse (UT) +/- (Total duration)/2 + 2:04 (= [24:00/360]x30.97)

The statistician Peter J. Huber, who carried out an in-depth study of these two lunar eclipses, refused the identification proposed by Gasche *et al* (1998) who had fixed these two lunar eclipses in 1954 BCE and 1912 BCE (-1911*). According to Huber, the two lunar eclipses in 2160 BCE and 2053 BCE confirmed (*sic*) Sollberger's relative chronology of the Ur III dynasty. He wrote (Huber: 1999/2000, 59-70):

Only two omens permit a relatively certain identification with specific historical events: EAE 20-III is generally taken to refer to the death of Šulgi (cf. Sollberger 1954-56, p. 22), and EAE 21-XII refers to the end of the dynasty. These two eclipses were already discussed in Huber (1987a).

Tablet 20, Month III.

(1) If an eclipse occurs on the 14th day of Simānu, and the god in his eclipse becomes dark on the side east above and clears on the side west below.(The eclipse) “pulls out” (*issuh*) the first watch and touches the middle watch (so Recension A; B has: “equals” (*imšul*) the first watch. The king of Ur, his son will wrong him, and the son who wronged his father, Šamaš will catch him. He will die in the mourning place of his father. The son of the king who was not named for kingship will seize the throne. -2094JUL25: mismatch day (...)

Tablet 21, Month XII.

(2) If an eclipse occurs on the 14th day of Addaru, and it begins in the south and clears in the north; it begins in the evening watch and clears in the morning watch. You observe his eclipse and bear in mind the south. The prediction is given for the king of the world: The destruction of Ur. [. will be] destroyed, variant: an order to destroy its city walls will be given. While the barley is being heaped up, the devastation of the city and its environs (will occur).

-2052APR13: mismatch day, end (0.4 watches), exit (10°).

This eclipse (2) must have occurred in the last month of Ibbi-Sîn's second-but-last year (year 23). In any case, it follows from the date of Šulgi's death and the regnal year counts that the distance between the two eclipses (1) and (2) must be 42 years. There is a single pair of eclipses having this distance and matching the dates required by the month-lengths: (-2094JUL25 and -2052APR13). There is one other pair having the required distance of 42 years: (-2018JUN26 and -1976MAR15), but it disagrees with the month-length data. According to calculation for -2052, the eclipse ends in the second rather than in the third watch, as stated in the omen. In fact, the calculated duration of the eclipse (3.08h) is less than the duration of a watch (3.88h).

The nearest compatible eclipses lasting a watch of the night or more are -2062MAY4 and -2015APR24. I conjecture that either the description of the end of the eclipse is in error or perhaps more likely that the estimated timing of the eclipse is inaccurate. The eclipse is one of the few among our identifications that is not total (magnitude 0.63). This does not necessarily speak against the identification (cf. the comments near the beginning of Section 4) but perhaps one might argue that an eclipse predicting the downfall of the “king of the world”, and hence supposedly affecting all lands, ought to be total. Gasche *et al.* (1998, p. 75) claim to have found a pair of eclipses (-1953JUN27 and -1911MAR16) that “fit the ancient descriptions at a higher confidence level” than the (-2093, -2052) pair. My computer search for eclipses matching the Simanu and Addaru omens had missed their pair. I was therefore puzzled and re-checked. The problem with the -1953 eclipse is that it begins too early: according to calculation the moon rises totally eclipsed at 19.00 local time (a few minutes before sunset). The Babylonian first watch of the night begins at sunset not at a fixed 18.00, as the authors intimate; 18.00-22.00 is valid at the equinox is only.

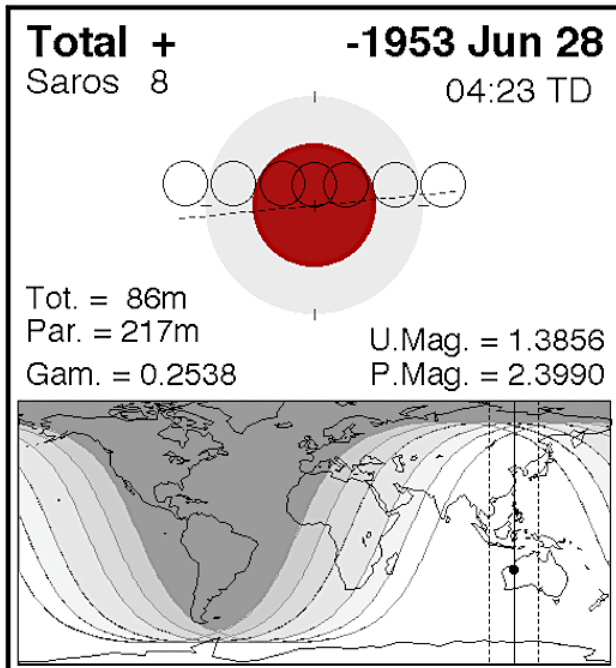
Huber's technical comments are impressive, yet they contain errors that are easy to detect. For example, the two eclipses proposed (the eclipse of 25 July -2094* [month IV year 48 of Šulgi] and the eclipse of 13 April -2052* [month I year 24 of Ibbi-Sîn]) are separated by 41 years and 9 months, not by 42 years and 9 months as required by the chronology of the Sumerian King list. This delay of 1 year comes from the change of the date marking the end of the reign of Ibbi-Sîn, because Huber replaced Year 24 month XII from the text by a hypothetical Year 23 month I, to justify his calculation. Moreover, the lunar eclipse of 25 July -2052* was partial, as Huber himself acknowledges, which prevents it from being considered as a bad omen concerning the death of the king. The explanations for rejecting the lunar eclipse of 28 June -1953* are not serious: 1) Huber's computer first failed to find the pair of eclipses proposed by Gasche *et al.* (this excuse is amusing), 2) then when it found it, Huber notes that the first watch of the night (18:00-22:00) starts rigorously at 18:00 (LT) only at the equinoxes, which would disqualify the eclipse of 28 June -1953*. Again, this explanation is not serious, because according to an astronomy software⁴⁵ the sunrise on 28 June -1953* started around 4:54 (LT) and the sunset started around 18:09 (LT). This eclipse lasted approximately from 16:03 to 19:41⁴⁶ (LT), which covered part of the first watch of the night (from 19:09 to 22:48). Huber's

⁴⁵ <https://promenade.imcce.fr/fr/pages5/585.html>

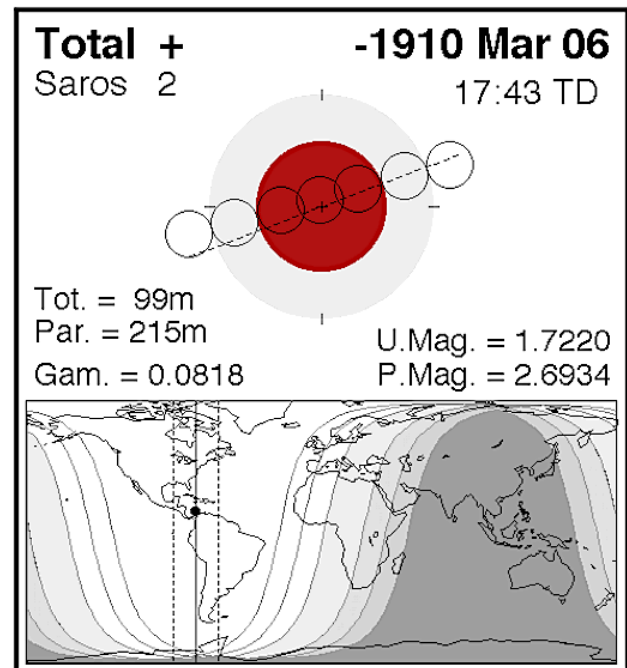
latitude 32°33' North; longitude 44°26' East; LT (Local Time) = UT (Universal Time) + 2:04.

⁴⁶ http://xjubier.free.fr/en/site_pages/lunar_eclipses/5MCLE/xLE_Five_Millennium_Canon.html

rejection of the total lunar eclipse of 28 June -1953* (1954 BCE) is therefore not justified, as he himself admits, his translation of the text of this eclipse is hypothetical. The date of 6 March (in 1911 BCE) of the second lunar eclipse corresponds exactly to the month of Simanu (month XII). Moreover, this eclipse was total which corresponds to a bad omen of death.



Five Millennium Canon of Lunar Eclipses (Espenak & Meeus)



Five Millennium Canon of Lunar Eclipses (Espenak & Meeus)

The translation of the text for the second eclipse poses no problem since it says: *If an eclipse occurs on the 14th day of Addaru, and it begins in the south and clears in the north; it begins in the evening watch and clears in the morning watch.* The total lunar eclipse of 6 March -1910* (1911 BCE) fits exactly with this description. The penumbra of this eclipse started around 5:27 (LT), before sunrise around 5:52 (LT), and ended around 10:11 (LT). The beginning of the eclipse (penumbra) therefore started during the 3rd and last evening watch and ended during the morning watch (first watch).

The result is irrefutable. There is no total lunar eclipse according to the Low, Middle, and High chronology, neither at the end of Šulgi's reign, nor at the end of Ibbi-Sîn's reign. In contrast, with the Ultra-Low chronology there was a total lunar eclipse (bad omen) at the end of each of these two reigns, the first one on 28 June 1954 BCE (27/06/-1953*) and the second eclipse on 6 March 1911 BCE (06/03/-1910*).

TABLE 31

Fall of Babylon (Venus Tablet)	Chronology	Date (BCE)	Lunar eclipse	Date (BCE)	Lunar eclipse
		14/III/48	Last year of Šulgi	14/XII/24	Fall of Ur III
1651 BCE	High	28/06/2106	(27/08/2106)	06/03/2063	-
1595 BCE	Middle	08/07/2050	-	08/03/2007	-
1531 BCE	Low	22/06/1986	-	28/02/1943	-
1499 BCE	Ultra-Low	28/06/1954	28/06/1954	06/03/1911	06/03/1911

Of all the eclipses dated according to the EAE 20 and EAE 21 tablets, only the Ultra-Low chronology perfectly matches the astronomical data. Even the first lunar eclipse dated 27/08/2106 BCE (High Chronology) does not correspond to the date on the tablet, since there is a gap of two months. More seriously, this eclipse could not be observed in Babylon because the maximum of the eclipse occurred at 10:21 (Local Time) whereas lunar eclipses can only be seen during the night (between 18:00 and 6:00 in local time). For example, the total lunar eclipse dated 06/27/1954 had a magnitude of 1.39 and was seen in the morning in Babylon from 5:43 to 7:09 (LT), and the total lunar eclipse dated 06/03/1911 had a magnitude of 1.72 and was seen in the evening in Babylon from 18:57 to 20:35 (LT). Therefore, the confirmation by astronomy of the two lunar eclipses, dated at the end of the reign of Šulgi and at the end of the reign of Ibbi-Sîn (marking the fall of Babylon), definitively eliminates the other three chronologies (High, Middle and Low). Despite the excellent agreement with the reign of Šamšî-Adad I (1712-1680) the Ultra-Low chronology is considered too low compared to Kassite and Hittite chronologies. This criticism is unfounded (Gasche: 2003, 205-221) because these chronologies are very approximate: most durations of reigns are

unknown, and they have no link with any astronomical events. The lunar eclipse dated: *Year 38 that Babylon was resettled (...) Month of Abu (July-August), Day 10*, mentioned in the economic texts from Tell Muhammad (Gasche, Armstrong, Cole: 1998, 86) confirms definitively the Ultra-Low Chronology (the lunar eclipse dated 16/09/1614 is not suitable because there is a difference of two months with the date, month V, mentioned in the text). In addition, the lunar eclipse was total since it is an economic text (Day 10 is a mistake because eclipses always take place on the 14th-15th of the month).

TABLE 32

Chronology (BCE):	Year	Ultra-Low		Low		Middle		High	
Fall of Babylon	1	1499		1531		1595		1651	
Date 14/V/38	38	19/07/1462		11/07/1494		29/07/1558		18/07/1614	
Lunar eclipse	38	19/07/1462	T	-		-		(16/09/1614)	T

Total lunar eclipses have played a major role in Babylonian astrology because they were often associated with a bad omen such as the death of the king, an epidemic or a war that broke out in the country. These eclipses can be used to establish absolute dates, when they are well referenced, which is unfortunately rarely the case. For example, a tablet of Mari written by Ašqūdum (eponym N°193 in 1686 BCE) mentions a total lunar eclipse (Heimpel: 2003, 176-177,209-210):

To my lord (Yasmah-Addu) speak! Your servant La’um (says), “The diviner Ašqūdum came from before the king (Šamši-Adad I). Where he talked, he told many things. [So] they said to me. He denounced me, Sin-Iddinam [and] Šamaš-Tillasu before the king. Nobody is safe in his hands. Once I arrive before my lord, I will place a full report before my lord.”

To my lord speak! Your servant Ašqūdum (says), “An eclipse of Sin (the moon) occurred on the 14th day (month?). And the occurrence of that eclipse bodes ill. I made extispicies for the well-being of my lord and the well-being of the upper district, and the extispicies were sound. Now my lord [must] have (extispicies) done there for [his] well-being and the well-being of the city of Mari, and the heart of my lord need not be concerned. My lord must send [me] a response to my tablet, [and my heart] will calm!”

All the letters written by Ašqūdum show that he had been a diviner in Šamši-Adad's service and that he pursued his career during the reign of Yasmah-Addu. During the first 8 years of Zimri-Lim. Ašqūdum must have played an important role in Yasmah-Addu's career since Šamši-Adad I appointed him as eponym (N°193) at the beginning of his reign in 1686 BCE. Šamši-Adad I became king of Mari and reigned for 10 years, after the death of Sumu-Yamam, under the name of Samsi-Addu. He then named his son Yasmah-Addu as his successor (Ziegler, Charpin: 2001, 496-501).

TABLE 33

KING OF MARI	reign	KING OF ASSYRIA	reign	KING OF BABYLON	reign
(Yaggid-Lîm) ⁴⁷	1740-1724	Ērišu II (n°38)	1722-1712	Apil-Sîn	1735-1717
Yahdun-Lîm	1716-1699	Šamši-Adad I (n°39)	1712 -	Sîn-muballit	1717 -
Sumu-Yamam	1699-1697			-1697	
Samsi-Addu	1697 -1687			Hammurabi	1697 -
Yasmah-Addu	1687- 1680		-1680		
Zimri-Lim	1680-1667	Išme-Dagan I (n°40)	1680-1670		-1654

The total eclipse of the moon mentioned by Ašqūdum, which could have been a bad omen for the king and the city of Mari, must be located at the beginning of the reign of Yasmah-Addu for two reasons: 1) Šamši-Adad having died in 1680 BCE the king concerned must have been Yasmah-Addu (at the beginning of his reign) or Šamši-Adad himself; 2) the total visible eclipses⁴⁸ of the moon occurring on average at least once every 3 years, only those that seemed “harmful” (bad omen) were mentioned.

TABLE 34

BCE	Date (1st eclipse)	Mag. max	duration (LT) visible in Mari	Date (2nd eclipse)	Mag. max	duration (LT) visible in Mari
1691	27/10/-1690*	1.59	3:58-5:28			
1687	19/02/-1686*	1.72	5:25-7:03	14/08/-1686*	1.48	(not visible)
1680	01/04/-1679*	1.42	6:02-6:09	25/09/-1679*	1.39	(not visible)

The year 1687 BCE was marked by two total lunar eclipses (but only one was visible in Mari), which could have been a very bad omen for the King of Mari. However, this was not the case because of the good

⁴⁷ Yaggid-Lîm was probably king of Terqa and was succeeded by Yahdun-Lîm (Anbar: 1991, 31-40; Ziegler: 2001, 496-501,750).

⁴⁸ <https://eclipse.gsfc.nasa.gov/LEcat5/LE-1699--1600.html> Some total lunar eclipses, which occurred during the day, were not visible in Mari (latitude 40°53' E, longitude 34°33' N), <https://promenade.imcce.fr/fr/pages5/585.html>

omens taken from the liver. A comparison of all of the reigns of the time shows that Šamšī-Adad I was replaced by his son, Yasmah-Addu, on Mari's throne at the end of year 1687 BCE and then named Ašqūdum as eponym in the beginning of the year 1686 BCE.

TABLE 35

BCE	month				[A]	[B]	[C]	[D]	King / eponym						
1688	10	<i>I</i>	<i>x</i> °	VII	9	25	9	39							
	11	<i>II</i>	<i>xi</i> °	VIII											
	12	<i>III</i>	<i>xii</i> °	IX											
1687	1	<i>IV</i>	<i>i</i> °	X						26	10	40	[A] Šamšī-Adad king of Mari [B] Šamšī-Adad I king of Assyria (n°39) [C] Hammurabi king of Babylon [D] Rīm-Sîn I king of Larsa		
	2	<i>V</i>	<i>ii</i> °	XI											
	3	<i>VI</i>	<i>iii</i> °	XII											
	4	<i>VII</i>	<i>iv</i> °	I						10				40	[A] Šamšī-Adad king of Mari [B] Šamšī-Adad I king of Assyria (n°39) [C] Hammurabi king of Babylon [D] Rīm-Sîn I king of Larsa
	5	<i>VIII</i>	<i>v</i> °	II											
	6	<i>IX</i>	<i>vi</i> °	III											
	7	<i>X</i>	<i>vii</i> °	IV											
	8	<i>XI</i>	<i>viii</i> °	V											
	9	<i>XII</i>	<i>ix</i> °	VI											
	10	<i>I</i>	<i>x</i> °	VII	10	40	[A] Šamšī-Adad king of Mari [B] Šamšī-Adad I king of Assyria (n°39) [C] Hammurabi king of Babylon [D] Rīm-Sîn I king of Larsa								
	11	<i>II</i>	<i>xi</i> °	VIII	0										
	12	<i>III</i>	<i>xii</i> °	IX	0			[A] Yasmah-Addu king of Mari							
1686	1	<i>IV</i>	<i>i</i> °	X	27			11	41		Ašqūdum (N°193)				
	2	<i>V</i>	<i>ii</i> °	XI											
	3	<i>VI</i>	<i>iii</i> °	XII											
	4	<i>VII</i>	<i>iv</i> °	I											
	5	<i>VIII</i>	<i>v</i> °	II											
	6	<i>IX</i>	<i>vi</i> °	III											
	7	<i>X</i>	<i>vii</i> °	IV											
	8	<i>XI</i>	<i>viii</i> °	V											
	9	<i>XII</i>	<i>ix</i> °	VI											
	10	<i>I</i>	<i>x</i> °	VII		1	41			Ašqūdum (N°193)					
	11	<i>II</i>	<i>xi</i> °	VIII		1									

CHRONOLOGY OF MESOPOTAMIAN REIGNS OVER THE PERIOD 2340–1912 BCE

The period 2243-1912 BCE has only one reign dated by astronomy, the one of Šulgi (2002–1954). The chronology of the Sumerian kings starting from Sargon of Akkad (2243–2187) can be reconstructed exactly because the durations of their reigns are all known through several King Lists and Chronicles (Pruzsinsky: 2009, 111–124). The different versions of the Sumerian King List (SKL) have many variants (Table 36), but the SKL WB list is (almost) complete and its reign durations are correct and reliable (durations in square brackets come from the other lists and are consistent with the total duration of 181 years), except for Utu-ḫegal's reign, which has a duration of 420½ years! (Mahieu: 2019, 1–25; 2020, 219-221):

TABLE 36

Sumerian King List	SKL WB	USKL	SKL TL	SKL L ₁ +N ₁	SKL IB	SKL BT	SKL	Reign
Sargon (Akkad)	56	40	54	55	53+x		56	2243-2187
Rimuš	9	8	7	15	7		9	2187-2178
Maništusu	15	15		7	[x]		15	2178-2163
Narām-Sîn	[37]	54½		56	37		37	2163-2126
Šar-kali-šarri	[25]	21+x		25	23+x		25	2126-2101
Irgigi/ Imi/ Nanum/ Ilulu	[3]	[x]			[3]	3	3	2101-2098
Dudu	21				[x]		21	2098-2077
Šu-Turul	15				18		15	2077-2062
Total (11 kings):	181				181		181	
Ur-nigina (Uruk IV)	7				3	7?	7	2062-2055
Ur-gigira	6				7		6	2055-2049
Kuda	6	5			6		6	2049-2043
Puzur-ilî	5				20		5	2043-2038
Ur-Utu	6				6		6	2038-2032
Total (5 kings):	30				43*		30	
Utu-ḫegal (Uruk V)	7x60	7	7½		26½		*	2032-2020
Sumerian King List	SKL WB	USKL	SKL TL	UIKL	SKL P ₅	SKL Su ₃₋₄		
Ur-Namma (Ur III)	18	18	10[+x]	18	18	18	18	2020-2002
Šulgi	48		48	48	58	48	48	2002-1954
Amar-Sîn	9		9	9	9	25	9	1954-1945
Šu-Sîn	9		9	9	7	16	9	1945-1936
Ibbi-Sîn	24		23 ⁷	24	25	15	24	1936-1912
Total (5 kings):	108				117	123	108	

The Utu-ḫegal reign of 7x60 years and 7 days in the SKL WB list is obviously an error. It should probably be 7 years and 7 days, as this reign corresponds to the 7 years, 6 months and 5 days of the SKL TL list. However, the 26 years, x+2 months and 15 days in the SKL IB list prove that there is an anomaly in this reign. Moreover, reign durations are always whole values. There are never durations of less than 1 year. For example, the four kings: Irgigi/ Imi/ Nanum/ Ilulu, reigned for 3 years which implies that the reign of two or three kings was less than 1 year and was therefore included in the months of accession (before the 1st Nisan) of the following king (or kings). A duration of the reign in months and days probably indicates a co-regency between Utu-ḫegal and Ur-Namma of x years, 7 months and a few days. The contemporaneity of Ur-Namma and Utu-ḫegal is indicated by several data, for instance “Ur-[Namma], military go[vern]or of Ur,” recognises Utu-ḫegal as his overlord (RIME 2.13.6.2001). Two inscriptions of Utu-ḫegal mention “the man of Ur” in a conflict with Lagaš (RIME 2.13.6.1, 3) and might concern Ur-Namma of Ur. It is still unclear at which moment during or after Utu-ḫegal’s reign, Ur-Namma assumes power. The only way to check the accuracy of this chronology is to use the synchronisms (highlighted in grey) with the chronology of the kings of Ebla and Mari, which can be reconstructed exactly using the durations of the reigns, which are all known. The Mesopotamian chronology can therefore be reconstructed until 2340 BCE. The chronology of this period confirms that Sargon destroyed the city of Mari (Durand: 2012, 117-132).

TABLE 37

n°	KING OF MARI	#	Reign	KING OF EBLA	#	Reign	LAGASH I	#	Reign
	Ikun-Šamaš	22	2340-2318	Abur-Lîm	22	2340-2318	Ur-Nanše	18	2340-2322
	Ikun-Šamagan	12	2318 - -2306	Agur-Lîm	6	2318-2312	Akurgal	4	2322-2318
	Iški-Mari	12	2306-2294	Ib̄bi-Damu	6	2312-2306	E-anatum	30	2318 - -2288
	Anubu	12	2294-2282	Baga-Damu	12	2306-2294	En-anatum I	[6]	2288-2282
	Sa’umu	6	2282-2276	Enar-Damu	12	2294-2282	En-metena	30	2282 -
	Itup-Išar	4	2276-2272	Iš’ar-Malik	6	2282-2276			
	Iblul-II	20	2272 - -2252	Kun-Damu	6	2276-2270			
	Nizi	3	2252-2249	Adub-Damu	6	2270-2264			
	Enna-Dagan	4	2249-2245	Igriš-Halab	12	2264-2252			
				Irkab-Damu/Tir	5	2252-2247	En-anatum II	7	2252 - -2245
				/Arrukun	2	2247-2245			
				Iš’ar-Damu	17	2245 -	En-entarzi	5	2245-2240
	ASSYRIAN KING			/Ibrium			Sargon (AKKAD)	56	2243 -
1	Tudiya	9	2235-2226	/Ib̄bi-zikir	15	-2228			
2	Adamu	9	2226-2217						
3	Yangi	9	2217-2208						
4	Suḫlâmu	9	2208-2199						
5	Harharu	9	2199-2190						
6	Mandaru	9	2190-2181						
7	Imšu	9	2181-2172				Rimuš	9	2187-2178
8	Haršu	9	2172-2163				Maništusu	15	2178 - -2163
9	Didânu	9	2163-2154	KING OF MARI	#	Reign			
10	Hanû	9	2154-2145	Ididiš	60	2164 -	Narâm-Sîn	37	2163 -
11	Zuabu	9	2145-2136						
12	Nuabu	9	2136-2127						
13	Abazu	9	2127-2118						
14	Belû	9	2118-2109				Šar-kali-šarri	25	2126 - -2104
15	Azarah	9	2109-2100	Šu-Dagan	5	2104 -			
16	Ušpia	9	2100 - -2091				Irgigi/ Imi/ Nanum/ Ilulu	3	2101 - -2098
17	Apišaš	11	2091-2080	Išmah-Dagan	45	2099 -	Dudu	21	2098-2077
18	Halê	14	2080-2066				Šu-Turul	15	2077-2062
19	Samânu	14	2066-2052				Ur-nigina (URUK)	7	2062-2055
20	Hayâni	14	2052 - -2038	Nûr-Mêr	5	2054-2049	Ur-gigira	6	2055-2049
				Išdub-El	11	2049 - -2038	Kuda	6	2049-2043
21	Ilu-Mer	14	2038-2024				Puzur-ilî	5	2043-2038
22	Yakmesi	14	2024-2010	Iškun-Addu	8	2038-2030	Ur-Utu	6	2038-2032
23	Yakmeni	14	2010-1996	Apil-Kîn	35	2030 - -1995	Utu-ḫegal (V)		2032-2020
24	Yazkur-El	14	1996-1982				Ur-Namma (UR)	18	2020-2002
25	Ila-kabkabû	14	1982-1968	Iddin-Ilum	5	1995-1990	Šulgi	48	2002 -
26	Amînum	14	1968 - -1954	Ilum-Iš’ar	12	1990-1978			
				Turâm-Dagan	20	1978-1958			
27	Sulili/Zariqum	14	1954-1940	Puzur-Eštar	25	1958 -			
							Amar-Sîn	9	1954-1945

28	Kikkia	14	1940 - -1927	Hitlal-Erra	7	-1933	Šu-Sîn	9	1945-1936
29	Akia	14	1927 - -1913	Hanun-Dagan	8	1926-1918	Ibbi-Sîn	24	1936 - -1912
30	Puzur-Aššur I	14	1913 - -1899	Itûr ?[-]	6	1912-1906	Išbi-Erra (ISIN I)	33	1923 -
31	Šalim-ahum	14	1899 - -1885	Amer-Nunnu	6	1906-1900			-1890
				Têr-Dagan	8	1900-1892			-1890
				Dagan-[-]	6	1892-1886	Šû-ilîšu		1890-1880

According to this chronological reconstruction Utu-ḫegal must have been king of Uruk IV for 12 years (2032-2020), then king of Uruk V for 8 (7½) years (2020-2012). The first duration of 12 years was therefore not recorded in the King List and the second duration of 8 (7½) years was recorded as a co-regency. The present analysis proposes that both reigns (Ur III and Uruk V) begin at the same time and that the second phase of Ur-Namma's reign begins at Utu-ḫegal's death. The contemporaneity lasts for 8 (7½) years. During these 8 years, Ur-Namma assumes the titles of "military governor of Ur" and "king of Ur". During the 10 years that follow Utu-ḫegal's death (2012-2002), he uses the title "king of Sumer and Akkad". The 18 years in the USKL, UIKL, and SKL represent Ur-Namma's entire period of government (Mahieu: 2020, 220). The durations of reigns of the kings of Gutium mentioned in the SKL WB list (Mahieu: 2019, 4-6) allow us to verify that the reign of Utu-ḫegal began in 2032 BCE because this king put an end to the dynasty of Gutium by killing Tirigan whose reign lasted 40 days. The second synchronism (highlighted in brown) is mentioned during the 11th year of Šar-kalli-šarri⁴⁹ (in 2114 BCE) who took King Sarlagab prisoner.

TABLE 38

AKKAD	reign	LAGASH II	reign	GUTIUM	reign	ELAM	AWAN I/II
Šar-kalli-šarri	2126 - -2114	Lugal-ušumgal Puzur-Mama	2130-2120 2120 - -2110	Nibia Inkišuš Sarlagab	2123-2120 2120-2114 2114-2108	3 Ili-išmani 6 (vassal) 6 ?	2135 -
	-2101	Ur-Ningirsu I	2110 - -2100	Šulme	2108-2102	6 ?	
Irgigi, Imi Nuhum Ilulu	2101 - -2098	Pirig-me	2100-2090	Silulumeš	2102-2096	6 ?	-2095
Dudu	2098-2077	Lu-Ba'u	2090-2080	Inimabakeš	2096-2091	5 ?	
Šu-Turul	2077 - -2062	Lu-Gula Inim-kug	2080-2070 2070 - -2060	Igeša'uš Jarlabag Ibate Jarla Kurum	2091-2085 2085-2070 2070-2067 2067-2064 2064-2063	6 Ḫielu (n°10) 15 3 3 1	2095 - -2065
URUK IV				Ḫabil-kîn	2063-2060	3 Ḫita (n°11)	2065 -
Ur-nigina	2062 - -2055	Ur-Ba'u	2060 - -2048	Lā'arābum Irarum Ibranum	2060-2058 2058-2056 2056-2055	2 2 1	
Ur-gigira	2055 - -2049			Ḫablum	2055-2053	2	
Kuda	2049-2043	Gudea	2048 -	Puzur-Sîn	2053-2046	7	
Puzur-ilî	2043-2038			Jarlaganda	2046 - -2039	7 (n°12)	-2040
Ur-Utu	2038-2032			Si'um	2039-2032	7	
Utu-ḫegal (V)	2032 - -2020			Tirigan (vassal of Awan)	2032-2032 2032 -	0 Puzur- Inšušinak	2040 -
		Ur-Ningirsu II	2028-2023				
		Ur-gar	2023-2022				
		Ur-abba	2022-2021				
UR III		Ur-Mama	2021-2020	ELAM	SIMAŠKI		
Ur-Namma	2020 - -2002	Nam-mahazi (Ur's vassal)	2020-2017	[unammed]	2020 -		-2005
Šulgi	2002 - -1954	Ur-Ninsuna Ur-Ninkimara Lu-kirilaza	1996-1986 1986-1976 1976-1954			[-]-lu Ku-du[-ur-La -gamar]	2005-1990 1990 - -1954
Amar-Sîn	1954-1945	Ir-Nanna	1954 -			Tazitta I	1955-1940
Šu-Sîn	1945-1936		-1933			Ebarat I	1955-1935
Ibbi-Sîn	1936 - -1912	Ur-Ningirsu Ur-Nanše ISIN I	1933-1928 1928-1923			Tazitta II Lurrakluḫḫan	1935-1925 1925 - -1915
		Išbi-Erra	1923 - -1890			Kindadu	1915-1905
						Idadu I	1905-1890

⁴⁹ https://cdli.ox.ac.uk/wiki/doku.php?id=sharkalisharri_year_names (year j) In the year in which Szarkalisharri laid the foundations of the temples of the goddess Annunitum and of the god Aba in Babylon and took prisoner Szarlag(ab) the king of Gutium.

This chronological agreement proves that the SKL WB list is reliable, the main difficulty is to place the parallel dynasties. The only way to do this is to use synchronisms (highlighted in grey). For example, the Elamite dynasty Awan I, which ruled over Akkad (2020-1954), is recorded in parallel with the Sumerian dynasty Ur III (2020-1912). The 12 kings of Awan II (2390-2032) with the 3 kings of Awan I had a duration of 356 years (SKL WB) and reigned before the 12 kings of Shimashki (Sallaberger, Schrakamp: 2015, 23-25). Consequently, Puzur-Inšušinak⁵⁰, the 12th and last king of Awan II, reigned first over Elam (2040-2020), then also over Akkad (2020-2005) as first king of Awan I (Sallaberger, Schrakamp: 2015, 122-126).

TABLE 39

SUMER		AKKAD		ELAM		
URUK IV				AWAN II		
Ur-nigina			2062-2055	Hita	2065 - 11th	
Ur-gigira			2055-2049			
Kuda			2049-2043			
Puzur-ilī			2043-2038		-2040	
Ur-Utu			2038-2032	Puzur-Inšušinak	2040 - 12th	
Utu-hegal	URUK V		2032-2021			
UR III		AWAN I			-2020	SIMASHKI
Ur-Namma	2020 - -2002		2020 - -2005	1st		[unammed] 2020 -
Sulgi	2002 - -1954	[-]-lu Kudu[r-Laga.]	2005-1990 1990-1954	2nd 3rd		-1990
Amar-Sin	1954-1945				1st	Girnamme 1990-1955
Šu-Sin	1945-1936				2nd	Tazitta I 1955-1940
Ibbi-Sin	1936 - -1912	ISIN I Išbi-Erra	1923 -		3rd	Ebarat I 1955-1935
			-1890		4th	Tazitta II 1935-1925
					5th	Lurrakluḥḥan 1925-1915
					6th	Kindadu 1915-1905
					7th	Idadu I 1905-1890

The chronology of the first 17 Assyrian kings is hypothetical for the following reason:

- According to the Assyrian King List the first 17 rulers were “kings under tents”, which means that these tribal kings were established not according to a royal lineage but according to their wisdom. Consequently, the duration of their reign must have been shorter since they began to rule at an advanced age. The average duration of 9 years was chosen because of the synchronism of Tudiya (2235-2226) with Ibrium (2245-2228), which can be deduced from the trade treaty between Ibrium, king of Ebla (in fact vizier of Iš’ar-Damu) and an anonymous king of Abarsal. According to Enna-Dagan, king of Mari: *Iblul-Il, king of Mari, took possession of Gallab’i, [of ...] and the Ganum (of Ebla) and conquered Abarsal (unknown city) at Zahiran* (Liverani: 2013, 119-126). Zahiran, also known as Sahiri (*Sa-hi-ri*), was an iron age city of the ancient near east. During the Mari-Ebla war, Zahiran was the site of a battle between Igrīš-Halab, King of Ebla (2264-2252), and Iblul-il, King of Mari (2272-2252). About a decade later it would have been absorbed into the empire of Sargon of Akkad. The town was sacked in the Battle of Nineveh (612 BCE). The chronicle of Aššur-uballit II states of this battle between Babylonian and Assyrian armies that: *in the month Ābu the king of Akkad and his army went upstream to Mane, Sahiri (Zahiran) and Bali-hu*. As the city of Abarsal had a king, it must have been an important city, so at that time (c. 2270 BCE) and in the Zahiran region there were two cities, Ashur and Nineveh. However, the name Ashur did not refer to a city but to the “region of the god Ashur”. In his report on the conquest of Abarsal, Enna-Dagan (2249-2245) does not mention any king of Abarsal, but Ibrium (2245-2228) does, which could, therefore, correspond to the first Assyrian king, Tudiya (2235-2226).

⁵⁰ An overlap of all available documents leads to the following conclusion (De Graef/Tavernier: 2012, 293-303): Puzur-Inšušinak was the first Elamite king (Awan I) who was able to dominate a major chunk of Babylonia by means of alliances to control main trade routes to Syria. That chunk was not insignificant, since included in it were northern Babylonia and the adjoining Diyala region, therefore more than half of the traditional Babylonian territories. Puzur-Inšušinak's dominion in the east were equally (if not even more) impressive, since, apart from the Susiana and the state of Awan, he put under his (military) rule the Zagros territories as far as the Hamadan plain (Kimash and Hurti). If he also controlled Anshan, Puzur-Inšušinak probably was the first Elamite ever both to establish commercial hegemony over the entire western section of the Iranian plateau and to integrate the Susiana with Elam in a vast conglomerate or “commercial empire”. This control of trade routes in Akkadian cities in the north sparked rivalries and opposition from Sumerian cities in the south. The king of Elam Puzur-Inšušinak founded his very brief empire (Awan I) by allying with the military aristocracy of kings of Gutium and joining the kings of Akkad to control the trade route towards Syria. Taxation (and plunder) of this important trade route severely disadvantaged Sumerian cities causing their resentment. On the other hand, the growing prosperity of this region attracted massively nomadic Amorites living in Syria. The relationship between the “emperor” of Elam, the Mesopotamian kings and the Amorites was complex because it wavered between vassalage and rebellion, which complicates a bit more the reading of documents. For example, Utu-hegal who put an end to the Gutium dynasty (in 2032 BCE), was king of Uruk, king of the four quarters of the world (Sumer and Akkad), but also vassal of Awan.

The synchronisms obtained by a prosopographical study of the kings of Lagash, Mari and Ebla (Archi: 1996, 11-28) allow a chronological rebuilding (Joannès: 2001, XVI-XVII). Since there are 12 intervals between the first king of Lagash Ur-Nanše (2340-2322) and the 5th, En-metena (2282-2252), each interval should have an average duration of 6 years = $(2322-2252)/12$.

TABLE 40

LAGASH I	MARI	EBLA	(Vizier)	UR I	N°	period
Ur-Nanše (18)	Ikun-Šamaš	Abur-Lîm		Mesannepada (20)		2340-2320
Akurgal (5<)				Aannepada	1	2320-2318
E-anatum (30)	Ikun-Šamagan	Agur-Lîm		Meski'agnuna (36?)	2	2318-2312
		Ibbi-Damu			3	2312-2306
	Iški-Mari	Baga-Damu			4	2306-2300
	Anubu	Enar-Damu			5	2300-2294
En-anatum I (6?)					6	2294-2288
En-metena (30)	Sa'umu	Iš'ar-Malik			7	2288-2282
	Itup-Išar	Kun-Damu		Balulu (36)	8	2282-2276
	Iblul-II (20?)	Adub-Damu			9	2276-2270
		Igriš-Halab (12) Darmia			10	2270-2264
			11		2264-2258	
					12	2258-2252
En-anatum II (7)	Nizi (3)	Irkab-Damu (7)	Tir			
En-entarzi (5)	Enna-Dagan (4?)		Arrukum			
Lugal-Anda (7)	Ikun-Išar (-)			AKKAD		
Urukagina (11)	Hida'ar (35)	Iš'ar-Damu (32)	Ibrium	Sargon		2243 -
Lugalzagesi (25)	Išqi-Mari (9)		Ibbi-zikir			-2213

Iš'ar-Damu (2245-2213), king of Ebla, reigned 32 years through his two viziers: 17 years with Ibrium (2245-2228) then 15 years with Ibbi-zikir (2228-2213), that is $17 + 15 = 32$ years (Pomponio: 2013, 71-83). This chronology can be improved by the following synchronisms (Charpin: 2008, 222-233):

- Year 1 of Irkab-damu king of Ebla (2252-2245) corresponds to year 1 of Nizi king of Mari (2252-2249) and his Year 7 corresponds to year 1 of Iš'ar-Damu king of Ebla (2245-2213);
- Year 1 of Hida'ar king of Mari (2245-2210) corresponds to year 1 of Iš'ar-Damu king of Ebla;
- The destruction of Ebla by Sargon is dated to year 32 of Iš'ar-Damu (2245-2213);
- The destruction of Mari in year [42] Sargon (2243-2187) is dated to year 9 of Išqi-Mari (2210-2201) king of Mari (Gordon, Rendsburg: 2002, 62-72);
- Lugalzagesi's reign is approximate (2240-2215). We only know that it encompasses Urukagina's reign.
- Year 1 of Puzur-Estar, king of Mari (1958-1933) corresponds to year 44 of Šulgi king of Ur (2002-1954);
- Ur-Namma's reign, king of Ur (2020-2002), is included in Apil-Kîn's reign (2030-1995), king of Mari.

TABLE 41

LAGAŠH I	Reign	MARI	Reign		EBLA	Reign	
Ur-Nanše	18	2340-2322	Ikun-Šamaš	2340-2318	/18/	Abur-Lîm	2340-2318
Akurgal	4	2322-2318	Ikun-Šamagan	2318 -		Agur-Lîm	2318-2312
E-anatum	30	2318 -		-2306		Ibbi-Damu	2312-2306
		-2288	Iški-Mari	2306-2294		Baga-Damu	2306-2294
En-anatum I	6?	2288-2282	Anubu (Ianupu)	2294-2282		Enar-Damu	2294-2282
En-metena	30	2282 -	Sa'umu	2282-2276		Iš'ar-Malik	2282-2276
			Itup-Išar	2276-2270		Kun-Damu	2276-2270
			Iblul-II	2270 -	20?	Adub-Damu	2270-2264
		-2252		-2252		Igriš-Halab	2264-2252
En-anatum II	7	2252 -	Nizi	2252-2249	3	Irkab-Damu	2252 -
		-2245	Enna-Dagan	2249-2245	4?		
AKKAD			Ikun-Išar	2245-2245	-		-2245
Sargon	56	2243 -	Hida'ar	2245-2210	35	Iš'ar-Damu	2245-2213
		-2187	Išqi-Mari	2210-2201	9	<i>Fall of Ebla</i>	
			<i>Fall of Mari</i>	2201 -			
Rimuš	9	2187-2178					
Maništuš	15	2178- 2163	<i>military governor</i>	-2164			
Narâm-Sîn	37	2163-2126	Ididiš	2164 -	60		
Šar-kali-šarri	25	2126-2101		-2104			
LAGAŠH II			Šu-Dagan	2104-2099	5		
Pirig-me		2100-2090	Išmah-Dagan	2099 -	45		
Lu-Ba'u		2090-2080		-2054			

Mesopotamian chronology can, therefore, be established by synchronisms from the reign of Ur-Nanše (2340–2322) to the reign of Nabonidus (556–539) and can be anchored on an absolute date from the reign of Ur-Namma (2020–2002). The Assyrian chronology can be established by synchronisms reliably only from the reign of Sulili (1954–1940) to the reign of Aššur-uballit II (612–609) and can be anchored on an absolute date from the reign of Erišu I (1873–1835). Since Elamite chronology has no year of reign or absolute date, it can only be established by synchronisms with Mesopotamian chronology (Vallat: 1999, 109–117; 2000, 7–17; 2001, 272–276; 2006, 123–135; 2007, 73–83).

CHRONOLOGY OF ELAMITE REIGNS OVER THE PERIOD 2390–1050 BCE

TABLE 42

ASSYRIA	Reign	BABYLON	Reign	ELAM	Reign
Šamšî-Adad I (n°39)	1712 -	Sîn-muballit	1717-1697	Širuk-tuḫ	1715-1695
	-1680	Hammurabi	1697 -	Siwe-palar-ḫuppak	1695 -
Išme-Dagan I	1680-1670				-1670
Aššur-dugul	1670-1664			Kudu-zuluš I	1670 -
Bêlu-bâni	1664-1654		-1654		
Libbaya	1654 -	Samsu-iluna	1654 -		-1645
	-1638			Kutir-Naḫḫunte I	1645 -
Šarma-Adad I	1638-1626				
Puzur-Sîn	1626-1615		-1616		-1620
Bazaya	1615-1588	Abi-ešuḫ	1616-1588	Temti-Agum II	1620-1595
Lullaya	1588-1582	Ammiditana	1588 -	Kutir-Silḫaḫa	1595 -
Šû-Ninûa	1582-1568				
Šarma-Adad II	1568-1565				-1570
Ērišu III	1565-1553		-1551	Kuk-Našur II	1570 -
Šamšî-Adad II	1553-1547	Ammišaduqa	1551 -		-1545
Išme-Dagan II	1547-1531		-1530	Kudu-zuluš II	1545-1525
Šamšî-Adad III	1531-1516	Samsuditana	1530 -	Tan-Uli	1525-1505
Aššur-nêrârî I	1516-1491	<i>Fall of Babylon</i>	-1499	Temti-ḫalki	1505 -
Puzur-Aššur III	1491 -	Burna-Buriaš I	1495-1479		-1485
	-1467	Ur[...]iaš	1479-1463	Kuk-Našur III	1485-1465
Enlil-nâšir I	1467-1455	Kaštiliašu III	1463-1451	Kidinu	1465-1450
Nûr-ili	1455-1443	Ulam-Buriaš	1451 -	Inšušinak-sunkir-nappipir	1450 -
Aššur-šadûni	1443-1443		-1439		-1440
Aššur-rabi I	1443-1433	Agum III	1439 -	Tan-Ruḫuratir II	1440-1435
Aššur-nâdin-aḫḫe I	1433-1424		-1423	Šalla	1435-1425
Enlil-našir II	1424-1418	Kadašman-Harbe I	1423 -	Tepti-aḫar	1425 -
Aššur-nêrârî II	1418-1411		-1407		
Aššur-bêl-nišešu	1411-1403	Kara-indaš	1407 -		-1405
Aššur-rê'im-nišešu	1403-1395		-1391	Igi-halki	1405 -
Aššur-nâdin-aḫḫe II	1395-1385	Kurigalzu I	1391 -		-1385
Eriša-Adad I	1385 -		-1375	Pahir-iššan	1385-1375
	-1358	Kadašman-Enlil I	1375 -	Attar-Kittaḫ	1375-1365
			-1360	Unpaḫaš-Napiriša	1365-1360
Aššur-uballit I	1358 -	Burna-Buriaš II	1360 -	Kidin-Ḫutran I	1360-1355
			-1333	Ḫumban-numena I	1355-1345
		Kara-ḫardaš	1333-1333	Untaš-Napiriša	1345 -
		Nazi-Bugaš	1333-1333		
	-1323	Kurigalzu II	1333 -		
Enlil-nêrârî	1323-1313		-1308		
Arik-dên-ili	1313-1302	Nazi-Maruttaš	1308 -		-1305
Adad-nêrârî I	1302 -		-1282	Kidin-Ḫutran II	1305 -
	-1271	Kadašman-Turgu	1282 -		-1275
Shalmaneser I	1271 -		-1264	Napiriša-untaš	1275 -
		Kadašman-Enlil II	1264-1255		
	-1242	Kudur-Enlil	1255-1246		-1245
Tukultî-Ninurta I	1242 -	Šagarakti-šuriaš	1246-1233	Kidin-Ḫutran III	1245 -
		Kaštiliašu IV	1233-1225		
		Enlil-nâdin-šumi	1225-1224		
		Kadašman-Harbe II	1224-1223		
		Adad-šuma-iddina	1223-1217		-1215
	-1206	Adad-šuma-ušur	1217 -	Ḫallutaš-Inšušinak	1215 -

Aššur-nâdin-apli	1206-1203				
Aššur-nêrârî III	1203-1197				
Enlil-kudurri-ušur	1197-1192		-1187		-1190
Ninurta-apil-Ekur	1192-1179	Meli-Šipak	1187-1172	Šutruk-Nahhunte I	1190 -
Aššur-dân I	1179 -	Marduk-apla-iddina	1172-1159		
		Zababa-šuma-iddina	1159-1158		-1160
		Enlil-nâdin-aḫi	1158-1155	Kutir-Nahhunte II	1160-1155
		Marduk-kabit-aḫhešu	1159-1141	Šilhak-Inšušinak	1155 -
		Itti-Marduk-balaṭu	1141 -		
	-1133				
Ninurta-tukultî-Aššur	1333-1333				
Mutakkil-Nusku	1333-1333		-1133		
Aššur-rêš-iši I	1133 -1115	Ninurta-nâdin-šumi	1133 -1127		-1125
Tiglath-pileser I	1115 -	Nebuchadnezzar I	1127-1105	Hutelutuš-Inšušinak	1125-1105
		Enlil-nâdin-apli	1105-1101	Šilhina-hamru-Lagamar	1105 -
	-1076	Marduk-nâdin-aḫḫê	1101-1083		-1080?

The Elamite chronology before the reign of Širuk-tuḫ (1715-1695) is more difficult to establish because of the presence of parallel dynasties. We can note that between En-anatum I (2288-2282) and Šulgi (2002-1954) the reigns of the 14 Elamite kings lasted on average about 25 years (= [2288 - 1954]/14).

TABLE 43

ELAM (AWAN)	reign			LAGASH I (SUMER)	reign
Pieli (n°1)	2390-2365			En-ḫegal (LUGAL)	2370-2355
Tari (n°2)	2365-2340			Lugal-ša-engur (ENSI)	2355-2340
Ukku-taḫiš (n°3)	2340 - -2315			Ur-Nanše	2340-2322
				Akurgal	2322-2318
Ḫišur (n°4)	2315-2290	ELAM (SUSA)	reign	E-anatum	2318-2288
Šušun-tarana (n°5)	2290-2265	[unnamed]		En-anatum I	2288-2282
Napil-ḫuš (n°6)	2265-2240			AKKAD	
Kikku-sime-temti (n°7)	2240-2215			Sargon of Akkad	2243 - -2187
Luhḫi-iššan (n°8)	2215-2195			Rimuš	2187-2178
Hišep-ratep (n°9)	2195-2180			Maništusu	2178 - -2163
Ešpum (<i>governor</i>)	2180-2170			Narâm-Sîn	2163-2126
Ilšu-rabi (<i>governor</i>)	2170-2160	(<i>governor</i>)		Šar-kali-šarri	2126-2101
Epir-mupi (<i>vassal</i>)	2160-2135	(<i>governor</i>)		(<i>anarchy</i>)	2101 -
Ili-išmani (<i>vassal</i>)	2135 - -2095				
Ḫielu (n°10)	2095-2065				
Ḫita (n°11)	2065-2040			URUK IV	
Puzur-Inšušinak (n°12) (/Akkad n°1)	2040 - -2005			Utu-ḫegal	2032-2021
		SIMAŠKI		UR III	
		[unnamed]	2020 - -1990	Ur-Namma	2020-2002
[Ḫie?]-lu n°2	2005-1990			Šulgi	2002 - -1954
Kudu ₇ [ur-Lagamar] ⁵¹	1990-1954	Girnamme	1990-1955		
		Tazitta I / Ebarat I	1955-1940	Amar-Sîn	1954-1945
		Ebarat I	1940-1935	Šu-Sîn	1945-1936
		Tazitta II	1935-1925	Ibbi-Sîn	1936 -
		Lurrak-luhḫan	1925-1915		
		Kindadu	1915-1905	(<i>Collapse of Ur</i>)	-1912
		Idadu I	1905-1890	LARSA	
EPARTIDS		Tan-Ruḫuratir I	1890-1875	Iemsium	1910-1882
Ebarti II	1875-1855	Ebarat II	1875-1855	Samium	1882-1847
Šilhaha	1855-1835	Idadu II	1855-1825	Zabâia	1847-1838
Temti-Agun I	1835-1815	Idadu-napir	1825 - -1795	Gungunum	1838-1811
Pala-iššan	1815-1795			Abi-sarê	1811-1800
Kuk-Kirmaš	1795-1775	Idadu-temti	1795 - -1765	Sumu-El	1800-1771
Kuk-Naḫudi	1775-1755			Nûr-Adad	1771-1755
Kuk-Našur I	1755-1735				
Atta-ḫušu	1735-1715	BABYLON		ASSYRIA	
Širuk-tuḫ	1715-1695	Sîn-muballit	1717-1697	Šamšî-Adad I (n°39)	1712 - -1680
Siwe-palar-ḫuppak	1695 - -1670	Hammurabi	1697 -	Išme-Dagan I (n°40)	1680-1670

⁵¹ The name of the last king of the Awan dynasty, who reigned 36 years, is *ku-du₇[ur-la-ga-mar]*, in line 13 of the WB444 prism (Langdon: 1923, 11-14, Plate II). This name is read *ku-ul[-]* despite the absence of Elamite names beginning with *kul*.

Kudu-zuluš I	1670 -			Aššur-dugul (n°41)	1670-1664
	-1645	Samsu-iluna	1654 -	Bêlu-bâni (n°48)	1664-1654
Kutir-Nahhunte I	1645 -			Libbaya (n°49)	1654 -
	-1620		-1616	Šarma-Adad I (n°50)	1638-1626

All synchronisms between the Elamite chronology and the “Ultra-Low” Mesopotamian chronology are respected, including between the regents (ENSI) Ešpum and Ili-išmani (Potts: 2016, 97). The transition between Ili-išmani, the last vassal (GIR.NÍTA) of the Akkadian kings, who was a contemporary of Šar-kali-šarri (2126-2101), and Hielu (2095?-2065), the 10th king of Awan, must have taken place at the time of the Akkadian anarchy that began in 2101 BCE. For a long time, the Mesopotamian chronology could not be evaluated by ¹⁴C dating, but the site of Hazor which could be dated by ¹⁴C allowed indirectly, through a precise synchronism with Hammurabi, the confirming of the Ultra-Low Chronology. The “Greater Hazor” that corresponded with Mari (Stratum XVI), which began in MB IIA-B (in 1700 +/- 20 BCE) reached its peak c. 1680 BCE at the earliest (Ben-Tor: 2004, 45-67). It was this Hazor, with its King Ibni-Addu, that corresponded with Mari for a period of no less than 20 years. Given that Mari was destroyed by Hammurabi (1697-1654) in the 32nd year of his reign, in 1665 BCE according to the Ultra-Low Chronology, the beginning of the correspondence was in 1685 BCE, or in 1700 BCE +/- 20, according to the stratigraphy of the “Greater Hazor” (Ben-Tor: 2016, 76-77) calibrated by ¹⁴C dating, but this result has been questioned by radiocarbonists who claim that the dating of the Waršama Palace would confirm the Middle Chronology!

COMPARISON OF ABSOLUTE DATES FROM ASTRONOMY AND ¹⁴C DATES

An absolute date is a date known exactly and with no error percentage, even a small one. For example, since the Egyptian reign of Psamtik I is known to the nearest month (02/663–01/609) it is an absolute chronology because Year 1 of his reign = 663 BCE +/- 0. Since the 2000s radiocarbonists consider that their dating method allows one to obtain an absolute chronology and propose to archaeologists to calibrate the historical chronologies, Babylonian and Egyptian, with their ¹⁴C dates. Contrary to what they claim, ¹⁴C dates are neither absolute nor historical for the following reasons: ¹⁴C dates are known to have a percentage of error and the transformation of these ¹⁴C dates into historical dates is based on hypothetical historical interpretations that are often debatable (Wiener: 2012, 423–434). Moreover, radiocarbonists naively believe that conventional chronologies are accurate.

- Even with an accuracy of 1% the measurements of ¹⁴C rates are unusable in their raw state to provide a dating. They must be calibrated by dendrochronology, but correspondence between the uncalibrated years BP (Before Present) and calibrated years BCE is complex. In addition, some parts of the calibration curve are unusable, such as the period 800–400 BCE called 'plateau of Hallstatt' because the value remains constant in years BP. For example, the reign of Psamtik I (663-609), which is situated in this period, is not measurable. As a result, the reading of the BP dates calibration curve is equivocal, resulting in a significant inaccuracy of plus or minus X years (X is sometimes greater than 100 years!) despite the accuracy of the radiocarbon measurements (1%).
- A second factor of imprecision comes from the nature of the carbonaceous samples, because whereas the climate in Egypt allowed the conservation of many documents, inscriptions on papyrus or wooden objects, the Mesopotamian climate did not allow it. The only inscriptions exhumed in Mesopotamia appear on clay tablets and stone stelae, which are not datable because they are carbonless. The only objects that can be dated are pieces of charred wood from a fire, which can be dated historically, or which can be precisely located in a geological stratum. In these two cases the dating supposes a hypothesis: 1) either the piece of wood was cut a few years before its use (which is not verifiable because cedar being a precious wood, the beams of buildings have often been used for several decades and often reused during the construction of a new building, which artificially ages the final date of the material at the time of the fire), or 2) the object was buried (to get rid of it) in a layer which is therefore older than the object. Despite this imprecision of radiocarbon dating due to the method, and not to the precision of measurements, since the date of the charred wood corresponds to the manufacture of the object and not to its destruction, which generally took place several decades after its manufacture, or even more than a century later, radiocarbonists consider their dating to be absolute.
- A third factor of imprecision comes from the assumptions used by radiocarbonists to transform ¹⁴C dates into historical dates. Indeed, this transformation assumes the use of a conventional chronology to identify historical events to be dated (for example the destruction of a city due to a war among kings). This method induces a circular reasoning since the conventional chronology used to identify a historical event is then precisely dated by ¹⁴C, which indirectly validates the conventional chronology. This self-

validation is difficult to detect because when a conventional chronology is validated by ^{14}C it is then used to evaluate the other conventional chronologies, which harmonizes all the dates among themselves and therefore prevents the detection of initial dating errors⁵².

Radiocarbonists completely minimize the interpretation bias of their radiocarbon dating and believe that the accuracy due to calibration by dendrochronology is sufficient, but they are unaware that conventional chronologies used as a reference are sometimes erroneous. This conviction leads radiocarbonists to interfere in the debate on the absolute chronology of the Mesopotamian chronology of the 2nd millennium BCE, as can be seen in the article: *Integrated Tree-Ring-Radiocarbon High-Resolution Timeframe to Resolve Earlier Second Millennium BCE Mesopotamian Chronology*:

500 years of ancient Near Eastern history from the earlier second millennium BCE, including such pivotal figures as Hammurabi of Babylon, Šamši-Adad I (who conquered Aššur) and Zimrilim of Mari, has long floated in calendar time subject to rival chronological schemes up to 150+ years apart (...) To address, we have integrated secure dendrochronological sequences directly with radiocarbon (^{14}C) measurements to achieve tightly resolved absolute (calendar) chronological associations and identify the secure links of this tree-ring chronology with the archaeological-historical evidence. The revised tree-ring-sequenced ^{14}C time-series for Kültepe and Achemhöyük is compatible only with the so-called Middle Chronology and not with the rival High, Low or New Chronologies. This finding provides a robust resolution to a century of uncertainty in Mesopotamian chronology and scholarship, and a secure basis for construction of a coherent timeframe and history across the Near East and East Mediterranean in the earlier second millennium BCE (Manning, Griggs, Lorentzen, Barjamovic, Bronk Ramsey, Kromer, Wild: 2016, 1-27).

Is this statement scientifically robust as the authors of this article assert? An examination of the arguments used leads to the conclusion that it is not, because while the accuracy of carbon-14 measurements is extremely rigorous from a scientific point of view, the interpretation of the dates obtained is extremely fanciful from a historical point of view. Here are the main arguments used in the article (statements that are hypotheses, or approximations, have been underlined):

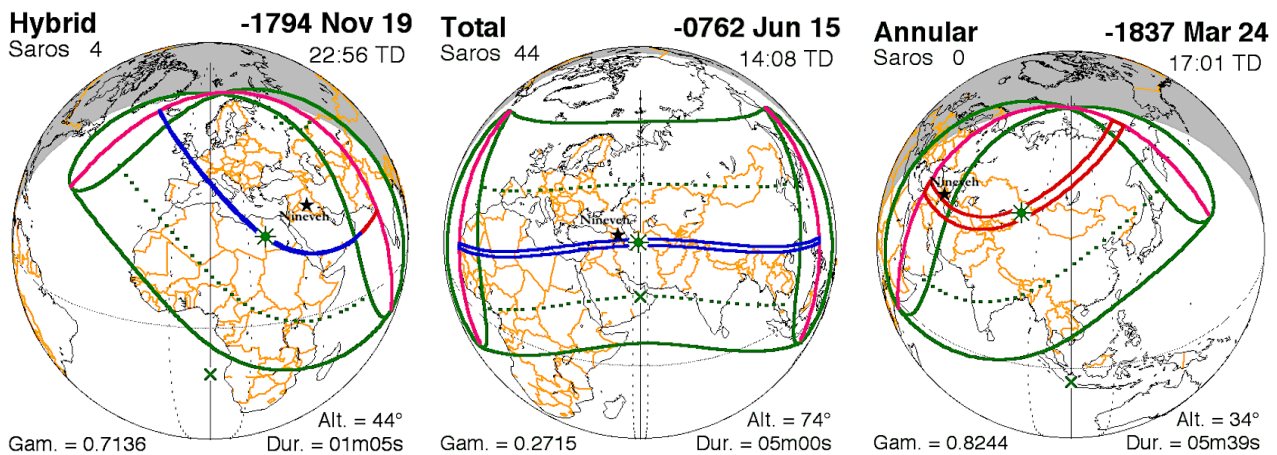
Alongside our knowledge of the Babylonian dynastic succession and the well-established synchronism of Šamši-Adad I's death in Hammurabi's 18th regnal year, this allows us to establish a relative chronological sequence of some 380 years between the ascent of the Assyrian ruler Erišum I and the destruction of Babylon during the Hittite invasion of Muršili I (...) At approximately the same time a new palace—the so called Waršama Palace of Mound Level 7 —was constructed on the citadel at the site of its burnt-down predecessor, the so-called Old Palace of Mound Level 8, and is contemporary with Kültepe Lower Town Level Ib. There is wood (Juniperus spp.) from the construction of the Waršama Palace with bark preserved, which allows dating of the exact year that the tree was felled, thereby offering a potential date for the palace's construction within a year or so, and a potential tie point with the REL. However, there is a critical gap in the evidence: the documentary record comes from the lower town area, which is entirely discrete from and with no stratigraphic or decisive documentary relationship to the Waršama Palace. A simultaneous destruction and transition from (i) Lower Town Level II to Ib, and (ii) the destruction and transition from the Old Palace to the Waršama Palace has hitherto been maintained as the most likely scenario and employed as a premise. But this assumption cannot itself form a fundamental link in the evidence chain and needs to be tested. A second site offers an independent starting point for doing so. A large number of bullae (sealed clay lumps) bearing e.g. the sealings of Šamši-Adad I, king of Upper Mesopotamia, and ruler of Aššur between REL 165 and his death in REL 197 (a reign lasting 33 or 34 years), were found at the Sarıkaya Palace at Achemhöyük in Anatolia (...) We may compare the placement of the MBA tree-ring series against the date

⁵² The dating of the United Monarchy illustrates this bias in the ^{14}C dating method. The United Monarchy is the name given to the Israelite kingdom of Israel and Judah, during the reigns of Saul, David and Solomon, as depicted in the Hebrew Bible. However, as the Kingdom of Saul left no archaeological traces, this archaeological period of the United Monarchy, named Iron IIA, actually covers only the reigns of David and Solomon. The kingdoms of these two famous kings are located in a period dated 1200-800 BCE called the "Dark Ages" which has left no documents, except for the stele of Tel Dan which mentions the "House of David" (BYTDWD). Consequently, some archaeologists have even denied their existence. The only way to date the reign of David is to use the traditional chronology calculated from the biblical text and then check whether this dating is in accordance with the Assyrian chronology (the only absolute chronology during this period). Dating the reign of David (1057-1017) by ^{14}C makes it possible to verify that this method does not give absolute dates but indirectly validates the conventional chronology (1010-970). Indeed, ^{14}C dates are obtained according to the following process: radiocarbon dates are first calibrated by dendrochronology and then associated with historical dates from conventional chronologies. Consequently, this dating method indirectly validates conventional chronologies. Consequently, there is a problem of method with ^{14}C dating because archaeologists proceed in the opposite manner to historians: their method requires first of all to have a hypothesis from which they derive a chronology that is then confirmed by ^{14}C measurements of archaeological remains (Finkelstein, Piasezky: 2011, 50-54). There are two ways to prevent this radiocarbon dating method from being biased, 1) using a conventional chronology that is anchored on absolute dates obtained by astronomy, such as the Assyrian chronology over the period 1050-600 BCE, or 2) using a chronology that is anchored on synchronisms with another chronology that is anchored on absolute dates obtained by astronomy over the period of the measurements.

ranges previously estimated for Mesopotamian chronology based on textual, astronomical and archaeological information as they intersect together in the construction date and assemblage of the Sarikaya Palace at Acemhöyük. It is evident that only some variation of the Middle Chronology is compatible with the tightly constrained data. Under the High Chronology Šamši-Adad would have died four decades before the Sarikaya Palace was even constructed, which is incompatible with his numerous documentary links with the building (...) The ~13–16 years older shift from our results critically resolves a problem with the (now withdrawn) previous dendrochronological dating. Although this previous date favored the Middle Chronology, it was problematic as it left the construction of the Sarikaya Palace at Acemhöyük (then given as 1774 +4/-7 BCE) occurring more or less when Šamši-Adad I died (REL 197 = 1776 BCE on the Middle Chronology—and not long before Šamši-Adad I's death on the Low Middle Chronology). And yet there are numerous sealings of Šamši-Adad I in the Sarikaya Palace suggesting, first, that they are unlikely to have been all heirlooms (or a secondary deposit), and, second, that the palace must have existed for at least several years if not a decade or few decades before his death (...) Importantly this questions the long-held but unsubstantiated assumption that the destruction/transition between Lower Town Levels II and Ib equates with the destruction of the Old Palace and building of the new Waršama Palace (...) If we consider, the notable coincidence of consonant scenarios based on the integrated dendrochronological and ¹⁴C analysis of multiple timbers from monumental constructions at two sites (over 200 km apart) demonstrates that the chronology identified reflects the correct historical timeframe and that our findings are not some accident caused by one or two re-used timbers or some other unusual situation affecting one context or even one site. The Middle Chronology offers the best fit between the Old Palace/Lower Town Level II evidence and the construction of the subsequent Waršama Palace, whereas the Low-Middle Chronology only just fits. The Middle Chronology also minimizes the gap between the start of Lower Town Level Ib and the Earliest Use of the Waršama Palace to likely as little as ~8–24 years, whereas it is likely ~16–33 years with the Low-Middle Chronology. This is not decisive, but the Middle Chronology allows the best compromise of all the pre-existing archaeological-textual assumptions with the new dendro-¹⁴C dating framework (...) More importantly, by separating the two fires, we retain the tie between the REL sequence and the astronomical data (eclipses, Venus tablets), intercalations and even potentially the suggested link between a major volcanic dust veil and several northern hemisphere tree-ring growth anomalies 1628–1627 BCE and poor atmospheric observation conditions as evident in Mesopotamian records. Finally, by dissociating the two conflagrations, we gain the necessary time for the deposit of the numerous Šamši-Adad I bullae at Sarikaya (previously something of a problem), but not enough time to render any of the later chronologies (Low Chronology, New Chronology) plausible (...) Conveniently, the sound new dates we report for the MBA chronology are only ~16 years different (older) than those previously suggested. Hence, although previous arguments using the now replaced tree-ring-based dates are inherently invalid in this strict respect, it turns out that the new, robust, evidence nonetheless finds the same Middle or Low-Middle Mesopotamian Chronology solutions are most likely but on a more rigorous basis. Thus, in line with recent text discoveries and analysis and astronomical study, we find that only the Middle Chronology or the Low-Middle Chronology (or a chronology very close to these) fits with the new dendro-¹⁴C dated constraints from the site of Acemhöyük, and also simultaneously creates a plausible historical linkage for the approximately associated dendrochronological-¹⁴C and text evidence from Kültepe. Contrary to claims that it should be dismissed, the Middle or Low-Middle Chronology can henceforth be regarded in approximate terms—with a robust dendro-¹⁴C anchor—as the accurate timeframe for Mesopotamian history. To express this new resolution in calendar years, the death of Šamši-Adad I (REL 197) may be placed ~1776 BCE or ~1768 BCE, removing previous uncertainty levels of +56/64 calendar years (to the High Chronology) and -64/88 calendar years (to the Low or New Chronologies). A decision between the Middle and Low-Middle Chronology largely hinges on the astronomical evidence, especially the record in the Mari Eponym Chronicle of what is interpreted as a solar eclipse placed about REL 127, the year after the birth of Šamši-Adad I – though there is some room for debate as the relevant text is not complete (...) The new dendro-¹⁴C dates require rethinking of recent analyses, which made assumptions based on the now incorrect previous dendrochronological dates. However, in sum, the situation remains similar—assuming we retain the approximate (within about 0–1 year) link between the birth of Šamši-Adad I in REL 126 and an eclipse in REL 127. There is a partial eclipse in 1845 BCE at sunset (hence likely visible), which is within 1 year of the Middle Chronology date for REL 127, and a slightly more conspicuous partial eclipse in 1838 BCE which matches exactly with the Low-Middle chronology date for REL 127 –whereas the total eclipse of 1833 BCE appears too late unless there are substantial unknown errors in the REL sequence. Earlier eclipses, such as in 1859 BCE, are too early, unless substantial reconsideration of the standard textual interpretation is considered. Thus, both the Middle and Low-Middle Chronology have suitable eclipse candidates within the approximate precision of the available textual evidence, but the 1838 BCE eclipse offers a slightly better (more conspicuous) case.

Contrary to what the authors of the article assert, the dating of the Middle Chronology depends on several hypothetical and approximate synchronisms (underlined parts). Worse, the defence of the Middle Chronology, which would be the most “robust according to ^{14}C measurements”, is contradicted by their own dating: *Although this previous date favored the Middle Chronology, it was problematic as it left the construction of the Sarıkaya Palace at Acmhöyük (then given as 1774 +4/-7 BCE) occurring more or less when Šamši-Adad I died (REL 197 = 1776 BCE on the Middle Chronology), which makes no sense.* The only conclusion to be drawn from this dating is that the beams of this palace, dated by dendrochronology to c. 1774 BCE, were used before the reign of Šamši-Adad I (1712-1680). In addition, the 1795 BCE eclipse contradicts the dating of the reign of Šamši-Adad I since this king died in 1776 BCE during eponym N°199 (Ṭab-šilli-Aššur) and the eclipse occurred during eponym N°126 (Puzur-Ištar) this eclipse should be dated in 1849 BCE (= 1776 + 199 - 126), which is again absurd (1795 = 1849). Despite these chronological contradictions, radiocarbonists continue to use this synchronism to defend the “Middle Chronology” (Manning, Wacker, Büntgen, Bronk Ramsey, Dee, Kromer, Lorentzen, Tegel: 2020, no. 13785). The radiocarbon measurements are not in question, but only the synchronicity of Šamši-Adad I's death with the dating of the buildings of his time. The second part of the article defending the Middle Chronology is based on the dating of a solar eclipse dated during the eponym N°127. The only problem in this astronomical analysis is that this solar eclipse never existed. The darkening of the sun mentioned during the Puzur-Ištar eponym (N°126), the year just after the birth of Šamši-Adad I, has been interpreted by some Assyriologists as a solar eclipse, which could presumably be dated 19/11/-1794* (Michel, Rocher: 2000, 111-126), but dated 24/03/-1837* according to astronomer Teije de Jong (De Jong: 2017, 127-143).

- First, the solar eclipse of 1795 BCE (19/11/-1794*) had a maximum magnitude of 1.012 at 2000 km south of Nineveh⁵³ (to the east of present-day Turkey, image below left) and therefore only had a magnitude of 0.35 above this city and was not seen because only eclipses with a magnitude greater than 0.95 are visible for a naked-eye observer (De Jong: 2013, 157). To calculate this magnitude, simply multiply the maximum magnitude of the eclipse (1.012) by its coefficient of distance from maximum (dark blue line), bearing in mind that the dotted line (image below left)⁵⁴ represents an attenuation of 0.5. It is interesting to compare this eclipse with the total solar eclipse that occurred during the Bur-Sagale eponym (the only eclipse mentioned in Assyrian Eponym lists), dated in 763 BCE (15/06/-762*). This solar eclipse had a maximum magnitude of 1.06 and was visible a few hundred kilometres below Nineveh⁵⁵ (middle image below) with a maximum distance coefficient of 0.95. This total eclipse was visible in Nineveh because the magnitude was 1.01 (= 1.06x0.95).



- The 1838 BCE eclipse (24/03/-1837*)⁵⁶ is no better, because, not only was it partial, with a maximum magnitude of 0.94, but its maximum passed a hundred or so kilometres above Nineveh (image above right)⁵⁷, with a distance coefficient of 0.95, and was therefore not visible, since the magnitude was 0.89 (= 0.94x0.95), much lower than the minimum of 0.95. As before, the date of this eclipse contradicts the Middle Chronology (1849 BCE).
- The solar eclipse during the Puzur-Ištar eponym (N°126) is impossible to find because there was not a single total solar eclipse, which was visible in an Assyrian city, like Aššur or Nineveh, during the period 1850-1700 BCE. As a result, this eclipse never existed. the term used *na'duru* “darkened, obscured,

⁵³ <https://eclipse.gsfc.nasa.gov/5MCSEmap/-1799--1700/-1794-11-19.gif>

⁵⁴ <https://eclipse.gsfc.nasa.gov/SEatlas/SEatlas-2/SEatlas-1799.GIF>

⁵⁵ <https://eclipse.gsfc.nasa.gov/5MCSEmap/-0799--0700/-762-06-15.gif>

⁵⁶ <https://eclipse.gsfc.nasa.gov/SEatlas/SEatlas-2/SEatlas-1839.GIF>

⁵⁷ <https://eclipse.gsfc.nasa.gov/5MCSEmap/-1899--1800/-1837-03-24.gif>

eclipsed” means an eclipse in a metaphorical way and is different from the usual *antallù* “eclipse” used in Mari (Pruzinsky: 2009, 75). In addition, for a real solar eclipse, the name of the month is indicated (Simanu for the 763 BCE eclipse), which is not the case for this darkening⁵⁸. Consequently, the comment has been added later in the list of eponyms, because Šamšî-Adad I was initially an Amorite king who became part of the Assyrian dynasty only at the end of his glorious reign.

According to some radiocarbonists, the Sarikaya palace at Acemhöyük, associated with Šamšî-Adad I (1809-1776 BCE according to Middle Chronology), which can be dated to c. 1776 BCE can only correspond to the Middle Chronology (Höflmayer, Manning: 2022, 1-24). In fact, the Sarikaya Palace and the Hatipler Tepesi building, both violently burned were constructed in the same year: c. 1774 BCE (+4/-7 years). Two repair timbers in the Sarikaya Palace were cut in 1767 and 1766 or later indicating that it had a lifespan of at least 8 years. The bulk of the reported 1600 bullae in the Sarikaya Palace should have been deposited there after 1774 and before its destruction **some time after 1766 BCE**⁵⁹. Foreign royalty whose bullae are found in the Sarikaya Palace include King Šamšî-Adad I, the Princess Dugedu, daughter of King Yahdun-Lim of Mari, and King Aplakhandu of Carchemish (Newton, Kuniholm: 2004, 165-176). We know that Yaggid-Lim (1740?-1724), king of Terqa (near Mari), was probably of Amorite origin, but little is known about his reign except that he came into conflict with Ila-kabkabû (1750?-1738), king of Ekallatum, after the two had first been allies (Anbar: 1991, 31-40; Ziegler: 2001, 496-501, 750-752). Yaggid-Lim was the father of Yahdun-Lim (1716-1699), and Ila-kabkabû is mentioned as the father of Šamšî-Adad I (1712-1680), born in 1752 BCE. As a result, the inscription in the name of Šamšî-Adad I was deposited at the beginning of his reign (1712 BCE), 54 years after the repair of the Sarikaya Palace. Contrary to what radiocarbonists claim, the “Ultra-Low” Chronology is based on perfectly dated lunar eclipses (highlighted in sky blue) and is consistent with ¹⁴C dating. Hammurabi's reign is rich in synchronisms (dates framed by a big black line), which allows us to compare all the chronologies with each other (Table 44). Since the chronologies of the Egyptian kings and Hazor can be determined by ¹⁴C, this allows the chronology of Hammurabi to be determined through the synchronisms with Neferhotep I and Ibni-Addu. There is therefore quadruple synchronism between Hammurabi, Zimri-Lim, Yantin-Ammu and Neferhotep I (Kitchen: 1967, 39-54).

TABLE 44

BCE	N°	Assyrian eponym	[A]	[B]	[C]	[D]	[E]	[F]	[G]	
1706	172	Abī-šagiš	10	6	11	21		15	3	[A] Yahdun-Lîm king of Mari
	173	Tab-šilla-Aššur		7						[B] Šamšî-Adad I king of Assyria n°39
1705	174	İddin-Aššur	11	8	12	22		16	4	[C] Sîn-muballiṭ king of Babylon
1704	175	Namiya	12	9	13	23		17	1	[D] Rîm-Sîn I king of Larsa
1703	176	Ahu-šarri	13	10	14	24		18	2	[F] Yakin-[ilu II?] king of Byblos
1702	177	Dadaya	14	11	15	25		19	3	
1701	178	Ennam-[Aššur?]	15	12	16	26		20	4	[G] Sobekhotep III king of Egypt
1700	179	[?]-Aššur	16	13	17	27		21	1	[G] Neferhotep I king of Egypt (¹⁴ C)
1699	180	Atānum	17	14	18	28		22	2	
1698	181	Aššur-taklāku	1	15	19	29		23	3	[A] Sumu-Yamam king of Mari
1697	182	Haya-malik	2	16	20	30		24	4	[C] Accession of Hammurabi (Year 0)
1696	183	Šalim-Aššur	1	17	1	31		25	5	[A] Samsî-Addu king of Mari
1695	184	Šalim-Aššur	2	18	2	32		26	6	[C] Hammurabi king of Babylon
1694	185	Ennam-Aššur	3	19	3	33		1	7	[F] Yantin-Ammu king of Byblos
1693	186	Suen-muballiṭ	4	20	4	34		2	8	
1692	187	Rēš-Šamaš	5	21	5	35		3	9	
1691	188	Ibni-Adad	6	22	6	36		4	10	
1690	189	Aššur-imittî	7	23	7	37		5	11	
1689	190	Ilî-ellatî	8	24	8	38		6	1	[G] Sobekhotep IV king of Egypt
1688	191	Rigmānum	9	25	9	39		7	2	
1687	192	Ikûn-pīya	10	26	10	40		8	3	
1686	193	Ašqūdum	1	27	11	41		9	4	[A] Yasmah-Addu king of Mari
1685	194	Aššur-malik	2	28	12	42		10	5	[E] Ibni-Addu king of Hazor (¹⁴ C)
1684	195	Aḫiyaya*	3	29	13	43	1	11	6	
1683	196	Awīliya	4	30	14	44	2	12	7	
1682	197	Nimar-Suen	5	31	15	45	3	13	8	
1681	198	Adad-bāni	6	32	16	46	4	14	9	
1680	199	Tab-šilli-Aššur	7	33	17	47	5	15	1	[B] Death of Šamšî-Adad I
1679	200	Ennam-Aššur	1	1	18	48	6	16	2	[B] Išme-Dagan I king of Assyria n°40

⁵⁸ As the sentence: “on the 26th day of the month Sivan, in the 7th year [of Simbar-šipak], the day turned to night,” did not describe a solar eclipse, because a solar eclipse always coincides with the last day of the lunar month (29 or 30).

⁵⁹ For example, a building date of 1832 BCE for the Wargama Sarayi is later than the last-preserved ring, 2024 BCE, of the Eski Saray by 192 years instead of 138 eponymous years. Consequently a half-century of rings is missing!

1678	201	Aššur-emūqī	2	2	19	49	7	17	1	[G] Sobekhotep V king of Egypt
1677	202	Abu-šalim	3	3	20	50	8	18	2	[A] Zimri-Lim king of Mari
1676	203	Puṣṣānum	4	4	21	51	9	19	3	
1675	204	Ikūn-pī-Ištar	5	5	22	52	10	20	1	[G] Ibiaw king of Egypt
1674	205	Ahiyaya	6	6	23	53	11	21	2	
1673	206	Bēliya	7	7	24	54	12	22	3	
	207	Ilī-bāni		8						(34 Assyrian years = 33 Babylonian years)
1672	208	Aššur-taklāku	8	9	25	55	13	23	4	
1671	208	Sassāpum	9	10	26	56	14	24	5	
1670	209	Ahu-waqar	10	11	27	57	15	25	6	
1669	210	Kizurum	11	1	28	58	16	1	7	[B] Aššur-dugul king of Assyria n°41
1668	211	Dādiya	12	2	29	59	17	2	8	
1667	212	Yam-aha?	13	3	30	60	18	3	9	Larsa is annexed by Hammurabi
1666	213	Adad-bāni	1	4	31	[1]	19	4	10	[A] Yâpah-Šumu-Abu king of Mari
1665	214	Ennam-Aššur	2	5	32	[2]	20	5	11	[E] Mari is destroyed by Hammurabi
1664	215	Attaya	3	6	33	[3]		6	1	[B] accession of 6 Assyrian kings n°42-47
1663	216	Ayā	4	1	34	[4]		7	2	[B] Bêlu-bāni king of Assyria n°48

The king of Hazor Ibni-Addu reigned for at least 20 years, from 1685 to 1665 BCE, but probably his reign had begun several years before (c. 1700 BCE?). The kings of Byblos, like Yantin-Ammu, reigned for an average of 25 years, but the variations of these reigns are not known. Egyptian reigns are based on several absolute dates fixed by astronomy (see Table 47).

Radiocarbon dating can be accurate to +/- 20 years if the synchronism between the historical event to be dated and the wooden object associated with that event occurred over a period of less than 20 years. Two candidates meet this condition: Ibni-Addu, king of the "Great Hazor", who reigned from 1700 to 1680, and Neferhotep I, who reigned from 1710 to 1690. These two reigns, which can be dated by radiocarbon, were synchronised with the reign of Hammurabi, making it possible to decide between the "Middle Chronology" and the "Ultra-low Chronology".

IBNI-ADDU KING OF HAZOR (1685-1665): ABSOLUTE CHRONOLOGY VERSUS ¹⁴C DATING

The city of Hazor also had important trade exchanges with Egypt which makes it possible to date this period of exchange through both stratigraphy and the study of the style of pottery in these two cities. Consequently, the Egyptian chronology of this period is linked with the Mesopotamian chronology via the chronology of the city of Hazor. This is particularly true for the history of "Greater Hazor", which encompasses both the lower and upper cities, forming a site of over 200 acres, the largest in Israel at that time. It stands to reason that the Hazor that corresponded with Mari is "Greater Hazor", consisting of the acropolis and the lower city. This Hazor, which began in MB IIA–B, approximately 1720–1680 BCE, reached its peak—even if its rise was rapid—only in MB IIB, some 20–30 years later, around 1680 BCE at the earliest. The Hazor that corresponded with Mari was thus Hazor Stratum XVI (= 3), and not XVII (= 4), during which construction of the city's fortifications had only begun. As shown, the Tell el-Dab'a chronology indicates that the MB IIA–B transition occurred not before the end of the 18th century, around 1700 BCE. Weinstein suggests dating this transition somewhat earlier, to between 1730–1710 BCE "in the late third and the early fourth quarters of the 18th century B.C." The difference between these two sets of dates is not crucial (a date of c. -1710 +/- 20 may be chosen). This is therefore when building activity started at Hazor, even before the earliest mention of Hazor in the Mari documents. One may argue that Stratum F at Tell el-Dab'a, equated with the beginnings of MB Hazor, is wrongly dated and that it is in fact earlier. The response to this would be that there is a consensus among Egyptologists regarding the date of this phase and that any margin of error would be negligible. Stratum F is dated relatively late in the 13th dynasty, the date of which is also generally agreed upon. Even a slightly earlier date for this stratum would have no significant bearing. In summary, the synchronisms between Hammurabi, king of Babylon, Ibni-Addu, king of Hazor, and Neferhotep I, king of Egypt, make it necessary to date all these reigns in the same period. Since the strata of the "Greater Hazor" (of Ibni-Addu) are dated c. -1700 +/- 20 by ¹⁴C and those of the corresponding Egyptian period are dated around -1710 +/- 20 years (McAneney, Baillie: 2019, 99–112), this implies that the corresponding Mesopotamian period (Hammurabi) should also be dated in this period. The reign of Neferhotep I (1710-1693) was dated through ¹⁴C measurements (Maderna-Sieben: 2018, 94-95).

TABLE 45

King of Egypt	Reign (¹⁴ C)	King of Hazor	Reign (¹⁴ C)	King of Babylon	Reign	Chronology
	(+/- 20)		(+/- 20)	Hammurabi	1793–1750	Middle
Neferhotep I	1710-1693	Ibni-Addu	1700-1680	Hammurabi	1697–1654	Ultra-Low

As the conventional Egyptian chronology of this period agrees to +/- 20 years with the ¹⁴C dating and as the stratigraphic dating of the objects found at Hazor gives the same value of -1700 +/- 20, this confirms the dating of the “Ultra-Low Chronology”, which fixes Šamši-Adad I's death in 1680 BCE. The chronology of the reigns of Neferhotep I (1710-1693) and Abni-Addu (1700-1680) obtained by ¹⁴C dating agrees with the astronomical chronology anchored on absolute dates obtained by astronomy, within the limit of course of the measurement errors (+/- 20 years) of the ¹⁴C dating in the period 2000-1600 BCE. However, the reign of Ibni-Addu (1685-1665) is 15 years lower than the reign measured by ¹⁴C (1700-1680) and that of Neferhotep I (1701-1690) is 10 years lower (1710-1693). Neferhotep I is considered the 27th Egyptian King of Dynasty 13. This dynasty is difficult to date because the duration of many reigns is not precisely known. However, Egyptologists use two chronological data to calculate these durations: Dynasty 13 began immediately after Dynasty 12, and given the number of reigns over this period, the average duration of the reigns is estimated to be about 4 years. Moreover, the chronology of Dynasty 13 can be anchored on absolute dates (like ¹⁴C dates) because the reigns of Senwosret III and Amenemhat III, include well-identified astronomical phenomena. According to dating Middle Bronze Age strata, dated +/- 30 years (Bietak: 1991, 27-72), the first part of the 13th Dynasty could be dated 1750-1650 (MB IIB), the 15th Dynasty in 1650-1550 (MB IIC) and the beginning of the 18th Dynasty in 1550 BCE (LB AI). The material culture of the Canaanite settlers in the eastern Delta displays a distinct similarity to the material culture found at Middle Bronze Age sites in Palestine (Ben-Tor: 2007, 1-3) and studies of scarabs of the Middle Bronze period from both regions argue for the southern Levant as the place of origin of the Second Intermediate Period of foreign rulers in Egypt⁶⁰ (Ben-Tor: 2009, 1-7). If the first Hyksos (14th dynasty) began to reign around 1750 BCE, they must have already arrived in Egypt more than a century earlier and, according to Egyptian records, most of them came from Palestine, which was called Retenu in Egyptian. Although the name and order of some pharaohs in the Hyksos period based on archaeological findings remain controversial the following chronological framework is generally accepted (Franke: 2013, 7-13):

TABLE 46

Strata	Period	#1	#2	Egyptian Dynasty	Vizier	Asiatic Dynasty	Capital	
MB IIA	1975–1778			12 (Lisht/ [Memphis])	Yes			
MB IIB	1778–1750			13 (Lisht/ [Memphis])	Yes			
	1750–1680				Yes	14 (Hyksos)	Tanis	
MB IIC	1680–1613	400	68	(Thebes)	-	15 (Great Hyksos)	Avaris	
	1613–1572		40		-			Apopi
	1572–1544				17 (Thebes)	-	16 (Theban kings)	Edfu?
	1544–1533				Seqenenre Taa	-		
LB AI	1533–1530			Kamose	-	(‘ <i>War of the Hyksos</i> ’)		
	1530 –			18 (Thebes)				
	–1505			Ahmoose	Yes			

The comparison of archaeological data with the Turin King List shows that the three Hyksos dynasties should be in parallel (Schneider: 1998, 123-145; Vernus, Yoyotte: 1998, 63, 185-186). The 17th Dynasty is a continuation of the 13th dynasty, but the order of its 9 kings remains controversial (Polz: 2010, 343-352). As there were 50 kings in the 13th Dynasty (1778-1572) and 9 kings in the 17th (1572-1530) the average duration of each reign is approximately 4 years = (1778 – 1530)/(50 + 9). As we know the duration of the last two reigns (3 years for Kamose and 11 years for Seqenenre Taa), the 17th dynasty had to have started in 1572 BCE (= 1530 + 3 + 11 + 7x4). The average of 4 years may be adjusted based on the number of dated documents and highest dates (Ryholt: 1997, 203-204). There is no consensus about the reconstruction of the 13th Dynasty. The only document available to restore this dynasty is the Turin Canon (Dodson, Hilton: 2010, 100-129), despite its very incomplete state and numerous errors. Durations of missing reigns are supposed to be on average 5 years because the total of 24 known reigns is 118 years. Some lists of Pharaohs appear in a few tombs, but their ranking is sometimes surprising⁶¹. Consequently, the chronology of the 13th dynasty (1778-1572) is uncertain, because the position of the first 35 kings is approximate and the last 15 kings are not identifiable in the present state of documentation⁶². The reign of Sihornedjherkef Hotepibre having

⁶⁰ The site of Tell el-Dab'a, identified with ancient Avaris, was recently identified with the New Kingdom port of *Prw Nfr*, when two possible harbours were found (Bader: 2011, 137-158).

⁶¹ For example, on the scene called “Lords of the West” from Inherkau's tomb (TT359) we see on the top row from the right: 1) King Amenhotep I, 2) King Ahmoose I, 6) King Siamun A, 11) Crown Prince Ahmoose Sapaïr, then on the bottom row from the right: 1) Ahmes-Nefertiry, 2) King Ramses I, 3) King Mentuhotep II, 4) King Amenhotep II, 5) King Taa Seqenenre, 6) Crown prince Ra(?)mose, 7) King Ramses IV, 8) King unknown, 9) King Thutmose I.

⁶² The choice made here is that of Dodson who rearranged the Turin King List based on genealogical links between kings. It is difficult to assess the accuracy about those periods of reigns (for the first 35 kings), but a value around +/- 10 years would seem reasonable. Similarly, unknown durations have been replaced by an average value of 4 years, except for kings No. 7 to 10 and because of Nebnuni and Iufeni having left no relics (Quirke: 2010, 55-68) we can assume that their reigns were short.

several prestigious relics, we can assume that he easily exceeded the average of 4 years. In addition, there are several synchronisms between kings of Egypt and kings of Byblos (Gerstenblith: 1983, 101-107) as well as Zimri-Lim, a king of Mari, that allow the verifying of the reliability of the chronological anchorage. Assuming an exact contemporaneity, the death of Abi-Shemu had to have occurred c. 1790 BCE (death of Amenemhat III). The living conditions of Byblos Rulers at the time of these Egyptian kings being quite similar one can assume a period of about 25 years of reign, because eight reigns lasted 197 years (25 years = 197/8). Given that the historical sequence of kings of Byblos is known⁶³ (Nigro: 2009, 159-175), one can also assume that Neferhotep I was a contemporary of Yantin-Ammu since there was found at Byblos a relief showing Pharaoh Neferhotep I opposite Prince Yantin-(‘Ammu) of Byblos. In addition, in a letter dated the 9th year of Zimri-Lim (1680-1667), the name Yantin-Ammu appears as the donor of a gold cup (Ryholt: 1997, 87-88). According to astronomy the first year of the reign of Senwosret I (1946-1901) is dated in 1946 BCE (Gabolde: 2010, 243-256) which therefore fixes the reign of Neferu-sobek (1782-1778).

The following chronological reconstruction shows that the agreement between reign dates, including ¹⁴C* dates, is satisfied at +/- 10 years (the parts highlighted indicate a synchronism between two reigns and the parts highlighted in sky blue indicate that the dates of the reigns were anchored on astronomical dates):

TABLE 47

King of Mari	Reign	King of Byblos	Reign	#	King of Egypt	Reign	#
(King of Terqa) (Yaggid-Lîm)	1740? - -1724	Abi-Shemu	1815-1790	[25]	Amenemhat III (¹⁴ C*)	1836-1791	45
		Ip-Shemu-Abi	1790 -	[25]	Amenemhat IV (¹⁴ C*)	1791-1782	9
			-1765		Neferusobek. (¹⁴ C*)	1782-1778	4
		Yakin-el	1765-1740	[25]	Sobekhotep I	1778-1775	4
		Ilimi-yapi ?	1740 -	[20]	[Hotepibre	1753-1741	[12]
					[-] Sewadjkare	1741-1737	[4]
					Sobekhotep II	1737-1733	[4]
					Hor I	1732-1728	[4]
					Amenemhat VII	1728-1724	[4]
					Wegaf (¹⁴ C*)	1724-1722	2
(Yahdun-Lîm)	1724 - -1716	Yakin-[ilu II?]	1720 -	[25]	Khendjer	1722-1717	[4]
Yahdun-Lîm	1716 - -1699				Imyremeshaw	1717-1713	[4]
					Antef V	1713-1709	[4]
					Seth	1709-1705	[4]
					Sobekhotep III	1705-1701	[4]
Sûmû-Yamam	1699-1697		-1695		Neferhotep I	1701 - -1690	11
Samsî-Addu	1697-1687	Yantin-Ammu	1695 -	[25]	Sobekhotep IV	1690-1681	9
Yasmah-Addu	1687-1680				Sobekhotep V	1681-1679	2
Zimri-Lim	1680 - -1667		-1670		Sobekhotep VI	1679-1676	3
Yapaḥ-šumu-Abu	1667-1664	‘Egel?	1670 -		Ibiaw	1676 - -1665	11

The chronology anchored on the dates obtained by astronomy and that deduced from radiocarbon dating (¹⁴C), are in good agreement, radiocarbon dates being only about 15 to 20 years higher.

TABLE 48

Egypt	Reign		Hazor	Reign		Babylon	Reign	Chronology
Wegaf	1768-1765	¹⁴ C					1793-1750	Middle
	1710-1693	¹⁴ C		1700-1680	¹⁴ C		1720-1670	
Neferhotep I	1701-1690	*	Ibni-Addu	1685-1665	*	Hammurabi	1697-1654	Ultra-Low

The results of this Table 48 show the following:

- The ¹⁴C dating of the reign of Ibni-Addu (1700-1680) agrees only with the reign of Hammurabi (1697-1654) according to the Mesopotamian Ultra-Low chronology.
- The ¹⁴C dating of the reign of Neferhotep I (1701-1690) agrees with the conventional Egyptian chronology: 1721-1710 BCE in 2006 (Hornung, Krauss, Warburton: 2006, 492) or 1710-1693 BCE in 2019 (Maderna-Sieben: 2018, 94-95), and agrees only with the Mesopotamian Ultra-Low chronology.
- The reigns anchored on absolute dates obtained by astronomy: Neferhotep I (1701-1690); Ibni-Addu (1685-1665), provide a better chronological agreement and show that ¹⁴C dates are on average 20 years higher (¹⁴C*), which would date the reign of Hammurabi around 1720-1670 BCE, instead of 1697-1654 BCE, and that of Šamši-Adad I around 1730-1700 BCE, instead of 1712-1680 BCE.

⁶³ 1) Abi-Shemu I (Tomb I), 2) Ip-Shemu-Abi (Tomb II), 3) Yakin-el (Tomb III), a contemporary of Sihomedjherkef Hotepibre, and 4) Ilimi-Yapi (Tomb IV). Yatin-Ammu's father was Yakin.

It is difficult to improve the accuracy of radiocarbon dating of the reign of Abni-Addu because we ignore his predecessors, which prevents having other synchronisms. On the other hand, we know the predecessors and successors of Neferhotep I, which allows us to refine the dating of this reign.

NEFERHOTEP I KING OF EGYPT (1701-1690): ABSOLUTE CHRONOLOGY VERSUS ¹⁴C DATING

Neferhotep I's relative chronological position is secured thanks to the Turin King List as well as contemporary attestations. He was the successor of Sobekhotep III and predecessor of Sobekhotep IV. On the other hand, the absolute chronological position of Neferhotep is debated, with Ryholt and Baker seeing him respectively as the 26th and 27th pharaoh of the 13th Dynasty while Detlef Franke and Jürgen von Beckerath contend that he was only the 22nd ruler. Similarly, the absolute dating of Neferhotep's reign varies by as much as 37 years between scholars: 1742-1731 BCE according to Kim Ryholt (Ryholt: 1997, 197) and 1705-1694 according to Thomas Schneider (Schneider: 1997, 1102-1107). Ryholt is the only Egyptologist who has published a book to explain in detail how he calculated the chronology of the Second Intermediate Period (1800-1550) including the reign of Neferhotep I. For the internal chronology of the 13th Dynasty, Ryholt relied partly on the Turin King-list (TKL) and partly on dates preserved in contemporary sources⁶⁴ (Ryholt: 1997, 190-251). From the latter group, only dates within the first regnal year and the highest attested dates are mentioned, since only these aid in establishing the reign lengths of the individual kings. The dates within the first regnal year help to narrow the accession date of the kings within the civil year.

In order to evaluate Ryholt's chronology, the absolute chronology based on astronomical dates (highlighted in midnight blue) is used to measure dating deviations. The 12th Dynasty chronology is used to measure the differences (D14) between radiocarbon dates (¹⁴C date) and dates deduced from astronomy (Astro date). This date difference (D14 = ¹⁴C date - Astro date) is due solely to the errors in radiocarbon measurements which are random (+/- 10 years). As the 12th Dynasty ends in **1778 BCE** according to astronomy, this date serves as an anchor for the beginning of the 13th Dynasty. However, as Ryholt chose the date 1803 BCE instead of 1768 BCE (the date obtained by ¹⁴C) a second deviation (DR) was introduced to measure the differences between the dates having as reference the astronomic dates (DR = D14 - 25 years, with 25 years = 1803 BCE – 1778 BCE). There is no consensus about the reconstruction of the 13th Dynasty. The only document available to restore this dynasty is the Turin King-list (Dodson, Hilton: 2010, 100-129). Consequently, the chronology of the 13th dynasty is uncertain because the position of the first 35 kings is approximate and the last 15 kings are not identifiable in the present state of documentation. It is assumed that the 17th dynasty (**1572-1530**) is a continuation of the 13th dynasty (**1778-1572**).

The 15th dynasty lasted about 108 years according to the Turin King-list and, according to Herodotus, the Egyptians did not want to remember this period perceived by them as harmful and which had lasted 106 years (The Histories II:128). According to the Stele of year 400, found at Tanis, the 15th dynasty of the Great Hyksos would have begun around 1680 BCE, 400 years prior to Ramses II. The Stele, made under Ramses II, apparently refers to the Sethian dynasty of the Hyksos, 400 years earlier⁶⁵. The era of Ramses II would be a continuation of a prestigious past, which would place the establishment of the cult of Seth/Baal around 1680 BCE, if one counts from Ramses II's reign. It should be noted that Seth is completely absent from the title of Ramses II (1283-1216) and its worship appears only after the Battle of Kadesh (Desroches Noblecourt: 1996, 185-189, 370-372) and from the construction of the temple of Abu Simbel started in Year 5 of his reign in **1279 BCE** (= 1283 – 5 + 1). Accordingly, the 15th dynasty began in **1679 BCE** (= 1279 + 400) and ended in **1572 BCE** (= 1679 – 108 + 1). The chronological data on the Hyksos period are few, but they overlap quite well.

⁶⁴ Neferhotep I is known from a relatively high number of objects found over a large area, from Byblos to the north to the Egyptian fortresses of Buhen and Mirgissa in Lower Nubia to the south through all parts of Egypt, especially in the southern portion of Upper Egypt. A single attestation is known from Lower Egypt, a scarab from Tell el-Yahudiya. Other attestations include over 60 scarab seals, 2 cylinder-seals, a statue from Elephantine, and 11 rock inscriptions from Wadi el Shatt el-Rigal, Sehel Island, Konosso and Philae. The inscriptions record the members of Neferhotep's family as well as two high officials serving him: The royal acquaintance Nebankh and the Treasurer Senebi. Two stelae are known from Abydos one of which, usurped from king Wegaf and dated to his 4th regnal year, forbids the construction of tombs on the sacred processional way of Wepwawet. Two naoses housing two statues each of Neferhotep, as well as a pedestal bearing Neferhotep's and Sobekhotep IV's cartouches, have been found in Karnak. There are also a few attestations from the Faiyum region where the capital of Egypt was located at the time, in particular a statuette of the king dedicated to Sobek and Horus of Shedet, now on display in the Archaeological Museum of Bologna. Inscriptions from Aswan indicate that Neferhotep I had at least two children, named Haankhef and Kemi like his parents, with a woman called Senebsen.

⁶⁵ The interpretation of this stele is controversial because it represents the vizier Sety (grandfather of Sety I, father of Ramses II), commemorating the event, but Ramses II seems to have connected his reign to his predecessor whose name Sethos I referred to the god Seth.

The Egyptian priest Manetho wrote (c. 280 BCE) that the Hyksos ruled Egypt from Pharaoh Toutimaïos (Doudimes?) and they were expelled by the Pharaoh Ahmose (1530-1505). Eusebius (Preparatio Evangelica IX:27:3-5) quotes Artapan's book entitled: *The Jews* (written c. 200 BCE), explaining that the region above Memphis was divided into various kingdoms under Pharaoh [Sobekhotep IV] Chenephres⁶⁶ (1690-1682). From this pharaoh, titles acquired a military bearing; they pertain to security and replace the character of administrative function of titles from the late Middle Kingdom. Similarly, the evolution of sculpture—relief and full relief—can follow an obvious loss of interest in quality. All these changes could be explained by the presence of Asiatic dynasties, especially the Hyksos dynasty (15th). There is no consensus to precisely restore the chronology of the 15th dynasty (**1680-1572**), except for Apopi, its last Hyksos king, who is well attested and reigned about 4[1] years according to the Turin king-list (Schneider: 1998, 57-75).

The Khyan sealings found at Edfu, in the same context together with those of Sobekhotep IV (1690-1681), attest a peaceful contact between the Hyksos (15th Dynasty)⁶⁷ and Upper Egypt (13th Dynasty) at that time (Moeller, Marouard: 2011, 108-111). The reign of Neferhotep I is located in a part of the Turin King List which is well identified. The missing reigning periods in the list of the first 25 kings of the 13th dynasty are replaced by an average value of [4] years (= [1778 – 1679]/25). The duration of the 5 reigns from Sobekhotep III to Sobekhotep VI can be reconstructed because the durations of all these reigns are known, except that of Sobekhotep V which can be replaced by an estimated value of [3] years, which gives a total duration of 27 years⁶⁸ between Sobekhotep III and Sobekhotep V (1705 = 1679 + 27 - 1).

TABLE 49

Dyn	EGYPT	TKL	¹⁴ C (Ryholt)	#	DR	D14	Astro date
13	20 Seth	[3] years	1752-1749		+43	+18	1709-1705
	21 Sobekhotep III <i>Sekemresewadjtawy</i>	4 years 2 m.	1749-1742	27	+44	+19	1705-1701
	22 Neferhotep I <i>Khasekhemre</i>	11 years 4 m.	1742-1731		+41	+16	1701-1690
	23 Sihathor <i>Menwadjre</i>	0 years X m.	1732-1732		+42	+17	1690-1690
24 Sobekhotep IV <i>Khaneferre</i>	9 II Akhet 3	1732-1720	+42		+17	1690-1681	
(15)	25 Sobekhotep V <i>Merhotepre</i>	[3] years	1720-1717		+39	+14	1681-1679
	26 Sobekhotep VI <i>Khahotepre</i>	4 years 8 m.	1717-1712	400	108	+13	1679-1676
	27 Ibiaw <i>Wahibre</i>	10 years 8 m.	1712-1701			+11	1676-1665

The relatively short duration of most of the 13th Dynasty's reigns, 4 years on average, has long intrigued Egyptologists compared to the average duration of 25 years for the 8 kings of the 12th Dynasty (25 years = [1975 – 1778]/8). The succession of Neferhotep I helps to explain the short durations of the 13th Dynasty, because whereas the kings of the 12th Dynasty succeeded one another from father to son, the kings of the 13th Dynasty succeeded one another from elder brother to younger brother⁶⁹. Paralleling ¹⁴C dates (Bronk Ramsey, Dee, Rowland, Higham, Harris, Brock, Quiles, Wild, Marcus, Shortland: 2010, 1554-1557) with astronomy-based dates. The astronomical dates (highlighted in sky blue) are obtained by calculations that are not mentioned in this study. For example, according to astronomy the first year of the reign of Senwosret I (1946-1901) is dated in **1946 BCE** (Gabolde: 2010, 243-256) which therefore fixes the reign of Neferusobek (1782-1778). The reign dates come from the Turin King List (TKL):

TABLE 50

Dyn	EGYPT	Highest date/ TKL	¹⁴ C date	#	DR	D14	astronomical date
12	1 Amenemhat I (¹⁴ C*)	30	1975-1948	197		00	1975-1946
	2 Senwosret I (¹⁴ C*)	45	1948-1903			+2	1946-1901
	3 Amenemhat II	35	1903-1870			+2	1901-1863
	4 Senwosret II	8	1870-1863			+7	1863-1855
	5 Senwosret III	19	1863-1825			+8	1855-1836

⁶⁶ The information is accurate, because the royal activities during the 13th dynasty are attested until the end of Sobekhotep IV's reign, the most prestigious king of this dynasty (Vandersleyen: 1995, 123,140,159-160), further to the north of Thebes rather than Thebes itself (the capital of Egypt remained Lisht until the end of the dynasty).

⁶⁷ Hyksos kings of the 15th dynasty were considered genuinely Egyptian kings since a manuscript, dated to the Third Intermediate Period (Barbotin: 2008, 58-59), lists two of them (likely six in all) in the following order: Shareq, Apopi, Ahmose and Amenhotep I.

⁶⁸ (0 year + X months) + (8 years + X months) + ([N] years) + (4 years + 8 months) = 4x[4 years] = 16 years; [N] = [3].

27 years = (4 years + 8 months) + (11 years + 4 months) + (0 year + X months) + (8 years + X months) + ([3] years).

⁶⁹ Towards the end of his reign, Neferhotep I shared the throne with his brother Sihathor, a coregency that lasted a few months to a year. Sihathor died shortly before Neferhotep, who probably then appointed another brother, Sobekhotep IV, as coregent. In any case, Sobekhotep IV succeeded Neferhotep I soon afterwards, and reigned over Egypt for 11 years and 4 months. The reigns of the two brothers mark the apex of the 13th Dynasty.

When kings succeeded one another from father to son in a peaceful context the average length of reigns is related to the average life span by the following equation: Average length of reigns = (average life span)/(3 x number of brothers). For example, with an average life of 75 years and a succession of only the elder brother the average length of reign is 25 years (= 75/3) but with an average life of 60 years and a succession of 5 brothers the average length of reign is 4 years (= 60/[3x5]).

	6	Amenemhat III	46	1825-1781			-11	1836-1791	
	7	Amenemhat IV	9 years 4 months	1781-1773			-10	1791-1782	
	8	Neferusobek (¹⁴ C*)	3 years 10 months	1773-1768			-9	1782-1778	
				K. Ryholt				astronomy	
13	1	Sobekhotep I	4 [I Akhet	1803-1800		+25	00	1778-1775	
	2	Sonbef	5 [I Akhet	1800-1796		+25	+2	1775-1771	
	3	[-] Nerikare	[4] years	1796-1796		+25	+2	1771-1765	
	4	Amenemhat V	[4] years	1796-1793		+31	+6	1765-1761	
	5	Qemaw	[4] years	1793-1791		+32	+7	1761-1757	
	6	Iufeni	-	1788-1788		+31	+6	1757-1757	
	7	Amenemhat VI	[4] years	1788-1785		+31	+6	1757-1753	
	8	Nebnuni	0 year ?	1785-1783		+32	+7	1753-1753	
	(14)	9	Sihor. Hotepibre	[4] years ?	1791-1788		+38	+13	1753-1741
		10	[-] Sewadjkare	[4] years ?	1781		+40	+15	1741-1737
		11	[-] Nedjemibre	0 year 7 months	1780-1780		+43	+18	1737-1737
		12	Sobekhotep II	[4] years	1780-1777		+43	+18	1737-1733
		13	Reniseneb	0 year 4 months	1777-1777		+45	+20	1733-1732
		14	Hor I	[4] years	1777-1775		+45	+20	1732-1728
		15	Amenemhat VII	[4] years	1769-1766		+41	+16	1728-1724
		16	Wegaf (¹⁴ C*)	2 years 3 months	1766-1764		+42	+17	1724-1722
		17	Khendjer	5 I Akhet 15	1764-1759		+42	+17	1722-1717
		18	Imyremeshaw	[4] years	1759-1755		+42	+17	1717-1713
		19	Antef V	[3] years	1755-1752		+42	+17	1713-1709
		20	Seth	[3] years	1752-1749		+43	+18	1709-1705
	21	Sobekhotep III	4 years 2 months	1749-1742	27	+44	+19	1705-1701	
	22	Neferhotep I	11 years 4 months	1742-1731		+41	+16	1701-1690	
	23	Sihathor	0 years X month	1732-1732		+42	+17	1690-1690	
	24	Sobekhotep IV	9 II Akhet 3	1732-1720		+42	+17	1690-1681	
(15)	25	Sobekhotep V	[3] years	1720-1717		+39	+14	1681-1679	
	26	Sobekhotep VI	4 years 8 months	1717-1712	400	108	+13	1679-1676	
	27	Ibiaw	10 years 8 months	1712-1701			+11	1676-1665	
	28	Aya	[1]3 years 8 months	1701-1677				1665-1652	
	29	Ini I	2 years 2 months	1677-1675				1652-1650	
	30	Sewadjtu	3 years 4 months	1675-1672				1650-1647	
	31	Ined	3 years 1 month	1672-1669				1647-1644	
	32	Hori	5 years	1669-1664				1644-1639	
	33	Sobekhotep VII	2 years	1664-1662				1639-1637	
	34	Ini II	[4] years	1662-1658				1637-1633	
	35	Neferhotep II	[4] years	1658-1654				1633-1629	
		?		1654 -			+13	1629 -	
		Sobekhotep VIII*	16 years					1615-1590	
(16)	50	?		-1580				-1572	
17	1	Rahotep	[4] years	1580-1576		40	+8	1572-1568	
	2	Sobekemsaf I	[2] years	1576-1573			+8	1568-1566	
	3	Sobekemsaf II	7	1573-1573			+7	1566-1556	
	4	Antef VI	[2] years	1573-1571			+17	1556-1554	
	5	Antef VII	3 III Peret 25	1571-1566			+17	1554-1545	
	6	Antef VIII	0	1566-1566			+21	1545-1545	
	7	Ahmoise Senakhtenre	1	1566-1559			+21	1545-1544	
	8	Taa Seqenenre	11 II Shemu (1)	1559-1558			+25	1544-1533	
	9	Kamose	3 III Shemu 10	1558-1554			+25	1533-1530	
18	1	Ahmoise (¹⁴ C*)	22	1557-1532			+27	04/1530-07/1505	
	2	Amenhotep I (¹⁴ C*)	21	1532-1511			+27	08/1505-02/1484	
	3	Thutmose I	11 ?	1511-1499			+27	02/1484-11/1472	
	4	Thutmose II	1 II Akhet 8	1499-1486			+27	08/1472-05/1469	
		[Hatshepsut] (¹⁴ C*)	20 III Peret 2	[1480-1458]				[08/1472-04/1450]	
	5	Thutmose III (¹⁴ C*)	54 III Peret 30	1486-1434			+14	08/1472-03/1418	
	6	Amenhotep II (¹⁴ C*)	26	1434-1407			+15	04/1418-02/1392	
	7	Thutmose IV	8 III Peret 2	1407-1397			+14	02/1392-10/1383	
	8	Amenhotep III (¹⁴ C*)	38 III Shemu 1	1397-1359			+14	10/1383-07/1345	
	9	Amenhotep IV (¹⁴ C*)	17 II Akhet	1359-1345			+3	03/1356-10/1340	
	10	Semenkhkare	1	1345 -			+5	10/1340-11/1338	
	11	-Ankhkheperure	3 III Akhet 10	-1342				11/1338-11/1337	
12	Tutankhamun (¹⁴ C*)	10 [III Akhet]	1342-1333			+5	11/1337-10/1327		

Astronomical dates (highlighted in sky blue) are given as an indication to avoid weighing down this article. It can be seen that from Amenhotep IV onwards the date differences (D14) are small since this reign is dated to 1359-1345 BCE by ¹⁴C and 03/1356-10/1340 by astronomy. For example, the papyrus Ebers dated Year 9 of Amenhotep I begins a list of celebrations with: “Feast of the New Year, III Shemu, day 9, rising of Sirius” (Von Bomhard: 1999, 32-33). It is a lunar date because the Sothic rising at that time was on 11 July and this date in the Egyptian civil calendar should have been III Shemu 14 (11 July)⁷⁰. This Sirius rising was dated in Year 9, month 9 and lunar day 9 (III Shemu 9) because of the symbolism of the number 9⁷¹. This chronological information makes it possible to anchor the chronology of Dynasty 18 on the reign of Amenhotep I (08/1505-02/1484) calculated by astronomy.

Calendars in 1496 BCE

TABLE 51

JUNE																															JULY (Julian calendar)																															AUGUST																														
26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4																																																					
										Full moon											Sothic rising											1st lunar crescent (= new moon +1)																																																												
SIMANU (Babylonian calendar)															DUMUZU																																																																													
7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17																																																					
III SHEMU (Egyptian civil calendar)															IV SHEMU																																																																													
29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8																																																					
II SHEMU						III SHEMU (Egyptian lunar calendar)																																																																																						
24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3																																																					

The chronology of Dynasty 18 is therefore exactly determined by astronomy⁷², which shows that ¹⁴C dating (IntCal09) is overestimated⁷³ by about 27 years (D1). This ageing of the dates is confirmed by the stratigraphic dating of the nine kings of Dynasty 17 which ends around 1545 BCE instead of 1557 BCE according to radiocarbonists (Dodson, Hilton: 2010, 122-129,290).

TABLE 52

Babylonian kings	reign		Dynasty 18	¹⁴ C dating	astronomical dating	Reign duration	D1
Ammišaduqa	1551-1530						
Samsuditana	1530 -	1	Ahmoose	1557-1532	04/1530-07/1505	25 years 4 months	+27
	-1499	2	Amenhotep I	1532-1511	08/1505-02/1484	20 years 7 months	+27
Burna-Buriaš I	1495-1479	3	Thutmose I	1511-1499	02/1484-11/1472	12 years 9 months	+27

The dating of the reign of Neferhotep I (1701-1690) anchored on absolute chronology, and in agreement with the ¹⁴C dating (1717-1706), confirms the synchronism between the reign of Hammurabi (1697-1654) and Neferhotep I. This synchronism is also confirmed by the dating of the reign of Ibni-Addu (1685-1665) anchored on absolute chronology, and in agreement with the ¹⁴C dating (1700-1680).

TABLE 53

EGYPT	Reign	BYBLOS	Reign	HAZOR	Reign	BABYLON	Reign
Neferhotep I	1701-1690	Yantin-Ammu	1695-1670	Ibni-Addu	1685-1665	Hammurabi	1697-1654
¹⁴ C date:	1717-1706			¹⁴ C date:	1700-1680		
D14 :	+16 years				+15 years		

Radiocarbonists defending the Middle Chronology instead of the “Ultra-Low” Chronology have been misled due to a methodological problem (only the reigns associated with many carbonaceous objects are dateable by radiocarbon) and ignorance of historical eclipses (only total eclipses over a Mesopotamian capital city have been observed). The 15–20-year gap between the ¹⁴C dates over the period 1750-1350 BCE and the dates anchored by the absolute chronology has long been ignored by radiocarbonists, as this discrepancy has been equated with measurement errors. For example, the trees carbonized by the eruption of the Santorini volcano (Thera) have been dated precisely in 1627 BCE by dendrochronology but around 1645 +/- 25 BCE by ¹⁴C. However, as the accuracy of the ¹⁴C measurements had been improved to +/- 8 years (instead of +/- 25 years), it was no longer possible to match the two dates, which were approximately 18 years apart (= 1945 BCE - 1927 BCE). This conundrum was solved recently: it had to be admitted that the calibration curve of the ¹⁴C had to be recalibrated by 18 years! (Van Der Plicht, Bronk Ramsey, Heaton,

⁷⁰ Julian day = 201 + (139 - Year*)/4 + (Egyptian day - 1); Year* = astronomical year.

⁷¹ The number “9” in Egyptian is called *psd* “shine”, which also explains the connection between lunar day 1 *psdntyw* “those shining ones”, the Ennead of gods (*psdt*) and the Nine Bows (*psdt*).

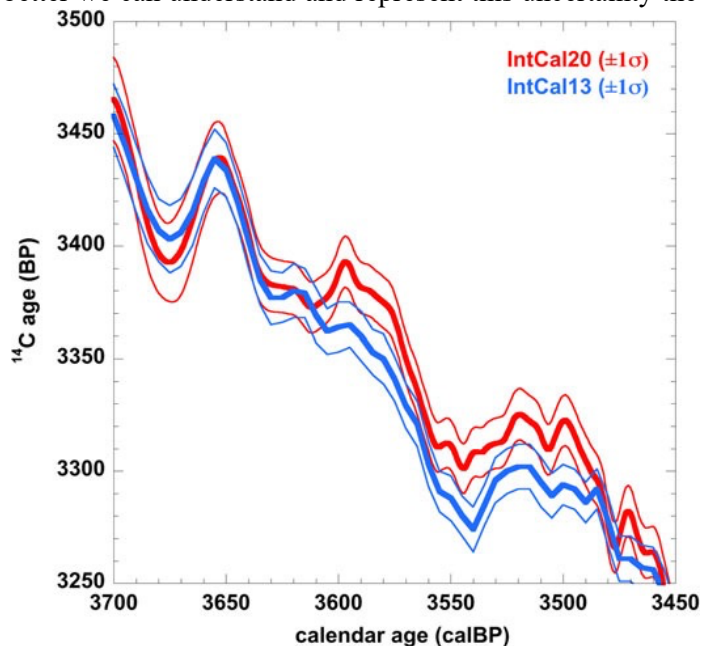
⁷² The first day of the Egyptian lunar calendar coincided with the full moon (Gertoux: 2018, 202-207; 2020, 273-279), not with the first invisibility (= day after the astronomical new moon and before the first astronomical crescent moon) as Egyptologists have believed since the study of Richard A. Parker in 1950.

⁷³ IntCal09 means “calibration curve” established in 2009 (<https://intcal.org/curves.html>)

Scott, Talamo: 2020, 1-23). For calibration purposes, chronological anchor points provide crucial tests. A case in point of major importance is the catastrophic Minoan eruption of the Santorini/Thera volcano in the second millennium BC, a crucial anchor for Bronze Age prehistory. The precise date of the eruption has been debated for decades. Using a Greenland ice core chronology, the Thera eruption was originally thought to date to around 1645 BCE based upon volcanic tephra found in the core. However, a recent and timely analysis shows that these volcanic horizons are more likely to be the result of eruptions in Alaska rather than Thera (McAneney, Baillie: 2019, 99-112). ^{14}C dating obviously plays a major role in this discussion. The debate has been and still is that ^{14}C shows older dates than archaeological dating of the eruption, up to more than a century. The authors of the study explain:

A key component for reliable radiocarbon calibration is the quantification and modeling of uncertainty, as well as how we approach data from different laboratories, different trees, different regions, and different environmental compartments. This is critical both for the construction of a robust IntCal20 curve and later calibration against it. We use the word uncertainty rather than error since it more correctly captures the natural variations that we are concerned with. Simply put every ^{14}C measurement comes with a measure of uncertainty (estimated by the laboratory) which must be incorporated into the curve fitting and calibration procedures. The better we can understand and represent this uncertainty the more reliable the calibration process.

Historically, from radiometric days, the quoted error was provided by the laboratory considering the internal measurement processes only. When an assemblage of dates is then formed, it frequently becomes apparent that the scatter in the results from the individual laboratory is greater than had been imagined given the quoted uncertainties on the individual measurements (...) This development led to major ^{14}C (re)dating efforts of wood dated by dendrochronology for the relevant time range (...) The result is that indeed between ca. 3600 and 3500 calBP the calibration curve needs a shift of about 20 BP upwards in ^{14}C age, as can be seen in the figure (opposite). By itself, this confirms the original observation by



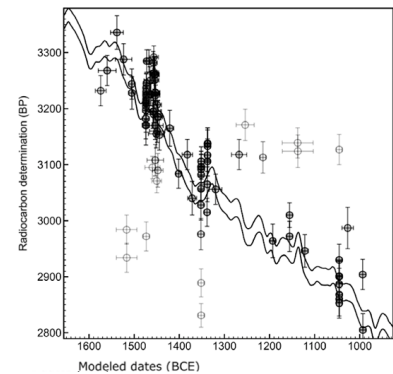
Pearson et al. (2018) and so, after calibration, the calendar dates will, therefore, become younger by a certain amount (...) Summarized, the ^{14}C date of the eruption can be taken as 3350 ± 10 BP ($1-\sigma$), which is an average of many dates from key sites like Palaikastro and Akrotiri (Bronk Ramsey et al. 2004; Bruins et al. 2008). Calibrating this ^{14}C date with calibration curves prior to the present IntCal20 curve yields a calendar date of the event in the late 17th century BC, most notably by wiggle matched ^{14}C dates of tree rings from an olive tree killed by the eruption. This resulted in a date of 1627–1600 BC for the event (Friedrich et al. 2006), between 100–150 years older than previous traditional archaeological assessments. This difference between archaeology and ^{14}C has spawned debates lasting decades (...) With IntCal13, the posterior calendar age estimate is approximately unimodal (i.e., shows a single large peak). In such an instance, it is reasonable to report a single interval—here we obtain a 68.2% ($1-\sigma$) interval extending from 1658–1624 calBC (= 1641 BCE \pm 17). However, with IntCal20 the picture is much more complex as our ^{14}C date of 3350 ± 10 BP hits the plateau in the curve (...) we note that the peak centered around 1625 calBC (1626 BCE \pm 19) carries the largest individual probability.

This new calibration curve transforms the raw radiocarbon dates (BP) into calibrated radiocarbon dates (calBP). Before 2020 the previous curve (IntCal13) gave the date of 1641 BCE but now the new curve (IntCal20) gives the date of 1626 BCE, i.e., a rejuvenation of 15 years (= 1641 - 1626). Although this 15-year lag depends on the position on the calibration curve and varies according to a complex relationship, this 15-year value corresponds to those measured with the ^{14}C dates of the reigns of Neferhotep I and Ibni-Addu. This recalibration of the ^{14}C dates proves that only the chronology anchored on absolute dates obtained by astronomy is an absolute chronology (± 0 year). For example, the reign of Senwosret I (1946-1901) is supported by astronomical evidence, but radiocarbonists take no account of this, proposing their own chronologies: Chrono1 (Bronk Ramsey et al: 2010, 1554-1557), Chrono2 (Höflmayer, Manning: 2022, 1-24), Chrono3 (Stiebing, Helft: 2023, 9,203). Chrono1 fits in well (± 10 years) with astronomical values.

TABLE 54

		Astronomy		¹⁴ C dating						
Dynasty 12		Reign	#0	Chrono1	#1	Chrono2	#2	Chrono3	#3	Δ3
1	Amenemhat I	1975-1946	29	1975-1948	27	[2003-1994]	29	1991-1962	29	+16
2	Senwosret I	1946-1901	45	1948-1903	45			1971-1926	45	+25
3	Amenemhat II	1901-1863	38	1903-1870	33			1929-1895	34	+27
4	Senwosret II	1863-1855	8	1870-1863	7			1897-1878	19	+34
5	Senwosret III	1855-1836	19	1863-1825	38	1892-1853	39	1878-1839	39	+23
6	Amenemhat III	1836-1791	45	1825-1781	44	1853-1807	46	1860-1814	46	+24
7	Amenemhat IV	1791-1782	9	1781-1773	8	1807-1798	9	1815-1806	9	+24
8	Neferusobek	1782-1778	4	1773-1770	3	1798-1794	4	1806-1802	4	+24
Dynasty 18										
1	Ahmosé	1530-1505	25	1557-1532	25			1570-1545	25	+40
2	Amenhotep I	1505-1484	21	1532-1511	11			1545-1525	20	+40
3	Thutmose I	1484-1472	12	1511-1499	12			1525-1492	33	+41

The Table 54 shows that, unlike astronomy, ¹⁴C dating does not provide an absolute chronology. For example, Ahmosé's reign: 1557-1532 BCE +/- 10 years (Chrono1) is only the mean value of a set of measurements (image on the right), according to the IntCal13 calibration curve, and the precision of +/- 10 years is actually not the margin of error but the statistical deviation of one standard deviation (+/-1σ) from this mean with a 68% confidence range. With two standard deviations (+/-2σ) the precision becomes +/- 20 years (95% confidence range) and with the IntCal20 calibration curve Ahmosé's reign is lowered by 20 years: 1537-1512 BCE +/- 10 years (+/-1σ), which corresponds exactly to astronomical dating: 1530-1505 BCE (absolute dating).



According to radiocarbonists, Djer's reign should be dated to 3055-2965 BCE with a margin of error of +/- 19 years (68% confidence range) or 3078-2967 BCE with a margin of error of +/- 55 years (95% confidence range). It is easy to see that the highest confidence range (95%) gives a reign length (Δ2) of 111 years, which is physically impossible, but this outlier does not confuse radiocarbonists. Second, even if the length of the reigns cannot be evaluated in absolute value, it can be evaluated in relative value deduced from the number of censuses and it is easy to see that the lengths of the reigns obtained by ¹⁴C (Δ2) have no connection with those from the Egyptian king lists (Δ0). Third, radiocarbonists claim (naively) to establish an absolute chronology, but the dates obtained get younger with time since the beginning of Dynasty 2 started around 2930 BCE, in 1992 (Vercoutter: 1992, 200,223), then around 2819 BCE, in 2013, then around 2700 BCE, in 2019 (Mączyńska, Chłodnicki, Ciałowicz: 2019, 1-139), a rejuvenation of 230 years in only 27 years, which is much for an “absolute chronology”. Paradoxically, in 1970, the first (uncalibrated) ¹⁴C dates of the Egyptian dynasties (Berger: 1970, 23-36) were much lower than later results.

TABLE 55

¹⁴ C dating in:	1970 (uncalib)	1992 (IntCal98)	2013 (IntCal13)	2019 (IntCal20)
Dynasty 1	2685–2315	3185–2930	3150–2819	3000–2700
Dynasty 2	2315–2225	2930–2715	2819–2660	2700–2600

The preceding results clearly show that the Egyptian chronology obtained by ¹⁴C measurements is not an absolute chronology, contrary to the claims of radiocarbonists, but only a relative chronology, calibrated by dendrochronology, which must be recalibrated on absolute dates retro-calculated by astronomy. In recent years, absolute calendrical dates for the Middle Bronze Age in the southern Levant have been challenged by several radiocarbon sequences. The traditional model was based on general historical associations with Dynastic Egypt, and hence absolute dates in the Levant were derived from the historical chronology of the Nile Valley (Höflmayer: 2022, 52-69). The Mesopotamian chronology obtained by ¹⁴C measurements is not reliable because of the almost complete absence of carbonaceous residues, which are perishable (except in Egypt because of the climate). For example, the oldest building unearthed at Ebla (Palace G), which can be associated with the beginning of kingship, is stratigraphically dated between 2700 and 2400 BCE (Kühne, Czichon, Kreppner: 2008, 66), i.e. an average date of 2550 BCE +/- 150 years⁷⁴.

⁷⁴ The king lists of the 33 kings of Ebla do not give the duration of their reigns, but the numerous synchronisms with the kings of Mari allow to precisely calculate the duration of the last three reigns (n°31 to n°33) and approximately that of the eight preceding reigns (n°23 to n°30). If we suppose that the average duration of these eight kings from Abur-Lim (2340-2318) to Igriš-Halab (2264-2252), of 11 years (= [2340 - 2252]/8), was the same as the 22 previous kings, the first king (Sakune) thus began to reign around 2582 BCE (= 2340 BCE + 22x11), a date close to the one obtained by stratigraphy (2550 BCE +/- 150). As the minimum duration of the reigns was 6 years this implies an average duration of 11 years with a variation of +/- 5 years on the averages.

Why do Assyriologists reject Ultra-Low Chronology?

Mesopotamian chronology was debated for a long time among Assyriologists, who finally accepted (in 1950) a Middle Chronology (between High and Low) based on a majority consensus but not on astronomical arguments, which were considered questionable at the time. In 1998 Hermann Gasche showed that the astronomical arguments and the relative Assyrian chronology were solely in favour of an “Ultra-Low” Chronology, but his proposal was rejected. The main reason for this rejection was the refusal to break the consensus around the Middle Chronology.

His main conclusion is that the fall of Babylon at the end of the so-called "Paleo-Babylonian" period, marked by the capture of the city by the Hittite king Muṣṣili I and the disappearance of the Babylonian king Samsu-ditana, the last of Hammurabi's successors, is to be dated to 1500 BCE, whereas the middle chronology places this event in 1595 (...). However, although very convincing, this new chronology is subject to verification and debate in the scientific community and cannot yet be considered as official. It therefore seemed more reasonable to us, in order to maintain a certain coherence with the bibliography as a whole to which the entries in this dictionary refer, to retain the most widespread system currently in use, which remains that of the middle chronology (...). In Babylonia, during the reign of Hammurabi's fourth successor, Ammiṣaduqa, the phenomena of the occultation of the planet Venus were recorded (known by copies from the 7th century). The conversion of the date of this phenomenon into absolute chronology served as an anchor for the chronology of this period, with three major possibilities that determined three systems called "low", "middle", and "high" chronology. For many reasons, the "middle" chronology has emerged as the most plausible and is commonly used. Recently, however, a general revision of the 2nd millennium chronology, focusing on the date of the fall of the first Babylonian dynasty (which occurred in 1595 according to the middle chronology) and combining archaeological, textual, and astronomical data, has very convincingly set the date of this event at 1500 BCE, within a few years, a century later than the "middle chronology" (Joannès: 2001, XI, 184-188).

At the 46th Rencontre assyriologique internationale on 12 July 2000, a meeting of Assyriologists concluded that dendrochronology imposed a lower chronology than the Middle Chronology but that there was still no consensus for the following reasons: the astronomical data concerning the lunar eclipses of Ur III were extremely debated and most Hittitologists defended the Middle Chronology because, according to them, *the average duration of a generation should be 24.01 years*, whereas it was only 18.27 years according to the Ultra-Low Chronology (Beckman: 2000, 19-32). This objection is not valid because no duration of these reigns is known, moreover, if we use the average duration of the 5 reigns between Tuṭḫaliya I (no. 16), dated c. 1400 BCE (Bryce: 2012, 310), and Šuppiluliuma I (no. 21), dated in 1353 BCE, by around 10 years (= [1400 - 1353]/5), the reign of Muṣṣili I (no. 4) must be dated c. 1490 BCE (= 1400 + 9x10), as there are only 9 effective reigns between these two kings (no. 4 & 16) because Zidanta I (no. 6), Ḫuzziya II (no. 8) and Taḫurwaili I (no. 10) had very short reigns. Instead of pursuing this debate, Assyriologist Cécile Michel and astronomer Patrick Rocher have proposed to anchor Mesopotamian chronology on the darkening of the sun mentioned during the eponymy of Puzur-Ištar (N°126), the year just after the birth of Šamšī-Adad I, which was interpreted as a solar eclipse dated 19 November 1795 BCE (Michel, Rocher: 2000, 111-126). If this debate among Assyriologists had been pursued in depth, the two objections would easily have been refuted because the two lunar eclipses of Ur III are not only precisely dated (14/III/48 of Šulgi and 14/XII/24 of Ibbi-Sin), but they must also have been total, since they were bad omens (partial eclipses cannot therefore be accepted), and exactly 42 years and 9 months apart. Cécile Michel realised that the eclipse dated 19 November 1795 BCE gave rise to several chronological inconsistencies, so she proposed the solar eclipse dated 24 June 1833 BCE (Michel: 2002, 17-18). Once again, this date leads to chronological inconsistencies, because if Šamšī-Adad I had been born one year before this eclipse, i.e. in 1834 BCE, he would have died in 1761 BCE (= 1834 + 199 - 126), which is not in agreement with either the Middle Chronology (1776 BCE) or the Low Chronology (1712 BCE). So Cécile Michel invented a new concept that would prove highly successful: the “Low Middle” Chronology. A comparison of the different chronologies (Table 56) shows that only the Ultra-Low Chronology matches the absolute dates of the total lunar eclipses (highlighted in black) and the reign of Šamšī-Adad as determined by the Assyrian King List (AKL).

TABLE 56

Chronology (BCE):	Ultra-Low	Low	Low-Middle	Middle	High
Eclipse 14/III/48 of Šulgi (Ur III)	28/06/1954	-	-	-	-
Eclipse 14/XII/24 of Ibbi-Sin (Ur III)	06/03/1911	-	-	-	-
Fall of Ur	1912	1944	1983	2008	2064
Reign of Šamšī-Adad I (AKL)	1712-1680	1745-1712	1784-1761	1809-1776	1865-1832
Reign of Hammurabi	1697-1654	1729-1686	1778-1635	1793-1750	1849-1806
Reign of Ammiṣaduqa (Venus tablet)	1551-1530	1583-1562	1632-1611	1647-1626	1703-1682
Fall of Babylon	1499	1531	1580	1595	1651
Eclipse 14/V/38 of Babylon's resettlement	19/07/1462	-	-	-	-

It is easy to see that this new concept of a “Low Middle” Chronology is illogical because it would mean that the astronomical information on the Venus tablet would be completely false (the errors on this tablet can be explained by copying errors but in no way invalidate the observation of a transit of Venus through the sun). Furthermore, it is impossible to identify astronomically the two total lunar eclipses of the Ur III dynasty, even though they are precisely dated in the Babylonian lunar calendar, outside these dates⁷⁵. In addition, only the Ultra-Low chronology is consistent with the chronology deduced from the Assyrian King List (AKL). Assyriologist Hermann Hunger explained what were the reasons that prevented him from adhering to the Ultra-Low Chronology:

In my opinion it is doubtful whether one can use eclipse descriptions preserved in omen texts of the first millennium BC as if they were records of actually observed eclipses for Ur III at the end of the third millennium BC. Leaving aside the lunar eclipses, a combination of the Venus Tablet data and Old Babylonian month lengths alone supports only the so-called High chronology. According to Huber, the data has been misunderstood by Gasche and his team; their astronomical calculations are also marred by errors. In particular, the insistence by Gurzadyan that the Venus Tablet can only be used to establish an 8-year cycle of Venus phenomena beginning with Ammišaduqa year 1 does not seem to reflect an understanding the Babylonian lunar calendar (...) Pruzsinszky (2006) has supported Michel's choice by means of the Assyrian time-spans which I mentioned earlier. While people may be inclined to disregard the time-spans altogether, Pruzsinszky's proposal happens to agree with that by Michel, which was based on Manning's use of dendrochronology. Unfortunately, other dendrochronological data, from buildings in Kültepe, cannot be brought into agreement with Michel's proposal. In conclusion I regret to say that there is conflicting evidence for Mesopotamian chronology: pottery development suggests a relatively Low Chronology, tree rings (assuming they are correctly interpreted) a somewhat higher, and astronomy (if P. Huber is correct) a very high one. At the moment, a decision seems to me impossible, but I hope for better data (Hunger: 2009, 145-152).

Hermann Hunger's argument (2009) for rejecting the Ultra-Low Chronology proposed by Hermann Gasche is surprising because, although he is known for his work on Babylonian astronomy and celestial omens, in his opinion: *it is doubtful whether one can use eclipse descriptions as if they were records of actually observed eclipses for Ur III at the end of the third millennium BC*, this argument is not logical, because the fact that two key events in Mesopotamian history were associated with bad omens deduced from precisely dated lunar eclipses implies that both total lunar eclipses were observed, otherwise why would the Babylonians have invented and archived these two memorable lunar eclipses. Similarly, it is surprising that Hermann Hunger has not detected the errors in the statistical analyses of Peter J. Huber, whose statistical calculations are astronomically wrong for the lunar eclipses of the Ur III dynasty (he changed the duration of certain reigns by one year to bring them into line with his calculations) and impossible for the data on the Venus tablet. In fact, he considered that the best statistical agreement was with the Middle Chronology, or even the High Chronology, and the worst with the Ultra-Low Chronology (Huber: 2000, 159-176), whereas this chronology is the only one for which the observed values are after the theoretical values, whereas for the other chronologies it is the other way round, which is impossible (unless you admit predictive observations). Hermann Hunger's doubts about using the eclipse descriptions as if they were actually observed eclipses for Ur III may have been influenced by Boris Banjević's conclusions about these two lunar eclipses:

The formation of an absolute chronology for the ancient Near East depends upon identifying the recorded observations of ancient astronomers. The author investigates connection between the Venus observations and nine ancient solar and lunar eclipses. The Middle Chronology for the fall of Babylon 1595 BC is too long; the Ultra-Low chronology (1499 BC) is too short. The new chronology is proposed starting with 1547 BC (Banjević: 2006, 251-257).

This purely mathematical analysis contradicts several chronological data points: the two eclipses selected (18/07/-2001* and 27/05/-1961*) are separated by 40 years and 2 months instead of the required 42 years and 9 months, the date of 1847 BCE for the fall of Babylon does not agree with any date deduced from the Venus Tablet and the calculated reign of Šamši-Adad I (1760-1727) is different from that deduced from the Assyrian King List (1712-1680). Hermann Hunger's negative opinion of the two eclipses at Ur III seems to have encouraged astronomers to anchor Mesopotamian chronology on the “darkening (eclipse) of the sun” mentioned the year after the birth of Šamši-Adad I rather than on the two lunar eclipses at the end of the Ur III dynasty. For example, astronomer Teije de Jong reused the concept of “Low Middle” Chronology, taking into account the astronomical results of the Venus tablet, which did not agree with the solar eclipse of 24 June 1833 BCE proposed in 2002 by Cécile Michel. The astronomical dates on the Venus Tablet can be moved back 8 years by assuming that the observations took place 3 days later, which may be consistent with the margin of error of the dates. The date of 1595 BCE for the fall of Ur, according to Middle Chronology,

⁷⁵ <https://eclipsewise.com/lunar/LEcatalog/LE-1999--1900.html> <https://eclipsewise.com/lunar/LEcatalog/LE-2099--2000.html>

becomes 1587 BCE (= 1595 - 8), according to Low Middle Chronology. However, the complex astronomical explanations used to justify this new anchoring of Mesopotamian chronology contain several elementary errors that can be understood even by the layman (the main points were underlined):

Using the well-established Old Babylonian relative chronology of the Hammurabi dynasty (e.g. Hunger and Pingree 1999, p. ix) this implies that the first year of the reign of king Ammi-saduqa is constrained to 1647 BC \pm 10 yrs, and the fall of Babylon to 1596 BC \pm 10 yrs. These much stricter limits to the absolute dating of the Old Babylonian chronology imply that of all the candidate chronologies allowed by the Venus observations only the two Middle Chronologies remain as viable candidates... The building of the Warsama palace must have taken place after the Old Palace was destroyed sometime during the period covered by REL 138-141. According to the chronological scheme, this destruction took place in 1834/1 BC for the High Middle Chronology or in 1826/3 BC for the Low Middle Chronology. Both ranges of dates fall within the 95% confidence radiocarbon window of 1835/32 BC \pm 6/-8 yrs in which the timber used for the construction of the Warsama palace was cut (Newton and Kuniholm 2006; Manning et al. 2010). If indeed the Low Middle Chronology will turn out to be the correct one this implies that the timber used for the construction of the Warsama Palace may have been cut a few years before the destruction of the Old Palace. This would allow for transportation of trees to Kanesh and for drying of the wood before processing ... On the other hand Veenhof (2007) has presented arguments in favour of shifting the birth of Samsi-Adad a few years backwards in time. He points out that according to the Distanzangaben the time interval between the accession year of Erisum I and the death of Samsi-Adad equals 199 years while according to the REL it is 196 years. This implies that Samsi-Adad would have died at the age of 74 rather than at 71 so that he may have been born three years earlier. For the discussion below I will adopt an uncertainty margin of \pm 2 years in the birth date of Samsi-Adad. Taking this margin into account I find from the chronological overview that the solar eclipse around the birth of Samsi-Adad must have taken place in 1845 BC \pm 2 yrs (High Middle Chronology) or in 1837 BC \pm 2 yrs (Low Middle Chronology). The data show that there are indeed candidate eclipses for both chronologies which may qualify as solar eclipses causing a “darkening of the Sun”, the partial eclipse of 5 August 1845 BC and the one of 24 March 1838 BC. On the basis of these solar eclipses there are two reasons to express preference for the Low Middle Chronology: (1) the 1838 BC eclipse is the most conspicuous one (0.94 magnitude at the horizon versus 0.75), and (2) the 1838 BC eclipse requires a much smaller clock-time correction error (0:30 versus 1:15 hrs, equivalent to about 0.5 versus 1.25s) which makes it about twice more probable. If the Low Middle Chronology indeed turns out to be the correct one the data imply that the birth of Samsi-Adad (REL 126) needs to be pushed backward one year in time so that an additional eponym is required between REL 127 and 197. It is of interest to note that the most spectacular candidate eclipse, the total solar eclipse of 24 June 1833 BC (Michel and Rocher 1999), while only reconcilable with the Low Middle Chronology, would require that the Revised Eponym List be inflated by about four years during the roughly 70 years spanning the lifetime of Samsi-Adad (REL 126-197) which seems more than allowed by the present uncertainties. Based on the fine-tuning process presented in this section I suggest that the Low Middle Chronology is the correct one for the history of Mesopotamia ... My arguments for this choice are threefold: 1) The Low Middle Chronology provides a better fit to the Venus observations as reflected in the mean deviation to the lunar calendar of -0.4 days for the Low Middle Chronology versus -4.3 days (exceeding the standard mean error) for the High Middle Chronology. Now that the possible candidate Venus chronologies have been reduced to two this is a much stronger argument than when one had to choose between six Venus chronologies. 2) Although for both Middle Chronologies a solar eclipse can be identified that might be responsible for the “darkening of the Sun” mentioned in the Mari Eponym Chronicle, I prefer the Low Middle Chronology eclipse candidate of 24 March 1838 BC because it is more conspicuous (magnitude 0.94 at the horizon versus 0.80) and the clock-time correction extrapolation error is more than two times smaller making it twice more probable. 3) The Low Middle Chronology also provides a natural explanation for the enhanced atmospheric extinction in Babylon, inferred from the Venus observations during years 12 and 13 of the reign of king Ammi-saduqa De Jong and Foertmeyer (2010) have argued that this enhancement was caused by aerosols expelled into the Earth atmosphere by the violent eruption of the volcano on the Greek island Thera (present-day Santorini). The eruption has been radiocarbon dated to 1613 BC \pm 14/-13 yrs (at the 95% confidence level) by Friedrich et al. (2006) based on tree-ring sequences in the remains of several olive branches found in layers of pumice left by the eruption. De Jong and Foertmeyer show that this dating can only be reconciled with the affected Venus observations if the Low Middle Chronology is adopted leading to a date for the eruption in 1628/27 BC (De Jong: 2013, 158-161). Teije de Jong excluded the Ultra-Low Chronology solely on the basis of statistical calculations (De Jong: 2013b, 366-370).

These explanations to justify the choice of the eclipse of 24 March 1838 BCE, corresponding to the darkening of the sun, and consequently the choice of the “Low Middle” Chronology are very technical and difficult to verify for a layman. The main points of the reasoning are as follows: the Middle Chronology is used as a starting point, it is then lowered by around 10 years based on hypothetical radiocarbon dates from the palace of Šamšî-Adad I, which finally makes it possible to choose the eclipse of 24 March 1838 BCE in accordance with the slightly modified dates on the Venus tablet. It should be noted that Puzur-Aššur III's reign is impossible to calculate: 1587-1563 (Middle Chronology), 1491-1467 according to the AKL (Pruzsinsky: 2009, 42) and 1521-1498 according to some archaeologists (Düring: 2020, XV-XVI):

TABLE 57

Chronology (BCE):	AKL	Ultra-Low	Low	Low-Middle*	Low-Middle	Middle
Fall of Ur		1912	1944	1993	2000	2008
Birth of Šamšî-Adad I (AKL)	1752	1752	1784	1833	1840	1848
Reign of Šamšî-Adad I (AKL)	1712-1680	1712-1680	1745-1712	1784-1761	1791-1768	1809-1776
Reign of Hammurabi		1697-1654	1729-1686	1778-1635	1785-1642	1793-1750
Reign of Ammisaduqa		1551-1530	1583-1562	1632-1611	1639-1618	1647-1626
Deviation from the Venus Tablet		0	0	(-15)	-8	0
Fall of Babylon		1499	1531	1580	1587	1595
Reign of Puzur-Aššur III (AKL)	1491-1467	1491-1467	1523-1499	1572-1548	1579-1555	1587-1563
Year 38 of Babylon's resettlement		1462	1494	1543	1550	1558

Impressed by the complexity of these astronomical calculations, no Assyriologist has challenged De Jong's assertions, even though one can see that the starting hypothesis 1) “Middle Chronology is almost correct” is arbitrary, 2) the radiocarbon dating of the palace of Šamšî-Adad I is based on several hypothetical suppositions and, icing on the cake, 3) the solar eclipse of 24 August 1838 BCE is chosen as the best option (mag. 0.94), even though it is stated just beforehand that: *Partial solar eclipses will pass unnoticed for a naked-eye observer unless the Sun is more than about 95% eclipsed* (De Jong: 2013, 157). The partial solar eclipse of 24 August 1838 BCE with a magnitude of 94% (< 95%) therefore went unnoticed by a naked-eye observer, which is quite something! What's more, only the (very rare) total solar eclipses, considered to be bad omens, are mentioned⁷⁶ (exceptionally), for example, a tablet from Ugarit (KTU 1.78) records: *On the ... day of the new moon, in (the month) of Hiyaru, the Sun went down, its gate-keeper was Mars // Two livers were examined: danger*, which corresponds to the total eclipse of the sun on 5 March 1223 BCE (De Jong, Van Soldt: 1989, 238–240). One can verify that there were no total solar eclipses over Assyria in the period 1860-1841 BCE⁷⁷. In addition, the term used for the “darkening” of the Sun, in the Mari Eponym Chronicle is *na'duru* “darkened, obscured, eclipsed” which means an eclipse in a metaphorical way and is different from the usual *antallû* (AN.TA.LÛ) “eclipse” used in astronomical tablets. Vahe Gurzadyan⁷⁸ concluded that the solar eclipse without description and without links to any other chronologically anchored astronomical events (by which he means the lunar eclipses of EAE) can hardly serve as good evidence for a specific chronology (Pruzsinsky: 2009, 75 n. 290). What is even more surprising: no Assyriologist has noticed that the reign of Šamšî-Adad I deduced from the Assyrian King List (1712-1680) was very different from that assumed by the Low Middle Chronology (1791-1768). Despite all these chronological inconsistencies, physicist Werner Nahm considered (in 2013) the Low Middle Chronology to be satisfactory:

Dendrochronological data and greater precision in the relative chronology between Babylonia and Assyria have led to the reopening of the discussion about Mesopotamian chronology in the 2nd millennium BC. The article makes four points. First, the arguments for the standard chronologies based upon the data of the Venus Tablets are robust. Counterarguments are found wanting. Second, once likely errors are taken into account, there is a natural recording procedure for which the Lower Middle Chronology is in accordance with the data. Third, among the four standard chronologies only the Lower Middle Chronology can easily satisfy the constraint provided by the eclipse record of the Mari Eponym Chronicle. Finally, this chronology is also in exact agreement with the widespread record of a volcanic eruption in 1628/27 BC (Nahm: 2013, 350-372).

Influenced by the complex scientific analyses of radiocarbonists, physicists and statisticians, the debates to anchor Mesopotamian chronology on absolute dates have completely evacuated the basic criteria of an absolute chronology: 1) reconstitution of a relative chronology of the reign of Šamšî-Adad I from the Assyrian King List (1712-1680) 2) anchored on the three total lunar eclipses exactly dated in the Babylonian

⁷⁶ A total solar eclipse (“solar omen”) is mentioned in a text dating to the reign of Muršili II (1322-1295). The text records that in the 10th year of Muršili's reign (1312 BCE), “the Sun gave a sign”, just as the king was about to launch a campaign against the Kingdom of Azzi-Hayasa in north-eastern Anatolia. The 1312 BCE eclipse occurred over northern Anatolia in the early afternoon, and its effects would have been quite spectacular for Muršili II and his men on campaign: 24 June 1312 BCE.

⁷⁷ <https://eclipse.gsfc.nasa.gov/SEatlas/SEatlas-2/SEatlas-1839.GIF>

⁷⁸ Vahe Gurzadyan, mathematical physicist, professor and head of Cosmology Center at Yerevan Physics Institute, Armenia.

lunar calendar: 14/III/48 of Šulgi dated 28/06/1954 BCE, 14/XII/24 of Ibbi-Sin dated 06/03/1911, 14/V/38 of Babylon's resettlement dated 19/07/1462 BCE. Despite this chronological evidence, which is easily verified by astronomy, astronomer Teije de Jong wrote the following (in 2017):

Recently much progress has been made in the absolute dating of the Old Assyrian and Old Babylonian chronologies by combining a new critical edition of the old Assyrian eponym lists found at Kültepe-Kaneš (Revised Eponym List) with radiocarbon and astronomical dating techniques. This has led to narrowing down the absolute dating of the Old Babylonian chronology to the two Middle Chronologies (Ammī-šaduqa year 1 = 1646 or 1638 BC) and to reducing the candidates for the solar eclipse recorded in the Mari Eponym Chronicle (REL 127) to three eclipses (in 1845 BC, 1838 BC, and 1833 BC). In this paper I use the results of a recent study of the intercalation of the old Assyrian calendar at Kaneš (REL 81–110) to further refine the absolute dating of the chronology of the first half of the second millennium BC. The new evidence suggests that astronomical intercalation criteria like the heliacal rising of the bright star Sirius may have played an important role in establishing the intercalation pattern of the Old Assyrian calendar. Using the REL to create three different solutions of the Old Assyrian calendar at Kaneš (REL 81–110), one for each candidate solar eclipse, I propose that the observed intercalation pattern provides an additional independent argument in support of the Low Middle Chronology. According to the absolute dating of the Old Assyrian chronology proposed here Šamši-Adad was born in 1839 BC (REL 126), in the year preceding the partial solar eclipse of 24 March 1838 BC (REL 127) and he died in December 1767 BC (REL 197), during the eighteenth year of the reign of king Hammurabi of Babylon. This chronology proposal implies that the beginning of the reign of the old Assyrian king Erišum (REL 1) may be dated to 1964 BC (De Jong: 2017, 127-143).

To reopen this debate on the anchoring of Mesopotamian chronology on absolute dates, two lectures entitled: *Mesopotamian chronology over the period 2340-539 BCE through astronomically dated synchronisms and comparison with carbon-14 dating*, showed that the three total lunar eclipses, mentioned in Babylonian Annals and in the economic texts from Tell Muhammad, anchored Mesopotamian chronology according to Ultra-Low Chronology (Gertoux: 2019a, 2019b). The main arguments confirming this absolute chronology have been mentioned in NABU 2021-3 note 73. Although the paper from this conference has been available as a preprint on HAL open science since 2019 (Gertoux: 2023, 1-87), papers on the chronology of the ancient Near East continue to deny any absolute dating values to the two lunar eclipses. The article "Mesopotamian Chronology" on Livius.org (last modified on 14 September 2020) explains why: *The publication of the ultra-low chronology, as recently as 1998, has resulted in a series of vehement polemics, from which ad hominem-arguments are not absent. Among the arguments for the ultra-low chronology is the identification of a set of eclipses; a counter-argument is that the Assyrian king list appears to be too long to fit in this framework* (<https://www.livius.org/articles/misc/mesopotamian-chronology/>). This counter-argument, asserted without reference, is false because the list of Assyrian King List (AKL) fits perfectly into this framework, since the reign of Šamši-Adad I (1712-1680) is dated exactly.

The radiocarbonists are the main defenders of the (Low) Middle Chronology, and to achieve their aim they ignore: 1) all the astronomical phenomena that have been precisely dated, as well as 2) the reign of Šamši-Adad I (1712-1680) as determined by the Assyrian King List (AKL), 3) in order to synchronise with Babylonian chronology, they increase the dates of Egyptian chronology by 40-60 years (Stiebing, Helft: 2023, 9,173, 203). For example, the reign of Senwosret III, set at 1855-1836 BCE by astronomy, is dated to 1892-1853 BCE by ¹⁴C and the only element used to anchor Babylonian chronology to an absolute date is the Sarıkaya palace at Acemhöyük, associated with Shamshi-Adad I, which can be dated to c. **1776 BCE** using dendrochronology, which agrees with the Middle Chronology (Höflmayer, Manning: 2022, 1-24). However, this date corresponds to the death of Šamši-Adad I (1809-1776), according to the Middle Chronology! The only conclusion we can draw from this dating is that the beams used to repair this palace, dated by dendrochronology to c. 1766 BCE, were used before the reign of Šamši-Adad I (1712-1680). So, it's not the radiocarbon measurements that are in question, but the concordance between the death of Šamši-Adad I and the dating of the buildings from his time. Conclusion: The "Ultra-Low" Chronology relies on absolute dates determined astronomically by the two precisely dated total lunar eclipses of Ur III dynasty (27 June 1954 BCE and 6 March 1911 BCE), whereas the Middle Chronology relies on an ancient consensus (1950) rather than the current scientific truth. The only scientific way to prove that a Mesopotamian chronology is absolute is to reconstruct exactly, year by year, all the Mesopotamian reigns with their historical and astronomical synchronisms (see All Mesopotamian synchronisms over the period 2400-1050 BCE).

Synchronisms between different chronologies, over the period 2020-1360 BCE, have been highlighted in grey, absolute dates based on astronomical phenomena have been highlighted in midnight blue, and the quadruple synchronism between Šamši-Adad I (1712-1680), Hammurabi (1697-1654), Yantin-Ammu (1695-1670) and Neferhotep I (1701-1690) has been highlighted in different colours (hereafter).

MAIN SYNCHRONISMS OVER THE PERIOD 2020-1360 BCE PROVING ULTRA-LOW CHRONOLOGY

ASSYRIA	Reign	BABYLON	Reign	MARI	Reign	EGYPT	Reign
Yakmeni	2010-1996	Ur-Namma	2020-2002	Apil-Kîn	2030-1995	Mentuhotep II	2045-1994
Yazkur-El	1996-1982	Sulgi	2002	Iddin-Ilum	1995-1990	Mentuhotep III	1994-1982
Ila-kakkabû	1982-1968			Ilum-Iš'ar	1990-1978	Mentuhotep IV	1982-1975
Amînum	1968-1954		-1954	Turâm-Dagan	1978-1958	Amenemhat I	1975 -
Sulili	1954-1940	Amar-Sîn	1954-1945	Puzur-Eštar	1958 -		-1946
Kikkia	1940-1927	Su-Sîn	1945-1936		-1933	Senwosret I	1946 -
Akia	1927-1913	Ibbi-Sîn	1936-1912	Iši-Dagan	1918-1912		-1901
Puzur-Aššur I	1913-1900	Išbi-Erra	1923				
Salim-ahum	1900-1886		-1890			Amenemhat II	1901 -
Ilu-šumma	1886-1873	Sû-ilîšu	1890-1880				
Erišu I	1873	Iddin-Dagân	1880-1859				-1863
	-1834	Išme-Dagân	1859-1840	BYBLOS	Reign	Senwosret II	1863-1855
Ikunum	1834-1821	Lipit-Eštar	1840-1829	Abi-Shemu	1815 -	Amenemhat III	1836 -
Sargon I	1821 -	Ur-Ninurta	1829- 1801		-1790		-1791
	-1782	Sumu-abum	1799-1785	Ip-Shemu-Abi	1790 -	Amenemhat IV	1791-1782
Puzur-Aššur II	1782-1774	Sumu-la-II	1785 -			Neferu-sobek	1782- 1778
Naram-Sîn	1774 -		-1749		-1765	Sobekhotep I	1778-1775
		Sâbium	1749 -	Yakin-el	1765 -	[Hotepibre	1753 -
			-1735		-1740		-1741
		Apil-Sîn	1735 -	Ilimi-yapi ?	1740 -	[-] Sewadjkare	1741-1737
	-1722				-1720	Sobekhotep II	1737-1733
Erišu II	1722 -			Yakin-[ilu II?]	1720 -	Hor I	1732-1728
						Amenemhat VII	1728-1724
						Wegaf	1724-1722
	-1712		-1717			Khendjer	1722-1717
Samši-Adad I	1712	Sîn-muballit	1717 -			Imyremeshaw	1717-1713
			-1697			Antef V	1713-1709
		Hammurabi	1697		-1695	Seth	1709-1705
	-1680		-1680	Yantin-Ammu	1695 -	Sobekhotep III	1705-1701
Išme-Dagan I	1680 -		1680 -			Neferhotep I	1701-1690
	-1670					Sobekhotep IV	1690- 1681
Aššur-dugul	1670-1664				-1670	Sobekhotep V	1681- 1679
Bêlu-bâni	1664-1654		-1654			Sobekhotep VI	1679-1676
Libbaya	1654 -	Samsu-iluna	1654-1645	KASSITE	Reign	Ibiaw	1676 -
	-1638		1645	Gandaš	1661		-1665
Šarma-Adad I	1638-1626		-1616	Agum I	1635 -	Aya	1665-1652
Puzur-Sîn	1626-1615				-1613		
Bazaya	1615-1588	Abi-ešuĥ	1616-1588	Kaštiliašu I	1613-1591		
Lullaya	1588-1582	Ammiditana	1588 -	Kaštiliašu II	1591-1583	Dynasty 17	
Šû-Ninûa	1582-1568			Abi-Rattaš	1583 -	Rahotep	1572-1568
Šarma-Adad II	1568-1565				-1563		
Erišu III	1565-1553		-1551	Urzigurumaš	1563-1543		
Samši-Adad II	1553-1547	Ammišaduqa	1551	Ĥurbaĥ	1543 -		
Išme-Dagan II	1547-1531		-1530		-1527	Dynasty 18	
Samši-Adad III	1531-1516	Samsuditana	1530	Šipta-ulzi	1527-1511	Ahmoose	1530-1505
Aššur-nêrârî I	1516-1491		-1499	Agum II	1511-1495	Amenhotep I	1505-1484
Puzur-Aššur III	1491-1467	<i>resettlement of</i>	1499	Burna-Buriaš I	1495-1479	Thutmose I	1484-1472
Enlil-nâšir I	1467 -	<i>Babylon</i>	-1462	Ur[...]iaš	1479-1463	Thutmose II	1472-1469
	-1455	Years 38-41	1462-1459	Kaštiliašu III	1463-1451	Thutmose III	1472 -
Nûr-ili	1455-1443			Ulam-Buriaš	1451 -		
Aššur-šadûni	1443-1443						
Aššur-rabi I	1443-1433				-1439		
Aššur-nâdin-aĥĥe I	1433-1424			Agum III	1439-1423		
Enlil-našir II	1424-1418			Kadašman-Harbe I	1423 -		-1418
Aššur-nêrârî II	1418-1411				-1407	Amenhotep II	1418 -
Aššur-bêl-nišešu	1411-1403			Kara-indaš	1407 -		-1392
Aššur-rê'im-nišešu	1403-1395				-1391		
Aššur-nâdin-aĥĥe II	1395-1385			Kurigalzu I	1391 -	Thutmose IV	1392-1383
Eriša-Adad I	1385 -				-1375	Amenhotep III	1383 -
	-1358			Kadašman-Enlil I	1375-1360		-1345
Aššur-uballit I	1358 -			Burna-Buriaš II	1360 -	Amenhotep IV	1356-1340
					-1333	Tutankhamun	1337-1327
	-1323			Kurigalzu II	1333 -	Aÿ	1327-1323
Enlil-nêrârî	1323-1313				-1308	Horemheb	1323-1295

All Mesopotamian synchronisms over the period 2400-1050 BCE

The absolute Mesopotamian chronology is based on the following six elements: 1) the reign lengths (number in bold type framed by a black line) come from the critical edition of the Sumerian and Babylonian king lists as well as the Assyrian eponyms lists; 2) the Sumerian and Babylonian reigns are dated in the Babylonian calendar which is luni-solar (starts at the 1st lunar crescent after the spring equinox); 3) Assyrian reigns are dated in the Assyrian calendar which is lunar before Ninurta-apil-Ekur (1192-1179) and then lunisolar afterwards; 4) several major periods (highlighted in colour) allow to fix some uncertain reigns; 5) precise synchronisms between several chronologies (highlighted in grey) allow to anchor these chronologies to each other; 6) astronomical dates (highlighted in dark blue) allow to anchor these chronologies absolutely. The reign years in italics are approximate as they are only calculated from a few synchronisms. For example, the absolute Assyrian chronology goes back to Erišu I (1873-1835), the reigns of the previous 16 kings (whose eponyms have been lost) can be estimated at 14 years which is the average length of the previous 6 kings. The synchronism between the 3rd king of Ur III, Amar-Sin (1954-1945), and the 27th Assyrian king, Sulili, makes it possible to calculate the average value of Assyrian reigns before Erišu I, the 33rd Assyrian king. This average duration (+/- 5 years) for the 6 Assyrian kings between Sulili and Erišu I is approximately 14 years = (1954 - 1873)/6. The reigns of the first 17 kings (“under tents”) can be estimated at 9 years, which corresponds to the average duration between Tudiya (2235-2226), the first Assyrian king contemporary with the vizier Ibrium (2235-2228), and Halê (2080-2066) the 18th king (9 years = [2235 - 2080]/17).

TABLE 58

BCE				EBLA		URUK I		
2400					6	Ur-Nungal	1	
2399					7	n°6	2	
2398					8		3	
2397					9		4	
2396					10		5	
2395				n°18	11		6	
2394				Ísrud-Damu	1		7	
2393					2		8	
2392					3		9	
2291					4		10	
2390					5		11	ELAM (AWAN)
2389					6		12	Pieli
2388					7		13	n°1
2387					8		14	
2386					9		15	
2385					10		16	
2384				n°19	11		17	
2383				Isidu	1		18	
2382					2		19	
2381					3		20	
2380					4		21	
2379					5		22	
2378					6		23	
2377					7		24	
2376					8		25	
2375					9		26	
2374					10		27	
2373				n°20	11		28	
2372				Ísrud-Halab	1		29	
2371					2	n°7	30	
2370	LAGASH I				3	Udul-kalama	1	
2369	En-ĥegal	1			4		2	
2368	n°-2	2			5		3	
2367		3			6		4	
2366		4			7		5	
2365		5			8		6	n°2
2364		6			9		7	Tari
2363		7			10		8	
2362		8		n°21	11		9	
2361		9		Igsud	1		10	
2360		10			2		11	
2359		11			3		12	

2358		12				4		13		7
2357		13				5		14		8
2356		14				6	n°8	15		9
2355	n°-1	15				7	Labāšum	1		10
2354	Lugal-ša-engur	1				8		2		11
2353	(governor)	2				9		3		12
2352		3				10		4		13
2351		4			n°22	11		5		14
2350		5			Talda-Lîm	1		6		15
2349		6				2		7		16
2348		7				3		8		17
2347		8				4	n°9	9		18
2346		9				5	En-nun-dara-	1		19
2345		10				6	-anna	2		20
2344		11				7		3		21
2343		12				8		4		22
2342		13				9		5		23
2341		14				10		6		24
2340	n°1	15	MARI		n°23	11		7	n°3	25
2339	Ur-Nanše	1	Ikun-Šamaš	1	Abur-Lîm	1	n°10	8	Ukku-taḫiṣ	1
2338		2	n°1	2		2	Mesḫe	1		2
2337		3		3		3		2		3
2336		4		4		4		3		4
2335		5		5		5		4		5
2334		6		6		6		5		6
2333		7		7		7		6		7
2332		8		8		8		7		8
2331		9		9		9		8		9
2330		10		10		10		9		10
2329		11		11		11		10		11
2328		12		12		12		11		12
2327		13		13		13		12		13
2326		14		14		14		13		14
2325		15		15		15		14		15
2324		16		16		16		15		16
2323		17		17		17		16		17
2322	n°2	18		18		18		17		18
2321	Akurgal	1		19		19		18		19
2320		2		20		20		19		20
2319		3		21		21		20		21
2318	n°3	4	n°2	22	n°24	22		21		22
2317	E-anatum	1	Ikun-Šamagan	1	Agur-Lîm	1		22		23
2316		2		2		2		23		24
2315		3		3		3		24	n°4	25
2314		4		4		4		25	Hišur	1
2313		5		5		5		26		2
2312		6		6	n°25	6		27		3
2311		7		7	Ibbi-Damu	1		28		4
2310		8		8		2		29		5
2309		9		9		3		30		6
2308		10		10		4		31		7
2307		11		11		5		32		8
2306		12	n°3	12	n°26	6		33		9
2305		13	Iški-Mari	1	Baga-Damu	1		34		10
2304		14		2		2		35		11
2303		15		3		3	n°11	36		12
2302		16		4		4	Melam-ana	1		13
2301		17		5		5		2		14
2300		18		6		6		3		15
2299		19		7		7		4		16
2298		20		8		8		5		17
2297		21		9		9	n°12	6		18
2296		22		10		10	Lugal-kigine-	1		19
2295		23		11		11	-dudu	2		20

2294		24	n°4	12	n°27	12		3		21
2293		25	Anubu	1	Enar-Damu	1		4		22
2292		26		2		2		5		23
2291		27		3		3		6		24
2290		28		4		4		7	n°5	25
2289		29		5		5		8	Šušun-tarana	1
2288	n°4	30		6		6		9		2
2287	En-anatum I	1		7		7		10		3
2286		2		8		8		11		4
2285		3		9		9		12		5
2284		4		10		10		13		6
2283		5		11		11		14		7
2282	n°5	6	n°5	12	n°28	12		15		8
2281	En-metena	1	Sa'umu	1	Iš'ar-Malik	1		16		9
2280		2		2		2		17		10
2279		3		3		3		18		11
2278		4		4		4		19		12
2277		5		5		5		20		13
2276		6	n°6	6	n°29	6		21		14
2275		7	Itup-Išar	1	Kun-Damu	1		22		15
2274		8		2		2		23		16
2273		9		3		3		24		17
2272		10	n°7	4		4		25		18
2271		11	Iblul-II	1		5		26		19
2270		12		2	n°30	6		27		20
2269		13		3	Adub-Damu	1		28		21
2268		14		4		2		29		22
2267		15		5		3		30		23
2266		16		6		4		31		24
2265		17		7		5		32	n°6	25
2264		18		8	n°31	6		33	Napil-ḫuš	1
2263		19		9	Igriš-Halab	1		34		2
2262		20		10		2		35		3
2261		21		11		3		36		4
2260		22		12		4				5
2259		23		13		5				6
2258		24		14		6				7
2257		25		15		7				8
2256		26		16		8				9
2255		27		17		9				10
2254		28		18		10				11
2253		29		19		11				12
2252	n°6	30	n°8	20	n°32	12				13
2251	En-anatum II	1	Nizi	1	Irkab-Damu	1				14
2250		2		2	/Tir	2				15
2249		3	n°9	3		3				16
2248		4	Enna-Dagan	1		4				17
2247		5		2	/Arrukun	5				18
2246		6	n°10	3		6				19
2245	n°7	7	Ikun-Išar	4	n°33	7				20
2244	En-entarzi	1	Hida'ar	1	Iš'ar-Damu	1				21
2243	AKKAD		n°11	2	/Ibrium	2				22
2242	Sargon	1		3		3				23
2241	n°1	2		4		4				24
2240		3		5		5			n°7	25
2239		4		6		6			Kikku-sime-temti	1
2238		5		7		7				2
2237		6		8		8				3
2236		7		9		9				4
2235		8		10		10	ASSYRIA	0		5
2234		9		11		11	Tudiya	1		6
2233		10		12		12	n°1	2		7
2232		11		13		13		3		8
2231		12		14		14		4		9

2230		13		15		15		5		10
2229		14		16		16		6		11
2228		15		17	/Ibbi-zikir	17		7		12
2227		16		18		18		8		13
2226		17		19		19	n°2	9		14
2225		18		20		20	Adamu	1		15
2224		19		21		21		2		16
2223		20		22		22		3		17
2222		21		23		23		4		18
2221		22		24		24		5		19
2220		23		25		25		6		20
2219		24		26		26		7		21
2218		25		27		27		8		22
2217		26		28		28	n°3	9		23
2216		27		29		29	Yangi	1		24
2215		28		30		30		2	n°8	25
2214		29		31		31		3	Luhhi-iššan	1
2213		30		32		32		4		2
2212		31		33	Fall of Ebla			5		3
2211		32		34				6		4
2210		33	n°12	35				7		5
2209		34	Išqi-Mari	1				8		6
2208		35		2			n°4	9		7
2207		36		3			Suhlāmu	1		8
2206		37		4			(Lillāmu)	2		9
2205		38		5				3		10
2204		39		6				4		11
2203		40		7				5		12
2202		41		8				6		13
2201		42		9				7		14
2200		43	Fall of Mari					8		15
2199		44					n°5	9		16
2198		45					Harharu	1		17
2197		46						2		18
2196		47						3		19
2195		48						4	n°9	20
2194		49						5	Hišep-ratep	1
2193		50						6		2
2192		51						7		3
2191		52						8		4
2190		53					n°6	9		5
2189		54					Mandaru	1		6
2188	n°2	55						2		7
2187	Rimuš	56						3		8
2186		1						4		9
2185		2						5		10
2184		3						6		11
2183		4						7		12
2182		5						8		13
2181		6					n°7	9		14
2180		7					Imsu	1		15
2179	n°3	8						2	Ešpum	1
2178	Maništusu	9						3	(governor)	2
2177		1						4		3
2176		2						5		4
2175		3						6		5
2174		4						7		6
2173		5						8		7
2172		6					n°8	9		8
2171		7					Haršu	1		9
2170		8						2		10
2169		9						3	Išū-rabi	1
2168		10						4	(governor)	2
2167		11						5		3

2166		12					6		4
2165		13					7		5
2164	n°4	14					8		6
2163	Narâm-Sîn	15	Ididiš	1			n°9	9	7
2162		1		2			Didânu	1	8
2161		2		3				2	9
2160		3		4				3	10
2159		4		5				4	Epir-mupi (vassal)
2158		5		6				5	2
2157		6		7				6	3
2156		7		8				7	4
2155		8		9				8	5
2154		9		10			n°10	9	6
2153		10		11			Hanû	1	7
2152		11		12				2	8
2151		12		13				3	9
2150		13		14				4	10
2149		14		15				5	11
2148		15		16				6	12
2147		16		17				7	13
2146		17		18				8	14
2145		18		19			n°11	9	15
2144		19		20			Zuabu	1	16
2143		20		21				2	17
2142		21		22				3	18
2141		22		23				4	19
2140		23		24				5	20
2139		24		25				6	21
2138		25		26				7	22
2137		26		27				8	23
2136		27		28			n°12	9	24
2135		28		29			Nuabu	1	25
2134		29		30				2	Ili-išmani (vassal)
2133		30		31				3	2
2132		31		32				4	3
2131		32		33				5	4
2130		33		34				6	5
2129		34		35				7	6
2128		35		36				8	7
2127		36		37			n°13	9	8
2126	n°5	37		38			Abazu	1	9
2125	Šar-kali-šarri	1		39				2	10
2124		2		40	GUTIUM			3	11
2123		3		41	n°1	0		4	12
2122		4		42	Nibia	1		5	13
2121		5		43		2		6	14
2120		6		44	n°2	3		7	15
2119		7		45	Inkišuš	1		8	16
2118		8		46		2	n°14	9	17
2117		9		47		3	Belû	1	18
2116		10		48		4		2	19
2115		11		49		5		3	20
2114		12		50	n°3	6		4	21
2113		13		51	Sarlagab	1		5	22
2112		14		52		2		6	23
2111		15		53		3		7	24
2110		16		54		4		8	?
2109		17		55		5	n°15	9	?
2108		18		56	n°4	6	Azarah	1	?
2107		19		57	Šulme	1		2	?
2106		20		58		2		3	?
2105		21		59		3		4	?
2104		22	n°2	60		4		5	?
2103		23	Šu-Dagan	1		5		6	?

2102	n°6-9	24		2	n°5	6		7	?	33
2101	Irgigi/ Imi/	25		3	Silulumeš	1		8	?	34
2100	Nanum/ Ilulu	1		4		2	n°16	9	n°10	35
2099		2	n°3	5		3	Ušpia	1	Ḫielu	1
2098	n°10	3	Išmah-Dagan	1		4		2		2
2097	Dudu	1		2		5		3		3
2096		2		3	n°6	6		4		4
2095		3		4	Inimabakeš	1		5		5
2094		4		5		2		6		6
2093		5		6		3		7		7
2092		6		7		4		8		8
2091		7		8	n°7	5	n°17	9		9
2090		8		9	Igeša'uš	1	Apiašal	1		10
2089		9		10		2	son of Ušpia	2		11
2088		10		11		3		3		12
2087		11		12		4		4		13
2086		12		13		5		5		14
2085		13		14	n°8	6		6		15
2084		14		15	Jarlabag	1		7		16
2083		15		16		2		8		17
2082		16		17		3		9		18
2081		17		18		4		10		19
2080		18		19		5	n°18	11		20
2079		19		20		6	Halê	1		21
2078		20		21		7	s. of Apiašal	2		22
2077	n°11	21		22		8		3		23
2076	Šu-Turul	1		23		9		4		24
2075		2		24		10		5		25
2074		3		25		11		6		26
2073		4		26		12		7		27
2072		5		27		13		8		28
2071		6		28		14		9		29
2070		7		29	n°9	15		10		30
2069		8		30	Ibate	1		11		31
2068		9		31		2		12		32
2067		10		32	n°10	3		13		33
2066		11		33	Jarla	1	n°19	14		34
2065		12		34		2	Samânu	1	n°11	35
2064		13		35	n°11	3	s. of Halê	2	Ḫita	1
2063		14		36	Kurum	1		3		2
2062	URUK IV	15		37	Ḫabil-kîn	1		4		3
2061	Ur-nigina	1		38	n°13	2		5		4
2060	n°1	2		39	n°14	3		6		5
2059		3		40	Lā'arābum	1		7		6
2058		4		41	n°15	2		8		7
2057		5		42	Irarum	1		9		8
2056		6		43	n°16	2		10		9
2055	n°2	7		44	Ibranum	1		11		10
2054	Ur-gigira	1	n°4	45	Ḫablum	1		12		11
2053		2	Nûr-Mêr	1	n°18	2		13		12
2052		3		2	Puzur-Sîn	1	n°20	14		13
2051		4		3		2	Hayâni	1		14
2050		5		4		3	s. of Samânu	2		15
2049	n°3	6	n°5	5		4		3		16
2048	Kuda	1	Išdub-El	1		5		4		17
2047		2		2		6		5		18
2046		3		3	n°19	7		6		19
2045		4		4	Jarlaganda	1		7		20
2044		5		5		2		8		21
2043	n°4	6		6		3		9		22
2042	Puzur-ilî	1		7		4		10		23
2041		2		8		5		11		24

2040		3		9		6		12	n°12	25
2039		4		10	n°20	7		13	Puzur-Inšušinak	1
2038	n°5	5	n°6	11	Si'um	1	n°21	14	/n°1	2
2037	Ur-Utu	1	Iškun-Addu	1		2	Ilu-Mer	1		3
2036		2		2		3	s. of Hayâni	2		4
2035		3		3		4		3		5
2034		4		4		5		4		6
2033		5		5	n°21	6		5		7
2032	URUK V	6		6	Tirigan	7		6		8
2031	Utu-ḫegal	1		7	Vassal of			7		9
2030		2	n°7	8	Elam			8		10
2029		3	Apil-Kîn	1				9		11
2028		4		2				10		12
2027		5		3				11		13
2026		6		4				12		14
2025		7		5				13		15
2024		8		6			n°22	14		16
2023		9		7			Yakmesi	1		17
2022		10		8			s. of Ilu-Mer	2		18
2021		11		9				3		19
2020	UR III	12		10				4	/[king? of SUSA]	20
2019	Ur-Namma	1	13	11				5		21
2018	n°1	2	14	12				6		22
2017		3	15	13				7		23
2016		4	16	14				8		24
2015		5	17	15				9	n°2	25
2014		6	18	16				10	[Ḫie?]-lu	1
2013		7	19	17				11		2
2012		8	20	18				12		3
2011		9		19				13		4
2010		10		20			n°23	14		5
2009		11		21			Yakmeni	1		6
2008		12		22			son of Yakmesi	2		7
2007		13		23				3		8
2006		14		24				4		9
2005		15		25				5		10
2004		16		26				6		11
2003		17		27				7		12
2002	n°2	18		28				8		13
2001	Šulgi	1		29				9		14
2000		2		30				10		15
1999		3		31				11		16
1998		4		32				12		17
1997		5		33				13		18
1996		6		34			n°24	14		19
1995		7	n°8	35			Yazkur-El	1		20
1994		8	Iddin-Illum	1			s. of Yakmeni	2		21
1993		9		2				3		22
1992		10		3				4		23
1991		11		4				5		24
1990		12	n°9	5				6	n°3	25
1989		13	Illum-Iš'ar	1				7	Kudu[ur-Lagamar]	1
1988		14		2				8	n°1 /Girnamme	2
1987		15		3				9	/SIMAŠKI)	3
1986		16		4				10		4
1985		17		5				11		5
1984		18		6				12		6
1983		19		7				13		7
1982		20		8			n°25	14		8
1981		21		9			Ila-kabkabû	1		9
1980		22		10			s. of Yazkur-El	2		10
1979		23		11				3		11
1978		24	n°10	12				4		12
1977		25	Turâm-Dagan	1				5		13

1976		26		2	(EGYPT)			6		14
1975		27		3	Amenemhat I	1		7		15
1974		28		4		2		8		16
1973		29		5		3		9		17
1972		30		6		4		10		18
1971		31		7		5		11		19
1970		32		8		6		12		20
1969		33		9		7		13		21
1968		34		10		8	n°26	14		22
1967		35		11		9	Amînum	1		23
1966		36		12		10	s. of Ila-kabkabû	2		24
1965		37		13		11		3		25
1964		38		14		12		4		26
1963		39		15		13		5		27
1962		40		16		14		6		28
1961		41		17		15		7		29
1960		42		18		16		8		30
1959		43		19		17		9		31
1958		44	n°11	20		18		10		32
1957		45	Puzur-Eštar	1		19		11		33
1956		46		2		20		12		34
1955		47		3		21		13	n°2	35
1954	n°3	48		4		22	n°27	14	Tazitta I/Ebarat I	36
1953	Amar-Sîn	1		5		23	Sulili	1		2
1952		2		6		24	s. of Amînum	2		3
1951		3		7		25		3		4
1950		4		8		26		4		5
1949		5		9		27		5		6
1948		6		10		28		6		7
1947		7		11		29		7		8
1946		8		12	Senwosret I	1	30	8		9
1945	n°4	9		13		2		9		10
1944	Šu-Sîn	1		14		3		10		11
1943		2		15				11		12
1942		3		16				12		13
1941		4		17				13		14
1940		5		18			n°28	14	n°3	15
1939		6		19			Kikkia	1	Ebarat I	1
1938		7		20				2		2
1937		8		21				3		3
1936	n°5	9		22				4		4
1935	Ibbi-Sîn	1		23				5	n°4	5
1934		2		24				6	Tazitta II	1
1933		3	n°12	25				7		2
1932		4	Hitlal-Erra	1				8		3
1931		5		2	LARSA	0		9		4
1930		6		3	Naplânium	1		10		5
1929		7		4	n°1	2		11		6
1928		8		5		3		12		7
1927		9		6		4	n°29	13		8
1926		10	n°13	7		5	Akia	1		9
1925		11	Hanun-Dagan	1		6		2	n°5	10
1924		12				7		3	Lurrak-luhhan	1
1923		13	ISIN I	0		8		4		2
1922		14	Išbi-Erra	1		9		5		3
1921		15	n°1	2		10		6		4
1920		16		3		11		7		5
1919		17		4		12		8		6
1918		18		5		13		9		7
1917		19		6		14		10		8
1916		20		7		15		11		9
1915		21		8		16		12		10
1914		22		9		17		13	Kindadu	1
1913		23		10		18	n°30	14	n°6	2

1912		24		11		19	Puzur-Aššur I	1		3
1911		25		12		20		2		4
1910				13	n°2	21		3		5
1909				14	Iemšium	1		4		6
1908				15		2		5		7
1907				16		3		6		8
1906				17		4		7		9
1905				18		5		8	n°7	10
1904				19		6		9	Idadu I	1
								10		
1903				20		7		11		2
1902				21		8		12		3
1901				22		9		13		4
1900				23		10	n°31	14		5
1899				24		11	Šalim-ahum	1		6
1898				25		12		2		7
1897				26		13		3		8
1896				27		14		4		9
1895				28		15		5		10
1894				29		16		6		11
1893				30		17		7		12
1892				31		18		8		13
1891				32		19		9		14
1890		n°2		33		20		10	n°8	15
1889		Šū-ilīšu		1		21		11	Tan-Ruḫuratir I	1
1888				2		22		12		2
1887				3		23		13		3
1886				4		24	n°32	14		4
1885				5		25	Ilu-šumma	1		5
1884				6		26		2		6
1883				7		27		3		7
1882				8	n°3	28		4		8
1881				9	Sâmium	1		5		9
1880		n°3		10		2		6		10
1879		Iddin-Dagān		1		3		7		11
1878				2		4		8		12
1877				3		5		9		13
1876				4		6		10		14
1875				5		7		11	EPARTIDS	15
1874				6		8		12	Ebarti II	1
1873				7		9	n°33	13		2
1872				8		10	Erišu I	1		3
1871				9		11		2		4
								3		
1870				10		12		4		5
1869				11		13		5		6
1868				12		14		6		7
1867				13		15		7		8
1866				14		16		8		9
1865				15		17		9		10
1864				16		18		10		11
1863				17		19		11		12
1862				18		20		12		13
1861				19		21		13		14
1860				20		22		14		15
1859		n°4		21		23		15		16
1858		Išme-Dagān		1		24		16		17
1857				2		25		17		18
1856				3		26		18		19
1855				4		27		19		20
1854				5		28		20	Šilḫaḫa	1
1853				6		29		21		2
1852				7		30		22		3
1851				8		31		23		4

1850			9		32		24		5
1849			10		33		25		6
1848			11		34		26		7
1847			12	n°4	35		27		8
1846			13	Zabâia	1		28		9
1845			14		2		29		10
1844			15		3		30		11
1843			16		4		31		12
1842			17		5		32		13
1841			18		6		33		14
1840		n°5	19		7		34		15
1839		Lipit-Eštar	1		8		35		16
1838			2	n°5	9		36		17
							37		
1837			3	Gungunum	1		38		18
1836			4		2		39		19
1835			5		3	n°34	0 40		20
1834			6		4	Ikunum	1 1	Temti-Agun I	1
1833			7		5		2 2		2
1832			8		6		3 3		3
1831			9		7		4 4		4
1830			10		8		5 5		5
1829		n°6	11		9		6 6		6
1828		Ur-Ninurta	1		10		7 7		7
1827			2		11		8 8		8
1826			3		12		9 9		9
1825			4		13		10 10		10
1824			5		14		11 11		11
1823			6		15		12 12		12
1822			7		16		13 13		13
1821			8		17	n°35	14 14		14
1820			9		18	Sargon I	15 1		15
1819			10		19		16 2		16
1818			11		20		17 3		17
1817			12		21		18 4		18
1816			13		22		19 5		19
1815			14		23		20 6		20
1814			15		24		21 7	Pala-iššan	1
1813			16		25		22 8		2
1812			17		26		23 9		3
1811			18	n°6	27		24 10		4
1810			19	Abî-sarê	1		25 11		5
1809			20		2		26 12		6
1808			21		3		27 13		7
1807			22		4		28 14		8
1806			23		5		29 15		9
1805					6		30 16		10
			24				31 17		
1804			25		7		32 18		11
1803			26		8		33 19		12
1802			27		9		34 20		13
1801		n°7	28		10		35 21		14
1800		Būr-Sîn	1	n°7	11		36 22		15
1799	BABYLON	0	2	Sumu-El	1		37 23		16
1798	Sumu-abum	1	3		2		38 24		17
1797	n°1	2	4		3		39 25		18
1796		3	5		4		40 26		19
1795		4	6		5		41 27		20
1794		5	7		6		42 28	Kuk-Kirmaš	1
1793		6	8		7		43 29		2
1792		7	9		8		44 30		3
1791		8	10		9		45 31		4
1790		9	11		10		46 32		5
1789		10	12		11		47 33		6

1788		11		13		12		48	34		7
1787		12		14		13		49	35		8
1786		13		15		14		50	36		9
1785	n°2	14		16		15		51	37		10
1784	Sumu-la-Il	1		17		16		52	38		11
1783		2		18		17		53	39		12
1782		3		19		18	n°36	54	40		13
1781		4		20		19	Puzur-Aššur II	55	1		14
1780		5		21		20		56	2		15
1779		6	n°8	22		21		57	3		16
1778		7	Lipit-Enlil	1		22		58	4		17
1777		8		2		23		59	5		18
1776		9		3		24		60	6		19
1775		10		4		25		61	7		20
1774		11	n°9	5		26	n°37	62	8	Kuk-Naḥudi	1
1773		12	Erra-imittī	1		27	Naram-Sîn	63	1		2
1772		13		2		28		64	2		3
								65	3		
1771		14		3	n°8	29		66	4		4
1770		15		4	Nûr-Adad	1		67	5		5
1769		16		5		2		68	6		6
1768		17		6		3		69	7		7
1767		18		7		4		70	8		8
1766		19	n°10	8		5		71	9		9
1765		20	Enlil-Bāni	1		6		72	10		10
1764		21		2		7		73	11		11
1763		22		3		8		74	12		12
1762		23		4		9		75	13		13
1761		24		5		10		76	14		14
1760		25		6		11		77	15		15
1759		26		7		12		78	16		16
1758		27		8		13		79	17		17
1757		28		9		14		80	18		18
1756		29		10		15		81	19		19
1755		30		11	n°9	16		82	20		20
1754		31		12	Sîn-iddinam	1		83	21	Kuk-Našur I	1
1753		32		13		2		84	22		2
1752		33		14		3	Birth of	85	23		3
1751		34		15		4	Šamši-Adad I	86	24		4
1750		35		16		5		87	25		5
1749	n°3	36		17		6		88	26		6
1748	Sābium	1		18	n°10	7		89	27		7
1747		2		19	Sîn-irībam	1		90	28		8
1746		3		20	n°11	2		91	29		9
1745		4		21	Sîn-iqišam	1		92	30		10
1744		5		22		2		93	31		11
1743		6		23		3		94	32		12
1742		7	n°11	24		4		95	33		13
1741		8	Zambīya	1	n°12	5		96	34		14
1740		9		2	Silī-Adad	1		97	35		15
1739		10		3	n°13	1		98	36		16
			n°12		Warad-Sîn		Samsi-Addu	99	37	King of Ekallatum	
1738		11	Itēr-pīša	1		2		100	38		17
1737		12		2		3		101	39		18
1736		13		3		4		102	40		19
1735	n°4	14	n°13	4		5		103	41		20
1734	Apil-Sîn	1	Urdukuga	1		6		104	42	Atta-ḥušu	1
1733		2		2		7		105	43		2
1732		3		3		8		106	44		3
1731		4	n°14	4		9		107	45		4
1730		5	Sîn-māgir	1		10		108	46		5
1729		6		2		11		109	47		6

1728		7		3		12		110	48		7
1727		8		4	n°14	13		111	49		8
1726		9		5	Rîm-Sîn I	1		112	50		9
1725		10		6		2		113	51		10
1724		11		7		3		114	52		11
1723		12		8		4		115	53		12
1722		13		9		5	n°38	116	54		13
1721		14		10		6	Erišu II	117	1		14
1720		15	n°15	11		7		118	2		15
1719		16	Damiq-ilišu	1		8		119	3		16
1718		17		2		9		120	4		17
1717	(n°5)	18	HANA	3		10		121	5		18
1716	Sîn-muballit	1	Yahdun-Lîm	4		11		122	6		19
1715		2	1	5		12		123	7		20
1714		3	2	6		13		124	8	Širuk-tuḥ	1
1713		4	3	7		14		125	9		2
1712		5	4	8		15	n°39	126	10		3
1711		6	5	9		16	Šamsî-Adad I	1			4
1710		7	6	10		17		128	2		5
1709		8	7	11		18		129	3		6
1708		9	8	12		19		130	4		7
1707		10	9	13		20		131	5		8
1706		11	10	14		21		132	6		9
								133	7		
1705		12	11			22		134	8		10
1704		13	12	16		23		135	9		11
1703		14	13	17		24		136	10		12
1702		15	14	18		25		137	11	(EGYPT)	13
1701		16	15	19		26		138	12	Neferhotep I	14
1700		17	16	20		27		139	13	1	15
1699		18	17	21		28		140	14	2	16
1698		19	1	22		29		141	15	3	17
1697	n°6	20	MARI	23		30		142	16	4	18
1696	Hammurabi	1	Samsî-Addu	1		31		143	17	5	19
1695	(BYBLOS)	2		2		32		144	18	6	20
1694	Yantin-Ammu	3		3		33		145	19	Siwe-palar-ḥuppak	1
1693	2	4		4		34		146	20	8	2
1692	3	5		5		35		147	21	9	3
1691	4	6		6		36		148	22	10	4
1690	5	7		7		37		149	23	11	5
1689	6	8		8		38		150	24		6
1688	7	9		9		39		151	25		7
1687	8	10		10		40		152	26		8
1686	9	11	Yasmah-Addu	1		41		153	27	(HAZOR)	9
1685	10	12		2		42		154	28	Ibni-Addu	10
1684	11	13		3		43		155	29	1	11
1683	12	14		4		44		156	30	2	12
1682	13	15		5		45		157	31	3	13
1681	14	16		6		46		158	32	4	14
1680	15	17		7		47	n°40	159	33	5	15
1679	16	18	Zimri-Lim	1		48	Išme-Dagan I	1	1	6	16
1678	17	19		2		49		2	2	7	17
1677	18	20		3		50		3	3	8	18
1676	19	21		4		51		4	4	9	19
1675	20	22		5		52		5	5	10	20
1674	21	23		6		53		6	6	11	21
1673	22	24		7		54		7	7	12	22
								8	8		
1672	23	25		8		55		9	9	13	23
1671	24	26		9		56		10	10	14	24
1670	25	27		10		57	n°41	11	11	15	25
1669		28		11		58	Aššur-dugul	12	1	Kudu-zuluš I	1
1668		29		12		59		13	2	17	2

1667		30		13		60		14	3	18	3
1666		31	Yapaḥ-šumu-	1		61		15	4	19	4
1665		32	Abu	2		-		16	5	20	5
1664		33		3		-	(42-47) n°48	17	6		6
1663		34				-	Bêlu-bâni	18	1		7
1662		35				-		19	2		8
1661		36	KASSITE	0		-		20	3		9
1660		37	Gandaš	1		-		21	4		10
1659		38	n°1	2		-		22	5		11
1658		39		3		-		23	6		12
1657		40		4		-		24	7		13
1656		41		5		-		25	8		14
1655		42		6		-		26	9		15
1654	n°7	43		7		-	n°49	27	10		16
1653	Samsu-iluna	1		8		-	Libbaya	28	1		17
1652		2		9		-		29	2		18
1651		3		10		-		30	3		19
1650		4		11		-		31	4		20
1649		5		12		-		32	5		21
1648		6		13		-		33	6		22
1647		7		14		-		34	7		23
1646		8		15	Rîm-Sîn II	0		35	8		24
1645		9		16		1		36	9		25
1644		10		17		2		37	10	Kutir-Naḥḥunte I	1
1643		11		18		3		38	11		2
1642		12		19		4		39	12		3
1641		13		20		5		40	13		4
1640		14		21				41	14		5
					SEALAND			42	15		
1639		15		22	Ilu-ma-ilu	9		43	16		6
1638		16		23		10	n°50	44	17		7
1637		17		24		11	Šarma-Adad I	45	1		8
1636		18		25		12		46	2		9
1635		19	n°2	26		13		47	3		10
1634		20	Agum I	1		14		48	4		11
1633		21		2		15		49	5		12
1632		22		3		16		50	6		13
1631		23		4		17		51	7		14
1630		24		5		18		52	8		15
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1620		34		15		28		62	6		25
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1472		28		7	Ea-gamil	1		215	19		13
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1462		38	Kaštiliašu III	1				225	5		3
1461		39		2				226	6		4
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1450		5	Ulam-Buriaš	1				237	4		15
1449		6		2				238	5	Inšušinak-sunkir-	1
1448		7		3				239	6	nappipir	2
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1431		24		8			aḫḫe I	257	2		4
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1422		8	Kadašman-	1			Enlil-našir II	266	1		3
1421		9	Harbe I	2				267	2		4
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1374		6	Kadašman-	1				316	11	Attar-Kittaḥ	1
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1363		17		12				327	22		2
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1259			5		9	434	12		16
1258			6		10	1	13		17
1257			7		11	2	14		18
1256			8		12	580 eponyms	3	15	19
1255		n°26	9		13	to Esarhaddon	4	16	20
1254		Kudur-Enlil	1		14	5	17		21
						6	18		
1253			2		15	7	19		22
1252			3		16	8	20		23
1251			4		17	9	21		24
1250			5		18	10	22		25
1249			6		19	11	23		26
1248			7		20	12	24		27
1247			8		21	13	25		28
1246		n°27	9		22	14	26		29
1245		Šagarakti-	1		23	15	27		30
1244		šuriaš	2		24	16	28	Kidin-Ḫutran III	1
1243			3		25	17	29		2
1242			4		26	n°78 18	30		3
1241			5	n°27	27	Tukulti-Ninurta I	1		4
1240			6	Tuḫaliya IV	1	20	2		5
1239			7		2	21	3		6
1238			8		3	22	4		7
1237			9		4	23	5		8
1236			10		5	24	6		9
1235			11		6	25	7		10
1234			12		7	26	8		11

1233		n°28	13	8	27	9	12
1232		Kaštiliašu IV	1	9	28	10	13
1231			2	10	29	11	14
1230			3	11	30	12	15
1229			4	12	31	13	16
1228			5	13	32	14	17
1227			6	14	33	15	18
1226			7	15	34	16	19
1225		n°29	8	16	35	17	20
1224	n°30	Enlil-nâdin-	1	17	36	18	21
1223	Kadašman-	šumi	1	18	37	19	22
1222	Harbe II	Adad-šuma-	1	19	38	20	23
		iddina			39	21	
1221		n°31	2	20	40	22	24
1220			3	21	41	23	25
1219			4	22	42	24	26
1218			5	23	43	25	27
1217		n°32	6	24	44	26	28
1216		Adad-šuma-	1	25	45	27	29
1215		ušur	2	26	46	28	30
1214			3	27	47	29	ŠUTRUKIDS
1213			4	28	48	30	Ḫallutaš-Inšušinak
1212			5	29	49	31	1
1211			6	30	50	32	2
1210			7	31	51	33	3
1209			8	32	52	34	4
1208			9		53	35	5
1207			10		54	36	6
1206			11		n°79	55	37
1205			12		Aššur-nâdin-apli	1	10
1204			13			57	2
1203			14			58	3
1202			15		n°80	59	4
1201			16		Aššur-nêrârî III	1	14
1200			17			61	2
1199			18			62	3
1198			19			63	4
1197			20			64	5
1196			21		n°81	65	6
1195			22		Enlil-kudurri-	1	20
1194			23		ušur	67	2
1193			24			68	3
		1st Nisannu	=		1st Šippu	69	4
1192			25		n°82	70	5
1191			26		Ninurta-apil-Ekur	1	24
1190			27			72	2
1189			28			73	3
1188			29			74	4
1187		n°33	30			75	5
1186		Meli-Šipak	1			76	6
1185			2			77	7
1184			3			78	8
1183			4			79	9
1182			5			80	10
1181			6			81	11
1180			7			82	12
1179			8		n°83	83	13
1178			9		Aššur-dân I	84	1
1177			10			85	2
1176			11			86	3
1175			12			87	4
1174			13			88	5
1173			14			89	6

1172		n°34	15			90	7		18
1171		Marduk-apla-	1			91	8		19
1170		iddina I	2			92	9		20
1169			3			93	10		21
1168			4			94	11		22
1167			5			95	12		23
1166			6			96	13		24
1165			7			97	14		25
1164			8			98	15		26
1163			9			99	16		27
1162			10			100	17		28
1161			11			101	18		29
1160		n°35	12	eponym	Aššur-išmânni	19			30
1159		Zababa-	13			103	20	Kutir-Nahḫunte II	1
1158	1	šuma-iddina	1			104	21		2
1157	2	Enlil-nâdin-	1			105	22		3
1156	3	aḫi	2			106	23		4
1155	4	n°37	3			107	24		5
1154		Marduk-	5			108	25	Šilhak-Inšušinak	1
1153		kabit-aḫḫešu	6			109	26		2
1152			7			110	27		3
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1150			9			112	29		5
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1148			11			114	31		7
1147			12			115	32		8
1146			13			116	33		9
1145			14			117	34		10
1144			15			118	35		11
1143			16			119	36		12
1142			17			120	37		13
1141		n°38	18			121	38		14
1140		Itti-Marduk-	1			122	39		15
1139		balatu	2			123	40		16
1138			3			124	41		17
1137			4			125	42		18
1136			5			126	43		19
1135			6			127	44		20
1134			7			n°86	128	45	21
1133		n°39	8	(n°84-85)	Aššur-rêš-iši I	46			22
1132		Ninurta-	1			130	1		23
1131		nâdin-šumi	2			131	2		24
1130			3			132	3		25
1129			4			133	4		26
1128			5			134	5		27
1127		n°40	6			135	6		28
1126		Nebu-	1	eponym	?	136	7		29
1125		chadnezzar I	2			137	8		30
1124			3			138	9	Ḫutluluš-Inšušinak	1
1123			4			139	10		2
1122			5			140	11		3
1121			6			141	12		4
1120			7			142	13		5
1119			8			143	14		6
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1117			10			145	16		8
1116			11			146	17		9
1115			12			n°87	146	18	10
1114			13		Tiglath-pileser I	1			11
1113			14			148	2		12
1112			15			149	3		13
1111			16			150	4		14
1110			17			151	5		15
1109			18			152	6		16

1108			19			153	7		17
1107			20			154	8		18
1106			21			155	9		19
1105		n°41	22			156	10		20
1104		Enlil-nâdin-	1			157	11	Shilhina-hamru-	1
1103		apli	2			158	12	Lagamar	2
1102			3			159	13		3
1101		n°42	4			160	14		4
1100		Marduk-	1			161	15		5
1099		nâdin-aḥḥê	2			162	16		6
1098			3			163	17		7
1097			4			164	18		8
1096			5			165	19		9
1095			6			166	20		10
1094			7			166	21		11
1093			8	eponym	Adad-apla-iddina		22		12
1092			9			168	23		13
1091			10			169	24		14
1090			11			170	25		15
1089			12			171	26		16
1088			13			172	27		17
1087			14			173	28		18
1086			15			174	29		19
1085			16			175	30	?	20
1084			17			176	31		
1083		n°43	18			177	32		
1082		Marduk-aḥḥê-	1			178	33		
1081		erība	2			179	34		
1080			3			180	35		
1079			4			181	36		
1078			5			182	37		
1077			6			183	38		
1076			7		n°88	184	39		
1075			8		Ašared-apil-Ekur		1		
1074			9		n°89	186	2		
1073			10		Aššur-bêl-kala		1		
1072			11			188	2		
1071			12			189	3		
1070		n°44	13			190	4		
1069		Adad-apla-	1			191	5		
1068		iddina	2			192	6		
1067			3			193	7		
1066			4			194	8		
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1058			12			202	16		
1057			13			203	17		
1056			14		n°90	204	18		
1055			15		Erība-Adad II		1		
1054			16		n°91	206	2		
1053			17		Šamšî-Adad IV		1		
1052			18			208	2		
1051			19			209	3		
1050			20		n°92	210	4		
1049			21		Aššurnaširpal I		1		
1048		n°45	22			212	2		
681		n°88	8	n°111	Sennacherib 580		24		

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