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

Gérard Gertoux

The Mesopotamian chronology of the 1st millennium before the Christian era (BCE) is well established. By contrast, that of the 2nd millennium remains highly controversial², 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 by its critics, has been strongly contested by scholars 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 dating) are significantly less expert in the analysis of historical or linguistic data. For example, any historian knows that a father must be born before his son, that a king reigns during his lifetime and not after his death and that an astronomical phenomenon can be observed a few days later than the theoretically calculated day, but not a few days in advance (unless the observer has made a prediction). For example, 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-Sîn (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 C14 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 +/- 7 BCE) occurring more or less when Šamši-Adad I died (REL 197 = 1776 BCE on the Middle Chronology)*. To solve this problem the authors of the article suggest adopting a “Low Middle Chronology” (sic) instead of the conventional Middle Chronology, which is an absurdity for astronomers, because whereas a date can be determined at +/- 20 years by radiocarbonists, astronomers only accept observed dates that are a few days off from the calculated dates. The explanation for this paradox is simple: the timbers of this palace were reused, which artificially aged the building, and Šamši-Adad I died decades after the palace was built. Therefore, 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. Secondly the reign of Neferhotep I was measured at +/- 20 years by carbon-14, because in Egypt carbonaceous remains are abundant (papyri, wooden sarcophagi, mummies, etc.). As there is a synchronism (at +/- 20 years) between Neferhotep I (1721-1710) and Ibni-Addu (1700-

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/>). ORCID <http://orcid.org/0000-0001-5916-0445>

² 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!

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 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 established³.

This long 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 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 (as shown in the table below) 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 Taḅ-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 Taḅ-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 eponyms⁴ 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

³ 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).

⁴ 614 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).

lists indicate 3 eponyms (Pruzinsky: 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 months⁵, 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 (Pruzinsky: 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.

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 17th 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, exactly satisfies the astronomical dating of the Ammisaduqa tablet on Venus, 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 paper 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 this absolute Mesopotamian chronology 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 Eriba-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-uballit 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

⁵ 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).

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** (Pruzsinsky: 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 Shalmaneser 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 Shalmaneser 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 (Pruzsinsky: 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 Erîba-Adad I and Kadašman-Enlil I (1375-1360), however we note that there are 185 eponyms⁶ between Erîba-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 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 x 365.24219 = 12053 days) are approximately equivalent to 34 lunar years (34 x 12 x 29.530588 = 12048 days), the 180 lunisolar years correspond to 185 eponyms (= 180 x 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 Shalmaneser I (1271–1242), in 1259 BCE, which makes it possible to determine the reign of Šamšî-Adad I (**1712–1680**), because 1680 = (434 x 33)/34 + 1259. As this Assyrian king died in Year 17 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 eclipses⁷ 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 king⁸, 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

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

⁷ 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).

⁸ 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).

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*⁹, 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, 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 controversial¹⁰ (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 as can be seen in the table below:

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-ilāni	(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-ilāni	<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-ilāni and Year 22 of

⁹ 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.

¹⁰ The chronological study of the eponyms over the period 648-609 BCE is still in progress (<http://oracc.org/rinap/rinap5/rinap52/>).

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).

TABLE 4

n°	ASSYRIAN KING	#	Reign	n°	BABYLONIAN KING	#	Reign	
99	Adad-nêrârî I	21	912-891	58	Šamaš-mudammiq	21	921-900	
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	Samšî-Adad V	13	824 - -811	62	Marduk-balâssu-iqbi	6	819-813	
				63	Bâba-ah-iddina	-	813-812	
104	Adad-nêrârî III	28	811 - -783	-	no kings	-	812-801	
					5 unknown kings (64-68)	-	801-800	
				69	Ninurta-apla-[...]	-	800-790	
				70	Marduk-bêl-zêri	-	790-780	
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 - -727	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
				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 - -705	80	Merodachbaladan II	12	722-710	Almagest IV:6
				81	Sargon II	5	710-705	
111	Sennacherib	24	705 - -681	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-ušezi	1	694-693	
				87	Mušezi-Marduk	4	693-689	
				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 - -605	Almagest V:14
116	Aššur-uballiṭ II	3	612-609					
				93	Nebuchadnezzar II	43	605-562	VAT 4956
				94	Amel-Marduk	2	562-560	
				95	Neriglissar	4	560-556	
				96	Nabonidus	17	556-539	

The Assyrian and Babylonian King lists can be reconstructed chronologically over the period 2020-900 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°10) 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-aḥḥe 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 aḥlamû (...) 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-aḥḥê king of Karduniash, and I defeated him (...) Month of Hibur, equivalent of the (Babylonian) month of Kislev, 18th day, [eponymy] of Taklak-ana-Aššur; I crossed the Euphrates [28?] times, 2 times in one year, in pursuit of the Arameans aḥlamû (...) 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 year¹¹. The mention of 28 crossings of the Euphrates, including two in one year, 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 January¹². 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)¹³.

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)
1090	1	X	Tebētu	<i>xii</i>	Ḫubur	25	[24]	
	2	XI	Šabātu	<i>i</i>	Šippu			
	3	XII	Addáru	<i>ii</i>	Qarrātu			
	4	I	Nisannu	<i>iii</i>	Kalmartu			
	5	II	Ayyaru	<i>iv</i>	^d Sin			
	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>	Muḫḫur ilâni			
	12	IX	Kisilimu	<i>xi</i>	Abû šarrâni			
1089	1	X	Tebētu	<i>xii</i>	Ḫubur	26	[25]	<i>Aššur-šuma-êriš</i> (MARV V 43)
	2	XI	Šabātu	<i>i</i>	Šippu			
	3	XII	Addáru	<i>ii</i>	Qarrātu			
	4	XIIa	Addáru2	<i>iii</i>	Kalmartu			
	5	I	Nisannu	<i>iv</i>	^d Sin			
	6	II	Ayyaru	<i>v</i>	Kuzallu			
	7	III	Simanu	<i>vi</i>	Allanātu			
	8	IV	Du'uzu	<i>vii</i>	Belêt-ekalli			
	9	V	Abu	<i>viii</i>	Ša sarrâte			
	10	VI	Ulûlû	<i>ix</i>	Ša kênâte			
	11	VII	Tašrîtu	<i>x</i>	Muḫḫur ilâni			
	12	VIII	Araḥsamna	<i>xi</i>	Abû šarrâni			
1088	1	X	Tebētu	<i>i</i>	Šippu	27	[26]	<i>Ninuaya son of Aššur-aplu-lišir</i> (RIMA 2, A.0.87.3)
	2	XI	Šabātu	<i>ii</i>	Qarrātu			
	3	XII	Addáru	<i>iii</i>	Kalmartu			
	4	I	Nisannu	<i>iv</i>	^d Sin			
	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>	Muḫḫur ilâni			
	11	VIII	Araḥsamna	<i>xi</i>	Abû šarrâni			
	12	IX	Kisilimu	<i>xii</i>	Ḫubur			
1088	1	X	Tebētu	<i>i</i>	Šippu	27	[27]	<i>Taklak-ana-Aššur</i> (RIMA 2, A.0.87.4)
	2	XI	Šabātu	<i>ii</i>	Qarrātu			
	3	XII	Addáru	<i>iii</i>	Kalmartu			
	4	I	Nisannu	<i>iv</i>	^d Sin			
	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>	Muḫḫur ilâni			
	11	VIII	Araḥsamna	<i>xi</i>	Abû šarrâni			
	12	IX	Kisilimu	<i>xii</i>	Ḫubur			

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*. In addition, 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

¹¹ 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.

¹² 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 Addáru2 in year 25 of Tiglath-pileser.

¹³ 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).

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 equivalence system was approximate because the 27th campaign (C) does not exactly correspond to the 27th year of reign (E) which was based on eponyms (Taklak-ana-Aššur). The beginning of regnal years was different depending on dating systems¹⁴. Although during the period 1500-1150 BCE there is no explicit notation or other inscriptional evidence for intercalary lunar months, 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	[25 ?]	MARV V 43
Month of Kuzallu, day 13, the eponym year of Ninuaya son of Aššur-aplu-lišir	[26 ?]	RIMA 2, A.0.87.3
The month of Ḫibur, which is during the month Kissilîmu, day 18, the eponym year of Taklak-ana-Aššur	[27 ?]	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	Araḥsamna	<i>ii</i>	Qarrâtu		
	12	IX	Kisilîmu	<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	Addâru2	<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>	Muḥḥur ilâni		
	7	IV	Du'ûzu	<i>xi</i>	Abû šarrâni		
	8	V	Abu	<i>xii</i>	Ḫibur		
1113	9	VI	Ulûlû	<i>i</i>	Šippu	2	[2] <i>Ištu-Aššur-ašamšu son of Aššur-aḫa-iddina</i>
	10	VII	Tašrîtu	<i>ii</i>	Qarrâtu		
	11	VIII	Araḥsamna	<i>iii</i>	Kalmartu		
	12	IX	Kisilîmu	<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		

¹⁴ 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.

	6	III	Simanu	<i>x</i>	Muḥḥur ilāni		
	7	IV	Du'uzu	<i>xi</i>	Abū šarrāni		
	8	V	Abu	<i>xii</i>	Ḥubur		
	9	VI	Ulūlū	<i>i</i>	Šippu	3	
	10	VII	Tašrītu	<i>ii</i>	Qarrātu		
	11	VIII	Arašsamna	<i>iii</i>	Kalmartu		
	12	IX	Kisilimu	<i>iv</i>	^d Sin		
1112	1	X	Tebētu	<i>v</i>	Kuzallu		
	2	XI	Šabātu	<i>vi</i>	Allanātu		
	3	XII	Addāru	<i>vii</i>	Belēt-ekalli		
	4	I	Nisannu	<i>viii</i>	Ša sarrāte	[3]	<i>Aššur-šallimšunu</i>
	5	II	Ayyaru	<i>ix</i>	Ša kēnāte		
	6	III	Simanu	<i>x</i>	Muḥḥur ilāni		
	7	IV	Du'uzu	<i>xi</i>	Abū šarrāni		
	8	V	Abu	<i>xii</i>	Ḥubur		
	9	VI	Ulūlū	<i>i</i>	Šippu	4	
	10	VII	Tašrītu	<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	Addāru	<i>vii</i>	Belēt-ekalli		
	4	I	Nisannu	<i>viii</i>	Ša sarrāte	[4]	<i>Šamaš-apla-êriš son of Aššur-šeziḫanni</i>
	5	II	Ayyaru	<i>ix</i>	Ša kēnāte		
	6	III	Simanu	<i>x</i>	Muḥḥur ilāni		
	7	IV	Du'uzu	<i>xi</i>	Abū šarrāni		
	8	V	Abu	<i>xii</i>	Ḥubur		
	9	VI	Ulūlū	<i>i</i>	Šippu	5	
	10	VII	Tašrītu	<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	Addāru	<i>vii</i>	Belēt-ekalli		
	4	XIIa	Addāru2	<i>viii</i>	Ša sarrāte		
	5	I	Nisannu	<i>ix</i>	Ša kēnāte	[5]	<i>Ḥiyašānu</i>
	6	II	Ayyaru	<i>x</i>	Muḥḥur ilāni		
	7	III	Simanu	<i>xi</i>	Abū šarrāni		
	8	IV	Du'uzu*	<i>xii</i>	Ḥubur		
	9	V	Abu	<i>i</i>	Šippu	6	
	10	VI	Ulūlū	<i>ii</i>	Qarrātu		
	11	VII	Tašrītu	<i>iii</i>	Kalmartu		
	12	VIII	Arašsamna	<i>iv</i>	^d Sin		
1109	1	X	Tebētu	<i>vi</i>	Allanātu		
	2	XI	Šabātu	<i>vii</i>	Belēt-ekalli		
	3	XII	Addāru	<i>viii</i>	Ša sarrāte		
	4	I	Nisannu	<i>ix</i>	Ša kēnāte	[6]	<i>Ina-ilīya-allak (rab šaqe)</i>
	5	II	Ayyaru	<i>x</i>	Muḥḥur ilāni		
	6	III	Simanu	<i>xi</i>	Abū šarrāni		
	7	IV	Du'uzu	<i>xii</i>	Ḥubur		
	8	V	Abu	<i>i</i>	Šippu	7	
	9	VI	Ulūlū	<i>ii</i>	Qarrātu		
	10	VII	Tašrītu	<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>	Belēt-ekalli		
	3	XII	Addāru	<i>viii</i>	Ša sarrāte		
	4	I	Nisannu	<i>ix</i>	Ša kēnāte	[7]	<i>Šadānāyu</i>
	5	II	Ayyaru	<i>x</i>	Muḥḥur ilāni		
	6	III	Simanu	<i>xi</i>	Abū šarrāni		
	7	IV	Du'uzu	<i>xii</i>	Ḥubur		
	8	V	Abu	<i>i</i>	Šippu	8	
	9	VI	Ulūlū	<i>ii</i>	Qarrātu		
	10	VII	Tašrītu	<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>	Belēt-ekalli		
	3	XII	Addāru	<i>viii</i>	Ša sarrāte		
	XIIa	Addāru2	<i>ix</i>	Ša kēnāte			

	4	I	Nisannu	<i>x</i>	Muḥḥur ilāni	[8] ?
	5	II	Ayyaru	<i>xi</i>	Abû šarrāni	
	6	III	Simanu	<i>xii</i>	Ḥubur	
	7	IV	Du'ūzu	<i>i</i>	Šippu	

The concordance of months is excellent between the Babylonian year, which was lunisolar (365.25 days in average), and the Assyrian year, which was lunar (354.36 days). The only discrepancy appears in regnal year 5: *The month of Abû-šarrāni (which is) the month Simānu (instead of Du'ūzu*)*, day 28, the eponym year of *Ḥiyašānu*. 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 26 (highlighted in light grey) is confirmed (Mahieu: 2018, 77-82):

TABLE 8

BCE	Eponym	son of:	(C)	(Y)	1st Nisan (Babylonian)	Intercalary month	month (Assyrian)
1115	Ninurta-nâdin-apli		18th	[0]	10 April	Addar2	Belêt-ekalli
1114	Tiglath-pileser (I)		1st	[1]	29 April		Ša sarrâte
1113	Ištu-Aššur-ašamšu	Aššur-aḡa-iddina	2nd	[2]	17 April		Ša sarrâte
1112	Aššur-šallimšunu		3rd	[3]	6 April		Ša sarrâte
1111	Šamaš-apla-êriš	Aššur-šezibanni	4th	[4]	27 March	Addar2	Ša sarrâte
1110	Ḥiyašānu		5th	[5]	15 April		Ša kênâte
1109	Ina-ilīya-allak (rab šaqe)		6th	[6]	3 April		Ša kênâte
1108	Šadânāyu		7th	[7]	24 March	Addar2	Ša kênâte
1107	?		8th	[8]	12 April		Muḥḥur ilāni
1106	Aššur-mudammeq		9th	[9]	1 April	Addar2	Muḥḥur ilāni
1105	Ibri-šarre		10th	[10]	19 April		Abû šarrāni
1104	Aššur-kêtti-šêssi		11th	[11]	8 April	Addar2	Abû šarrāni
1103	Mutakkil-Aššur		12th	[12]	27 April		Ḥubur
1102	Mušêzib-Aššur		13th	[13]	16 April		Ḥubur
1101	Ippitte		14th	[14]	4 April	Addar2	Ḥubur
1100	Mudammeq-Bêl		15th	[15]	23 April		Šippu
1099	Aššur-apla-iqîša		16th	[16]	13 April		Šippu
1098	Šahhutu		17th	[17]	3 April	Addar2	Šippu
1097	Bêl-libûr		18th	[18]	21 April		Qarrātu
1096	Nusku-âlik-pânî		19th	[19]	10 April		Qarrātu
1095	Aplaya		20th	[20]	30 March	Addar2	Qarrātu
1094	Ninurta-aha-iddina		21th	[21]	18 April		Kalmartu
1093	Adad-apla-iddina		22th	[22]	6 April		Kalmartu
	<i>No eponym</i>		23th				
1092	Aššur-šuma-êriš		24th	[23]	26 March	Addar2	Kalmartu
1091	Ninuaya	Aššur-aplu-lišir	25th	[24]	14 April		°Sin
1090	Taklak-ana-Aššur		26th	[25]	4 April	Addar2	°Sin
1089			27th	[26]	22 April		Kuzallu
1088			28th	[27]	12 April		Kuzallu
1087			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 (with two campaigns in 1093 BCE). 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 occurred every lunar year but since there is no eponym in 1093 BCE (because 34 lunar years = 33 luni-solar years), the eponyms were named at the 1st Nisannu, the beginning of the Babylonian year. The eponyms were already named in the 1st Nisannu under Aššur-dân I, because Aššur-išmânni" 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-dân I (1179-1133) because his 46th year began on the eponym Pišqīya son of Kaššu (April 1133 BCE), the same as Ninurta-tukultî-Aššur who reigned from the months Ša kênâte to Abu šarrâni (from February to April 1132 BCE). Afterwards, Mutakkil-Nusku reigned briefly (a few days)¹⁵, followed by Aššur-reš-iši I (1133-1115) whose year 1 began 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	6	III	<i>i</i> Šippu	45	Aššur-dân I n°83	<i>Marduk-aḫa-ēriš</i>	7 Itti-Marduk-balaṭu				
	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								
1133	1	X	<i>viii</i> Ša sarrâte					46		<i>Pišqīya s. of Kaššu</i>	8
	2	XI	<i>ix</i> Ša kênâte								
	3	XII	<i>x</i> Muḫḫur ilâni								
	4	I	<i>xi</i> Abû šarrâni								
	5	II	<i>xii</i> Ḫubur								
	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> Ša sarrâte	0	Ninurta-tukultî-Aššur n°84	<i>Aššur-šēzibanni s. of Pa'uzu</i>	0				
	2	XI	<i>ix</i> Ša kênâte								
	3	XII	<i>x</i> Muḫḫur ilâni								
	4	I	<i>xi</i> Abû šarrâni								
	5	II	<i>xii</i> Ḫubur								
	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> Ša sarrâte	1	Mutakkil-Nusku n°85	<i>Sîn-šēya s. of Urad-ilâne</i>	Ninurta-nâdin-šumi				
	2	XI	<i>ix</i> Ša kênâte								
	3	XII	<i>x</i> Muḫḫur ilâni								
	4	I	<i>xi</i> Abû šarrâni								
	5	II	<i>xii</i> Ḫubur								
	6	III	<i>i</i> Šippu								
	1131	1	X					<i>viii</i> Ša sarrâte	2	Aššur-reš-iši	2
		2	XI					<i>ix</i> Ša kênâte			
		3	XII					<i>x</i> Muḫḫur ilâni			
		4	I					<i>xi</i> Abû šarrâni			
		5	II					<i>xii</i> Ḫubur			
		6	III					<i>i</i> Šippu			

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

¹⁵ 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).

in the Babylonian system (the Assyrian year started on 1st Šippu or 27 March in 1225 BCE)¹⁶. 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	Kîdin-Aššur (?)		32th	[31]		6
1210	Sin-uballit (?)		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:

¹⁶ N = 1225, (N - 1088) × 365,24219 = (141) × 12 × 29,530588 + 72 => 72 + 13 = 85th day of the year = 27 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				-1187
81	Enlil-kudurri-ušur	5	1197-1192				

TABLE 12

BCE	Month	Assyrian	[A]	[B]	King / eponym				
1225	1	X <i>x</i>	Muḫḫur ilâni	17	7	[A] Tukultî-Ninurta I Assyrian			
	2	XI <i>xi</i>	Abû šarrâni			[B] Kaštiliašu IV Babylonian			
	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>	Qarrātu						
	6	III <i>iii</i>	Kalmartu						
	7	IV <i>iv</i>	^d Sin				0	<i>(Babylon taken)</i> [B] Enlil-nâdin-šumi (Babylonian Viceroy)	
	8	V <i>v</i>	Kuzallu						
	9	VI <i>vi</i>	Allanātu						
	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>	Muḫḫur 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>	Qarrātu						
	6	III <i>iii</i>	Kalmartu						
	7	IV <i>iv</i>	^d Sin						
	8	V <i>v</i>	Kuzallu						
	9	VI <i>vi</i>	Allanātu						
	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>	Muḫḫur 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>	Qarrātu						

CHRONOLOGY OF MESOPOTAMIAN REIGNS OVER THE PERIOD 2020–912 BCE

The chronology of Assyrian reigns can, therefore, be fully reconstructed starting from Aššur-uballiṭ 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 below) 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 eponyms¹⁷ 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 Aḫiyaya 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).

¹⁷ 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	Su-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 Salim-ahum, year 1	1	1
1833	42	Ikūnum	Šudaya		2	2
1832	43	Dan-Wēr	Ahuahi		3	3
1831	44	Su-Anum	Nērabtim		4	4
1830	45	Ilī-massu	Aššur-ṭab		5	5
1829	46	Šu-Hubur	Šulī		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	Quḫidi	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	Ilī-ālum	accession of Sābium	88	26	36
1748	129	Aššur-rē'ī	Ilī-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-imitti			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-imitti		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	Ipid-Adad		135	9	13
1703	176	Ahu-šarri	Ilī-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	Reš-Šamaš	Anum-piša?		147	21	5
1691	188	Ibni-Adad	Aššur-tukultī		148	22	6
1690	189	Aššur-imitti			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	Aḥiyaya*	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 (1873-1834).
- After the accession of King Ikunum, some lists give Šuli as eponym before Iddin-Suen brother of Šuli (eponym N°41 in KEL A, the longest list). 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 list KEL A states that he was the eponym during the accession of Ikunum. Therefore, Šuli has to be removed from the list, as dis list KEL A.
- 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: 1997-2000, 111-126), but there was no total solar eclipse visible in Assyria (between Ashur and Nineveh) over the period 1800-1700 BCE¹⁸. Moreover, the term used *na'duru* “darkened, obscured, eclipsed” means an eclipse in a metaphorical way and is different from the usual *antalū* “eclipse” used in Mari¹⁹. 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).

¹⁸ 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)!

¹⁹ 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-nêrârî 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-kāšid		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	Abî-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-pî-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	Abî-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-kettî-îde	Abî-ilī	24	12	[23]	7
1247	Ekaltāyu	Abî-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	Tukultî-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-aḥḥê-êreš	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		Abî-rāmu	4	4	4	4
676		Banbâ	5	5	5	5
675		Nabû-aḥḥê-iddin	6	6	6	6
674		Šarru-nûrî	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 lists²⁰ (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 (1873-1834), 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).

²⁰ 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 (Abi-Rattaš) to n°17 (Kurigalzu I), 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), it seems appropriate to delete Ušši (n°4) and replace it with Kaštiliašu II and to insert Ur[...]iaš²¹ (n°11) between Burna-Buriaš I and Kaštiliašu III (Mahieu: 2021, 98). Bieke Mahieu proposed to change the order of succession between n°17 and n°36 based on an unverifiable hypothesis which, moreover, contradicts several synchronisms²², but the reigns of Abi-Rattaš (n°5) and Urzigurumaš (n°6) seem to have been around 20 years and those of Kaštiliašu III (n°12) and Ulam-Buriaš (n°13) around 12 years (Mahieu: 2021, 121-123), instead of the average duration of 16 years of the 36 Kassite reigns ($16 = 576/36$). For example, there are several synchronisms between the Assyrian and Kassite kingships as well as between the Kassite and Babylonian kingships:

- 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 which is not thought to be Ulam-Buriaš. Two passages in the Chronicle of Early Kings mention Kaštiliašu (III): “Ulam-Buriaš, brother of Kaštiliašu, the Kassite” and “Agum, the son of Kaštiliašu”.

Putting all these synchronisms (highlighted in grey) in parallel shows that Abi-Rattaš, the 5th Kassite king, was a contemporary of the 54th Assyrian king, Šû-Ninûa (1582-1568), which makes it possible to calculate the average duration of the 13 Kassite kings between Abi-Rattaš and Kadašman-Enlil I (1375-1360), 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°	KASSITE KING	reign	#	BABYLONIAN	reign	#	ASSYRIAN	reign
				Sâbium	1749-1735	14	Naram-Sîn	1774-1722
				Apil-Sîn	1735-1717	18	Ērišu II	1722-1712
				Sîn-muballiṭ	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 (n°54)	1582 -1568
		-1563					Šarma-Adad II	1568-1565
6	Urzigurumaš	1563-1543	[20]		-1551		Ērišu III	1565-1553
7	Ḫurbaḥ	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]	Resettling of	1499 -	41	Puzur-Aššur III	1491 -

²¹ The exact position of King Ur[...]iaš (1479-1463), however, remains hypothetical

²² For example, she places King Nazi-Bugaš (1333-1333) 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-Sah and places him in 15th position, but this king does not appear in the king lists. The only evidence of his existence are tablets that are dated to the reign of 'Agum and Kadašman-Sah', suggesting that he was a king, and that there was some form of co-rulership. It is possible that he was a transitional ruler with only local power (Beaulieu: 2018, 131-132).

11	Ur[...]iaš	1479-1463	[16]	Babylon	-1462				-1467
12	Kaštiliašu III	1463-1451	[12]	Years 38-41	1462-1459		Enlil-nâšir I (n°62)		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	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					Erîba-Adad I (n°72)		1385 -
18	Kadašman-Enlil I	1375-1360	15						-1358
19	Burna-Buriaš II	1360-1333	27				Aššur-uballiṭ I (n°73)		1358 -
20	Kara-ḥardaš	1333-1333	0						
21	Nazi-Bugaš	1333-1333	0						-1323
22	Kurigalzu II	1333-1308	25				Enlil-nêrârî (n°74)		1323-1313

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 below are those commonly proposed for the Sealand I, except for Damiq-ilišu II, who is given '39' instead of 16, 26, 36, or 46 years, 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 Udinim 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 land”. 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 17

BABYLONIAN	reign	#	ISIN I	reign	#			
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
Abi-ešuh	1616-1588	28		-1588			-1593	
Ammiditana	1588 -	37	Damiq-ilišu II	1588 -	'39'	Iškibal	1593-1578	15
	-1551			-1549		Šušši	1578-1554	24
Ammišaduqa	1551-1530	21	Pešgaldarameš	1549 -	50	Gulkišar	1554 -	55
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)		

(n°10 to n°20); New Kingdom (n°21 to n°29), which are preceded by the Hattian kings (pre-Hittites). It is interesting to note that the carbon-14 dating 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 proposed by Freu. All specialists agree that the origins of Hittite history are still full of darkness and many uncertainties remain (Margueron, Pfrisch: 2012, 212). According to a well-known tradition, Naram-Sîn of Akkad (2163-2126) marched against a coalition of 17 kings including Pamba king of Hatti, and Zipani king of Kanesh. The triple synchronism between kings Agum II (Kassite), Kirta (Mitannian) and Ammuna (Hittite) requires the setting of the reign of those kings over a period covering the reign of Agum II (1503-1487). Contrary to what Freu, an eminent Hittitologist, believed, recent archaeological discoveries have shown that the synchronisms with the Kassite kings fit only with the Ultra-Low chronology (Podany: 2014, 51-73). The oldest Hattian king²⁴, 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 make it possible to fix the Hittite chronology:

- 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.
- Yadiḫ-Abu I, overseer of Hana (*ugula Ḫana*), had fought Samsu-iluna in the latter's 27th year of Samsu-iluna's reign (Charpin: 2011, 41-59), in 1627 BCE. Afterwards the kingdom of Hana was under the influence of Kassites since the following king of Terqa was Kaštiliaš I (1613-1591).
- 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 (1534-1519) and Muršili I (1519-1499), 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, the incentive for the Hittites being the rich spoils of Babylon, and for the Kassites the prospect of creating a new ruling dynasty in Babylonia (Bryce: 2005, 99-100).
- The average duration of the Hittite reigns over the period 1500-1450 (kings n°5 to n°10) must have been low because this period was very troubled (wars and murders).
- The Hittite kings had relations with the Assyrian and Babylonian kings, but also with the Hanaean and Mitannian kings, consequently it is interesting to add the few additional synchronisms with these reigns. Among Mitannian kings, Šutarna I's father was Kirta (Freu: 2003, 37) and the king before Šutarna I was Sausadatra (Podany: 2014, 56-57). The final attack on Mitanni, in 1264 BCE, coincided with the disappearance of the Hanaean kingdom (Freu: 2003, 177-198).
- 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, three cities near Carchemish. 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, Klock-Fontanille: 2007, 15-16). According to later Hittite documents, Sargon of Akkad (2243-2187) had fought with the Luwian king Nurdaggal of Burushanda.

²⁴ The existence of the Hittite homeland is thus 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 group was documented at least as early as the empire of Sargon of Akkad (2243-2187), 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 the Great 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.

TABLE 19

n°	HATTI	reign	#	HANA (MARI)	reign	#	ASSYRIA	reign	#
1	Ḫurmeli	1750-1730	[20]	?			(MEC A)	1775-1745	
2	Ḫarpatiwa	1730-1710	[20]	Yaggid-Lîm	1738-1716	22	Ērišu II (n°38)	1722-1712	10
3	Ḫinar	1710 -	[20]	Yahdun-Lîm	1716-1699	17	Šamšî-Adad I	1712 -	33
		-1690		Sumu-Yamam	1699-1697	2			
				Samsî-Addu	1697-1687	10			
4	Waršama	1690 -	[20]	Yasmah-Addu	1687-1680	7		-1680	
		-1670		Zimrî-Lîm I	1680-1667	13	Išme-Dagan I	1680-1670	10
5	Pithana	1670-1650	[20]	Yâpaḫ-Šumu-Abu	1667-1654	13	BABYLONIA	reign	
6	Anitta	1650 -	[20]	Iši-Šumu-Abu	1654-1641	13	Samsu-iluna	1654 -	38
		-1630		Yadiḫ-Abu	1641-1626	15			
7	Zûzu	1630-1610	[20]	Muti-Huršana ?	1626 -	13			
	HITTITE	reign	#		-1613			-1616	
1	Ḫuzziya I	1605-1585	[20]	Kaštiliašu (I)	1613-1591	22	Abi-ešuḫ	1616-1588	28
	Tudḫaliya?	1585-1565	[20]	Sunuḫru-Ammu	1591-1575	[16]	Ammiditana	1588 -	37
	PU-Šarruma?	1565-1550	[15]	Ammi-madar	1575-1559	[16]		-1551	
2	Labarna	1550 -	[16]	Idi-Abu	1559-1543	[16]	Ammiṣaduqa	1551 -	21
		-1534		Zimri-Lim II	1543-1527	[16]		-1530	
3	Ḫattušili I	1534-1519	[15]	Kasapan	1527-1511	[16]	Samsuditana	1530 -	31
4	Muršili I	1519-1499	[20]	Kuari	1511 -	[16]		-1499	
5	Ḫantili I	1499-1494	[5]		-1495		Agum II	1511-1495	16
6	Zidanta I	1494-1494	<1	Hanaya / Ya'usa	1495 -	[15]	Burna-Buriaš I	1495 -	16
7	Ammuna	1494-1484	[10]	MITANNIAN	-1485				
8	Ḫuzziya II	1484-1484	<1	Sinia/ Šutarna I	1485 -				
				(Sa'itarna)	-1480			-1479	
9	Telipinu	1484-1479	[5]	Qiš-Addu /	1480 -	[25]	Ur[...]iaš	1479 -	16
10	Alluwamna	1479-1474	[5]	Barattarna I	-1475				
11	Ḫantili II	1474-1469	[5]						
12	Taḫurwaili I	1469-1469	<1						
13	Zidanza (II)	1469-1462	[7]					-1463	
14	Ḫuzziya III	1462-1455	[7]				Kaštiliašu III	1463 -	12
15	Muwatalli I	1455-1448	[7]		-1455			-1451	
16	Tudḫaliya I	1448-1428	[20]	Iddin-Kakka	1455-1430	[25]	Ulam-Buriaš	1451-1439	12
17	Ḫattušili II	1428-1413	[15]	Išar-Lim	1430 -	[25]	Agum III	1439-1423	16
18	Tudḫaliya II	1413-1383	[30]		-1405		Kadašman-	1423-1407	16
19	Arnuwanda I	1393-1368	[25]	Iggid-Lim	1405-1380	[25]	Harbe I		
20	Tudḫaliya III	1368-1353	[15]	Išiḫ-Dagan	1380-1355	[25]			
21	Šuppiluliuma I	1353-1322	31	Ahuni	1355-1330	[25]			
22	Arnuwanda II	1322-1322	<1	Hammurapi	1330 -	[25]			
23	Muršili II	1322-1295	27		-1305				
24	Muwatalli II	1295-1275	20	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 of Mitanni	-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 (AKL) allows dating the reign of Šamšî-Adad I (1712-1680). The synchronism with Hammurabi (1697-1654) allows dating the reigns of Šulgi, Ibbi-Sîn and Ammiṣaduqa, 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 the Second Dynasty of Isin had a reign of 18 years (1159-1141), as he started to rule from Zababa-šuma-iddina (Chen: 2020, 76,202-206).

TABLE 20

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	Sulgi	48	2002 -
25	Ila-kakkabû		14	1982-1968				-1954
26	Aminum		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		Išbi-Erra (ISIN I)	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 - -1834	3		Iddin-Dagân	21	1880-1859
					4		Išme-Dagân	19	1859-1840
34	Ikunum	159	14	1834-1821	5		Lipit-Eštar	11	1840-1829
35	Sargon I		40	1821 - -1782	6		Ur-Ninurta	28	1829-1801
					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				
					13				-1735
38	Erišu II		10	1722-1712	14	4	Apil-Sîn	18	1735-1717
39	Šamšî-Adad I		33	1712 - -1680	15	5	Sîn-muballiṭ	20	1717-1697
					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	Erišu III		13	1565-1553					-1551
57	Šamšî-Adad II		6	1553-1547	7	10	Ammišaduqa	21	1551 - -1530
58	Išme-Dagan II		16	1547-1531					
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 - -1467			Agum II (KASSITE)	16	1511-1495
					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 - -1423
66	Aššur-nâdin-aḥḥe I		10	1433-1424					
67	Enlil-našir II		6	1424-1418	15		Kadašman-Harbe I	16	1423 - -1407
68	Aššur-nêrârî II		7	1418-1411					
69	Aššur-bêl-nišešu		9	1411-1403	16		Kara-indaš	16	1407 - -1391
70	Aššur-rê'im-nišešu		8	1403-1395					
71	Aššur-nâdin-aḥḥe II		10	1395-1385	17		Kurigalzu I	16	1391 - -1375
72	Erîba-Adad I		27	1385 - -1358					
					18		Kadašman-Enlil I	15	1375-1360
73	Aššur-uballiṭ I		36	1358 -	19		Burna-Buriaš II	27	1360-1333
					20		Kara-ḥardaš	0	1333-1333
					21		Nazi-Bugaš	0	1333-1333
74	Enlil-nêrârî		10	1323-1313	22		Kurigalzu II	25	1333 - -1308
75	Arik-dên-ili		12	1313-1302					
76	Adad-nêrârî I		32	1302-1271	23		Nazi-Maruttaš	26	1308-1282
77	Šalmaneser I		12	1271-1259	24		Kadašman-Turgu	18	1282-1264
		580	18	1259 - -1242	25		Kadašman-Enlil II	9	1264-1255
					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
					31		Adad-šuma-iddina	6	1223-1217
				-1206					

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
82	Ninurta-apil-Ekur	13	1192-1179	33		Meli-Šipak	15	1187	-
83	Aššur-dân I	46	1179						-1172
				34		Marduk-apla-iddina	13	1172-1159	
				35		Zababa-šuma-iddina	1	1159-1158	
				36		Enlil-nâdin-aḫi	3	1158-1155	
				37		Marduk-kabit-aḫḫešu	18	1159-1141	
				38		Itti-Marduk-balaṭu (ISIN II)	8	1141	-
84	Ninurta-tukultî-Aššur	0	1133-1133						-1133
85	Mutakkil-Nusku	0	1133-1133						-1133
86	Aššur-rêš-iši I	18	1133-1115	39		Ninurta-nâdin-šumi	6	1133-1127	
87	Tiglath-pileser I	39	1115			40			
						41			
						42			
						43			
88	Ašared-apil-Ekur	2	1076-1074			44			
89	Aššur-bêl-kala	18	1074-1056			45			
90	Eriša-Adad II	2	1056-1054			46			
91	Šamšî-Adad IV	4	1054-1050			47			
92	Aššurnaširpal I	19	1050-1031			48			
93	Šalmaneser II	12	1031-1019			49			
94	Aššur-nêrârî IV	6	1019-1013			50			
95	Aššur-rabi II	41	1013			51			
						52			
						53			
						54			
						55			
96	Aššur-rêš-iši II	5	972-967			56			
97	Tiglath-pileser II	32	967			57			
						58			
98	Aššur-dân II	23	935-912						
99	Adad-nêrârî II	21	912-891						
100	Tukultî-Ninurta II	7	891-884			59			
101	Aššurnaširpal II	25	884-859			60			
102	Šalmaneser III	35	859-824			61			
103	Šamšî-Adad V	13	824			62			
						63			
104	Adad-nêrârî III	28	811			-			
						64-68			
						69			
						70			
105	Šalmaneser IV	10	783-773			71			
106	Aššur-dân III	18	773-755			72			
107	Aššur-nêrârî V	10	755-745			73			
108	Tiglath-pileser III	18	745			74			
						75			
						76			
						77			
						78			
109	Šalmaneser V	5	727-722			79			
110	Sargon II	17	722			80			
						81			
111	Sennacherib	24	705			82			
						83			
						84			
						85			
						86			
						87			
						88			
112	Esarhaddon	72	681-669			89			
113	Aššurbanipal	42	669-627			90			
114	Aššur-etel-ilâni	1	627-626			91			

115	Sin-šar-iškun	14	626-612	92	Nabopolassar	21	626 -
116	Aššur-uballiṭ II	3	612-609				-605
				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 Šamšī-Adad I it is possible to get the following synchronisms among months of several different calendars (Charpin, Ziegler: 2003, 134-176, 260-262): the end of Šamšī-Adad I's reign is dated²⁵ 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 Ṭab-šilla-Aššur”)²⁶.

TABLE 21

	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>Tîrum</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>Kinûnum (VII)</i>	ii*	<i>Kinûnum</i>	<i>Qarrâtîm (viii*)</i>
II	Ayyaru	5	May	iii°	<i>Dagan (VIII)</i>	iii*	<i>Tamhîrum</i>	<i>Kanwarta (ix*)</i>
III	Simanu	6	June	iv°	<i>Lîliatum (IX)</i>	iv*	<i>Nabrûm</i>	<i>Te'inâtîm (x*)</i>
IV	Du'ûzu	7	July (<i>summer</i>)	v°	<i>Bélet-bîrî (X)</i>	v*	<i>Mammîtum</i>	<i>Kuzallu (xi*)</i>
V	Abu	8	August	vi°	<i>Kiskissum (XI)</i>	vi*	<i>Mana</i>	<i>Allanâtîm (xii*)</i>
VI	Ulûlû	9	September	vii°	<i>Ebûrum (XII)</i>	vii*	<i>Ayyarum</i>	<i>Bêltî-ekallîm (i*)</i>
VII	Tašrîtu	10	October (<i>autumn</i>)	viii°	<i>Urâḥum (I)</i>	viii*	<i>Niggalum</i>	<i>Ša sarratîm (ii*)</i>
VIII	Araḥsamna	11	November	ix°	<i>Malkânûm (II)</i>	ix*	<i>Maqrânûm</i>	<i>Narmak Aššur (iii*)</i>
IX	Kisilîmu	12	December	x°	<i>Laḥḥum (III)</i>	x*	<i>Du'uzum</i>	<i>Maḥḥurîlî (iv*)</i>

The table (above) 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 Urâḥum; 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 calendars²⁷. 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 Šamšī-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 Nisannu²⁸.

Δ = year (BCE) – 1088 (for example in 1679 BCE: Δ = 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 x 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:

Δ = 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 astronomy²⁹.

²⁵ 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 Šamšī-Adad I started with a total lunar eclipse (bad omen).

²⁶ The fall of Larsa is dated [1-6]/XII/30 of Hammurabi and matches the [1-6]/VI/60 of Rim-Sîn I, because Zimrî-Lîm congratulated Hammurabi for his having taken Larsa in his letter dated 7/VI/12 (*ARM* XXV 9).

²⁷ For instance, the year 1 of Zimrî-Lîm 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 Zimrî-Lîm, 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).

²⁸ 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).

²⁹ <https://promenade.imcce.fr/fr/pages4/441.html> (first astronomical lunar crescent = first day after the new moon).

TABLE 22

BCE	month			Assyrian	[A]	[B]	[C]	[D]	King / eponym										
1680	1	IV	xi°	X	Ab šarrâni	6	32	16	46	<i>Adad-bâni</i>									
	2	V	xii°	XI	Hubur														
	3	VI	i°	XII	Šip'im						33	17	47	<i>Tab-šilli-Aššur</i> (N°199)					
	4	VII	ii°	I	Qarrâtîm														
	5	VIII	iii°	II	Kanwarta														
	6	IX	iv°	III	Te'inâtîm														
	7	X	v°	IV	Kuzallu														
	8	XI	vi°	V	Allanâtîm														
	9	XII	vii°	VI	Bêltî-ekallim														
	10	I	viii°	VII	Ša sarratîm										7	18	48	[A] Yasmah-Addu king of Mari [B] Šamšî-Adad I king of Assyria (n°39) [C] Hammurabi king of Babylon [D] Rîm-Sîn I king of Larsa	
	11	II	ix°	VIII	Narmak Aššur														
	12	III	x°	IX	Maḥḥurili														
1679	1	IV	xi°	X	Ab šarrâni	0	1	18	48	<i>after Tab-šilli-Aššur</i>									
	2	V	xii°	XI	Hubur														
	3	VI	i°	XII	Šip'im						0	1	18	48					[A] Zimrî-Lîm king of Mari [B] Išme-Dagan I king of Assyria (n°40)
	4	VII	ii°	I	Qarrâtîm														
	5	VIII	iii°	II	Kanwarta														
	6	IX	iv°	III	Te'inâtîm														
	7	X	v°	IV	Kuzallu														
	8	XI	vi°	V	Allanâtîm														
	9	XII	vii°	VI	Bêltî-ekallim														
	10	I	viii°	VII	Ša sarratîm										1	18	48	<i>Ennam-Aššur</i> (N°200)	
	11	II	ix°	VIII	Narmak Aššur														
	12	III	x°	IX	Maḥḥurili														
1678	1	IV	xi°	X	Ab šarrâni	2	19	49	<i>(Feast of Ištar in month xi° Ab Šarrani)</i>										
	2	V	xii°	XI	Hubur														
	3	VI	i°	XII	Šip'im					<i>Aššur-emūqī</i> (N°201)									
	4	VII	ii°	I	Qarrâtîm														
	5	VIII	iii°	II	Kanwarta														

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 see (below) 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 days³⁰ 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 Venus³¹ 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 years³². 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 follows³³ (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	

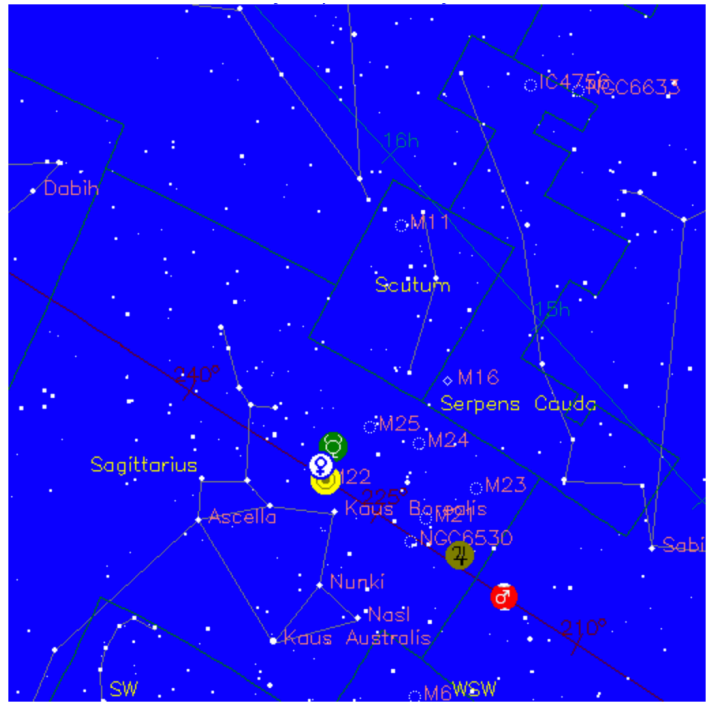
³⁰ 2 days = 8 x 365.24519 days - (8 x 12 + 3) x 29.530588 days (= -1.6 days)

³¹ http://en.wikipedia.org/wiki/Transit_of_Venus

³² 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.

³³ <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 1529 BCE (= -1528*), when this planet “crossed through the sun” (see image opposite). The observations were performed in Babylon³⁴. Teije de Jong regards Šamši-Adad I's death (dated 1776 BCE +/- 10 indirectly by carbon-14), instead of 1680 BCE, as an absolute date (De Jong: 2012-2013, 147-163) but carbon-14 dating is not absolute. In addition, dendrochronological dating of the Acmehöyüke palace requires locating the death of Šamši-Adad I after 1752 BCE (Michel, Rocher: 1997-2000, 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 Šulgi³⁵ (14/III/48) and another (Enuma Anu Enlil 21) mentions a (total) lunar eclipse³⁶, 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 eclipses³⁷, spaced by 42 years and 9 months, matching the description of astronomical omens (Huber: 2000, 159-176).

TABLE 23

BCE	month		King	
1954	1	X	47 Šulgi (Ur III n°2) (1/I/48 = 7 April)	
	2	XI		
	3	XII		
	4	I	48 <i>Total lunar eclipse dated</i> 14/III/48 (28 June)	
	5	II		
	6	III		
	1953	7	IV	0 Amar-Sîn (Ur III n°3)
		8	V	
		9	VI	
		10	VII	
		11	VIII	
		12	IX	
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	
	10	VII	
	11	VIII	
	12	IX	
1911	1	X	Total lunar eclipse dated 14/XII/24 (6 March)
	2	XI	
	3	XII	
	4	I	
	5	II	25 Fall of Ur (see SKL IB)
	6	III	
	7	IV	
	8	V	

³⁴ <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.

³⁵ 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).

³⁶ 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).

³⁷ 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.

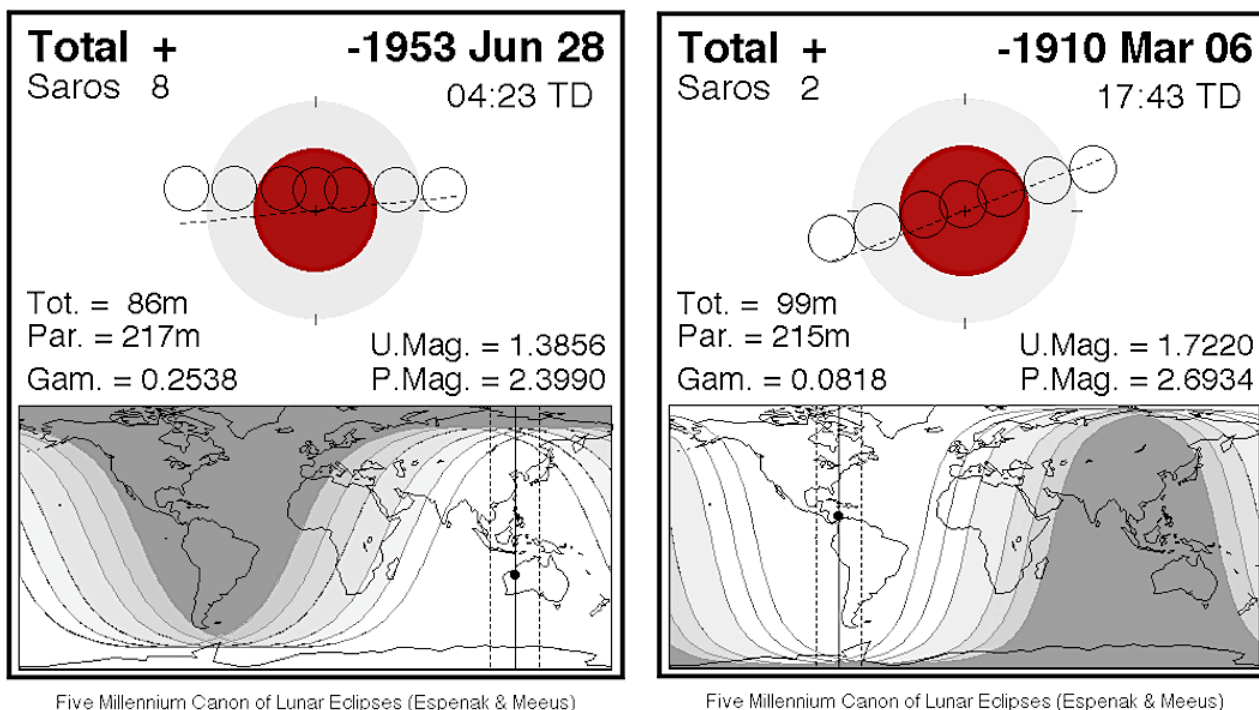
Huber's technical comments are impressive, yet they contain errors that are easy to detect. For example, the two eclipses proposed (the eclipse of 25 July -2094* [month IV year 48 of Šulgi] and the eclipse of 13 April -2052* [month I year 24 of Ibbi-Sîn]) are separated by 41 years and 9 months, not by 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 software³⁸ 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 19:41³⁹ (LT), which covered part of the first watch of the night (from 19:09 to 22:48). Huber's

³⁸ <https://promenade.imcce.fr/fr/pages5/585.html>

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

³⁹ 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.



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 24

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 Šamši-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 25

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 Zimrî-Lîm. 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 Samsî-Addu. He then named his son Yasmah-Addu as his successor (Ziegler/Charpin: 2001, 496-501).

TABLE 26

KING OF MARI	reign	KING OF ASSYRIA	reign	KING OF BABYLON	reign
Yaggid-Lîm ⁴⁰	1738-1716	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
Samsî-Addu	1697 -1687			Hammurabi	1697 -
Yasmah-Addu	1687- 1680		-1680		
Zimrî-Lîm	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 eclipses⁴¹ of the moon occurring on average at least once every 3 years, only those that seemed "harmful" (bad omen) were mentioned.

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

⁴⁰ The reign of Yaggid-Lîm began with the eponym N°139: Šu-Bēlum (Anbar: 1991, 31-40).

⁴¹ <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 27

BCE	month				[A]	[B]	[C]	[D]	King / eponym								
1688	10	I	x°	VII	9	25	9	39									
	11	II	xi°	VIII													
	12	III	xii°	IX													
1687	1	IV	i°	X						26				<i>Ikūn-pīya son of Šalim-Aššur (N°192)</i>			
	2	V	ii°	XI													
	3	VI	iii°	XII													
	4	VII	iv°	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	VIII	v°	II													
	6	IX	vi°	III													
	7	X	vii°	IV													
	8	XI	viii°	V													
	9	XII	ix°	VI													
	10	I	x°	VII	10												
	11	II	xi°	VIII	0	[A] Yasmah-Addu king of Mari											
12	III	xii°	IX														
1	IV	i°	X	27			<i>Ašqūdum (N°193)</i>										
1686	2	V	ii°			XI											
	3	VI	iii°			XII											
	4	VII	iv°			I		11	41								
	5	VIII	v°			II											
	6	IX	vi°			III											
	7	X	vii°			IV											
	8	XI	viii°			V											
	9	XII	ix°			VI											
	10	I	x°			VII				1							
	11	II	xi°			VIII											

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 (below), 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 28

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
Manišusu	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[vernor] 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 29

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	Ibbi-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	/Ibbi-zikir	15	-2228			
2	Adamu	9	2226-2217						
3	Yangi	9	2217-2208						
4	Lillâmu	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 -
15	Azarah	9	2109-2100						
16	Ušpia	9	2100 - -2091	Šu-Dagan	5	2104 -			
17	Apišal	9	2091-2082				Irgigi/ Imi/ Nanum/ Ilulu	3	2101 - -2098
18	Halê	14	2082-2068	Išmah-Dagan	45	2099 -	Dudu	21	2098-2077
19	Samânu	14	2068-2054				Šu-Turul	15	2077-2062
20	Hayâni	14	2054 - -2040				Ur-nigina (URUK)	7	2062-2055
				Nûr-Mêr	5	2054-2049	Ur-gigira	6	2055-2049
				Išdub-El	11	2049 -	Kuda	6	2049-2043
							Puzur-ilî	5	2043-2038
21	Ilu-Mer	14	2040-2026	Iškun-Addu	8	2038-2030	Ur-Utu	6	2038-2032
22	Yakmesi	14	2026-2012	Apil-Kîn	35	2030 -	Utu-ḫegal (V)		2032-2020
23	Yakmeni	14	2010-1996				Ur-Namma (UR)	18	2020-2002
24	Yazkur-El	14	1996-1982	Iddin-Ilum	5	1995-1990	Šulgi	48	2002 -
25	Ila-kabkabû	14	1982-1968	Ilum-Iš’ar	12	1990-1978			
26	Amînum	14	1968 - -1954	Turâm-Dagan	20	1978-1958			
				Puzur-Eštar	25	1958 -			
27	Sulili/Zariqum	14	1954-1940				Amar-Sîn	9	1954-1945

28	Kikkia	14	1940 - -1927	Hitlal-Erra	7	-1933 1933-1926	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	Iši-Dagan	6	1918-1912			
				Itûr ?[-]	6	1912-1906	Išbi-Erra (ISIN I)	33	1923 -
				Amer-Nunnu	6	1906-1900			
31	Šalim-ahum	14	1899 - -1885	Têr-Dagan	8	1900-1892			-1890
				Dagan[-]	6	1892-1886	Šû-ilīšu		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-šarri⁴² (in 2114 BCE) who took King Sarlagab prisoner.

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 6 6 ?	Epir-mupi 2140 - -2015 2115 -
	-2101	Ur-Ningirsu I	2110 - -2100	Šulme	2108-2102	6	
Irgigi, Imi Nuhum Ilulu	2101 - -2098	Pirig-me	2100-2090	Silulumeš	2102-2096	6	
Dudu	2098-2077	Lu-Ba'u	2090-2080	Inimabakeš	2096-2091	5	-2090
Su-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 15 3 3 1	Hielu 2090 - -2065
URUK IV				Ḫabil-kîn	2063-2060	3	Hita 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 - -2039	Puzur-Sîn	2053-2046	7	
Puzur-ilī	2043-2038			Jarlaganda	2046 - -2039	7	-2040
Ur-Utu	2038-2032			Si'um	2039-2032	7	Puzur- Inšušinak
Utu-ḫegal (V)	2032 - -2020		-2028 2028-2023 2023-2022 2022-2021	Tirigan (vassal of Awan)	2032-2032 2032 -	0	2040 -
UR III		Ur-Mama	2021-2020				
Ur-Namma	2020 - -2002	Nam-mahazi (Ur's vassal)	2020-2017	ELAM [unammed]	SIMAŠKI 2020 -		-2005
Šulgi	2002 - -1954	Ur-Ninsuna Ur-Ninkimara Lu-kirilaza	1996-1986 1986-1976 1976-1954				[-]-lu 2005-1990 1990 - -1954
Amar-Sîn	1954-1945	Ir-Nanna	1954 - -1933	Girnamme	1990-1955		Tazitta I 1955-1940
Šu-Sîn	1945-1936						Ebarat I 1955-1935
Ibbi-Sîn	1936 - -1912	Ur-Ningirsu Ur-Nanše ISIN I	1933-1928 1928-1923				Tazitta II 1935-1925 1925 - -1915
		Išbi-Erra	1923 - -1890				Kindadu 1915-1905 Idadu I 1905-1890

⁴² 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 Sarlag(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-Inšušinak⁴³, 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).

SUMER		AKKAD		ELAM		
URUK IV				AWAN II		
Ur-nigina			2062-2055	Ḫita	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	SIMĀŠKI
Ur-Namma	2020 - -2002		2020 - -2005	1st	[unammed]	2020 -
Šulgi	2002 - -1954	[-]-lu Kudu[r-Laga.]	2005-1990 1990-1954	2nd 3rd		-1990 1st Girmamme 1990-1955
Amar-Sîn	1954-1945				2nd	Tazitta I 1955-1940
Su-Sîn	1945-1936				3rd	Ebarat I 1955-1935
Ibbi-Sîn	1936 - -1912	ISIN I Išbi-Erra	1923 - -1890		4th 5th 6th	Tazitta II Lurrakluḫḫan Kindadu 1935-1925 1925-1915 1915-1905
					7th	Idadu I 1905-1890
		Šû-ilišu	1890-1880		8th	Tan.Ruḫuratir 1890-1875

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 Ibrum (2245-2228), which can be deduced from the trade treaty between Ibrum, 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 Ibrum (2245-2228) does, which could, therefore, correspond to the first Assyrian king, Tudiya (2235-2226).

⁴³ 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 30

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		Elulu (25)	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			8	2282-2276
	Iblul-II (20?)	Adub-Damu		Balulu (36)	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 ⁴⁴ (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);
- 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 31

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	[6]
E-anatum	30	2318 - -2288	Ibbi-Damu	-2306		Ibbi-Damu	2312-2306	[6]
			Iški-Mari	2306-2294		Baga-Damu	2306-2294	[6]
En-anatum I	6?	2288-2282	Anubu (Ianupu)	2294-2282		Enar-Damu	2294-2282	[6]
En-metena	30	2282 - -2252	Sa'umu	2282-2276		Iš'ar-Malik	2282-2276	[6]
			Itup-Išar	2276-2270		Kun-Damu	2276-2270	[6]
			Iblul-II	2270 -	20?	Adub-Damu	2270-2264	[6]
				-2252		Igriš-Halab	2264-2252	12
En-anatum II	7	2252 - -2245	Nizi	2252-2249	3	Irkab-Damu	2252 -	7
			Enna-Dagan	2249-2245	4?			
AKKAD			Ikun-Išar	2245-2245	-		-2245	
Sargon	56	2243 - -2187	Hida'ar	2245-2210	35	Iš'ar-Damu	2245-2213	32
			Išqi-Mari	2210-2201	9	<i>Fall of Ebla</i>		
			<i>Fall of Mari</i>	2201 -				
Rimuš	9	2187-2178						
Maništusu	15	2178- 2163	<i>military governor</i>	-2164				
Narâm-Sîn	37	2163-2126	Ididiš	2164 -	60			
Šar-kali-šarri	25	2126-2101		-2104				

⁴⁴ Lugalzagesi's reign is approximate (2240-2215). We only know that it encompasses Urukagina's reign.

LAGASH 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 (1873–1834). 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 32

ASSYRIA	Reign	BABYLON	Reign	ELAM	Reign
Šamšî-Adad I (n°39)	1712 -	Sîn-muballiṭ	1717-1697	Širuk-tuḥ	1715-1695
	-1680	Hammurabi	1697 -	Siwe-palar-ḥuppak	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-Naḥḥunte I	1645 -
Šarma-Adad I	1638-1626				
Puzur-Sîn	1626-1615		-1616		-1620
Bazaya	1615-1588	Abi-ešuḥ	1616-1588	Temti-Agun II	1620-1595
Lullaya	1588-1582	Ammiditana	1588 -	Kutir-Silḥaḥa	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-ḥalki	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-ilî	1455-1443	Ulam-Buriaš	1451 -	Inšušinak-sunkir-	1450 -
Aššur-šadûni	1443-1443		-1439	nappipir	-1440
Aššur-rabi I	1443-1433	Agum III	1439 -	Tan-Ruḥuratir II	1440-1435
Aššur-nâdin-aḥḥe I	1433-1424		-1423	Šalla	1435-1425
Enlil-nâšir II	1424-1418	Kadašman-Harbe I	1423 -	Tepti-aḥar	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-aḥḥe II	1395-1385	Kurigalzu I	1391 -		-1385
Eriša-Adad I	1385 -		-1375	Pahir-iššan	1385-1375
	-1358	Kadašman-Enlil I	1375 -	Attar-Kittaḥ	1375-1365
			-1360	Unpaḥaš-Napiriša	1365-1360
Aššur-uballiṭ I	1358 -	Burna-Buriaš II	1360 -	Kidin-Ḥutran I	1360-1355
			-1333	Ḥumban-numena I	1355-1345
		Kara-ḥardaš	1333-1333	Untaš-Napiriša	1345 -
		Nazi-Bugaš	1333-1333		
	-1323	Kurigalzu II	1333 -		
Enlil-nêrârî	1323-1313		-1308		
Arik-dên-ilî	1313-1302	Nazi-Maruttaš	1308 -		-1305
Adad-nêrârî I	1302 -		-1282	Kidin-Ḥutran 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-Ḥutran 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-Sipak	1187-1172	Sutruk-Naḫḫunte I	1190 -
Aššur-dân I	1179 -	Marduk-apla-iddina	1172-1159		
		Zababa-šuma-iddina	1159-1158		-1160
		Enlil-nâdin-aḫi	1158-1155	Kutir-Naḫḫunte II	1160-1155
		Marduk-kabit-aḫḫešu	1159-1141	Šilhak-Inšušinak	1155 -
	-1133	Itti-Marduk-balaṭu	1141 -		
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	Ḫutelutuš-Inšušinak	1125-1105
		Enlil-nâdin-apli	1105-1101	Šilhina-hamru-Lagamar	1105 -
	-1076	Marduk-nâdin-aḫḫê	1101-1083		-?
Ašared-apil-Ekur	1076-1074	Marduk-šapik-zêri	1083-1070		
Aššur-bêl-kala	1074-1056	Adad-apla-iddina	1070-1048		

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 33

ELAM (AWAN)	reign			LAGASH I (SUMER)	reign
Pieli	2390-2365			En-ḫegal	2370-2355
Tari	2365-2340			Lugal-ša-engur ⁴⁵	2355-2340
Ukku-taḫiš	2340 -			Ur-Nanše	2340-2322
	-2315			Akurgal	2322-2318
Ḫišur	2315-2290	ELAM (SUSA)	reign	E-anatum	2318-2288
Šušun-tarana	2290-2265	[unnamed]		En-anatum I	2288-2282
Napil-ḫuš	2265-2240			AKKAD	
Kikku-sime-temti	2240-2215			Sargon of Akkad	2243 -
Luhḫi-iššan	2215-2190				-2187
Hišep-ratep	2190-2175			Rimuš	2187-2178
Ešpum (<i>governor</i>)	2175-2165			Maništusu	2178-2163
Ili-išmani (<i>vassal</i>)	2165-2140			Narâm-Sîn	2163 -
Epir-mupi (<i>vassal</i>)	2140-2115				-2126
?	2115-2090			Šar-kali-šarri	2126-2101
Ḫielu	2090-2065				
Ḫita	2065-2040			URUK IV	
Puzur-Inšušinak	2040 -			Utu-ḫegal	2032-2021
		SIMAŠKI		UR III	
	-2005	[unnamed]	2020 -	Ur-Namma	2020-2002
[Ḫie?]-lu	2005-1990		-1990	Šulgi	2002 -
Kudu ₇ [ur-Lagamar] ⁴⁶	1990-1954	Girnamme	1990-1955		-1954
		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	(Collapse of Ur)	-1912
		Idadu I	1905-1890	LARSA	
EPARTIDS		Tan-Ruḫuratir I	1890-1875	Iemšium	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 -	Gungunum	1838-1811
Pala-iššan	1815-1795		-1795	Abi-sarê	1811-1800
Kuk-Kirmaš	1795-1775	Idadu-temti	1795 -	Sumu-El	1800-1771
Kuk-Naḫudi	1775-1755		-1765	Nûr-Adad	1771-1755

⁴⁵ Governor (ENSI) Lugal-ša-engur and King (LUGAL) En-ḫegal do not appear in King Lists but only in inscriptions.

⁴⁶ 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*.

Kuk-Našur I	1755-1735				
Atta-ḥušu	1735-1715	BABYLON		ASSYRIA	
Širuk-tuḥ	1715-1695	Sin-muballit	1717-1697	Šamši-Adad I (n°39)	1712 -
Siwe-palar-ḥuppak	1695 - -1670	Hammurabi	1697 -		-1680
Kudu-zuluš I	1670 -			Išme-Dagan I (n°40)	1680-1670
				Aššur-dugul (n°41)	1670-1664
				Bêlu-bâni (n°48)	1664-1654
	-1645	Samsu-iluna	1654 -	Libbaya (n°49)	1654 -

All synchronisms between the Elamite chronology and the “Ultra-Low” Mesopotamian chronology are perfectly respected. For a long time, the Mesopotamian chronology could not be evaluated by carbon-14 dating, but the site of Hazor which could be dated by carbon-14 allowed indirectly, through a precise synchronism with Hammurabi, the confirming of the Ultra-Low Chronology. For example, the “Greater Hazor” that corresponded with Mari (Stratum XVI), which began in MB IIA-B, in 1700 +/- 20 BCE, reached its peak around 1680 BCE at the earliest (Ben-Tor: 2004, 45-67). It was this Hazor, with its King Ibni-Addu, that maintained correspondence 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 with Mari was in 1685 BCE, or in 1700 BCE +/- 20, according to the stratigraphy of the “Greater Hazor” (Ben-Tor: 2016, 76-77) calibrated by carbon-14 dating. This confirmation has recently been questioned by radiocarbonists who now 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 ^{14}C , 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 errors⁴⁷.

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 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).

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

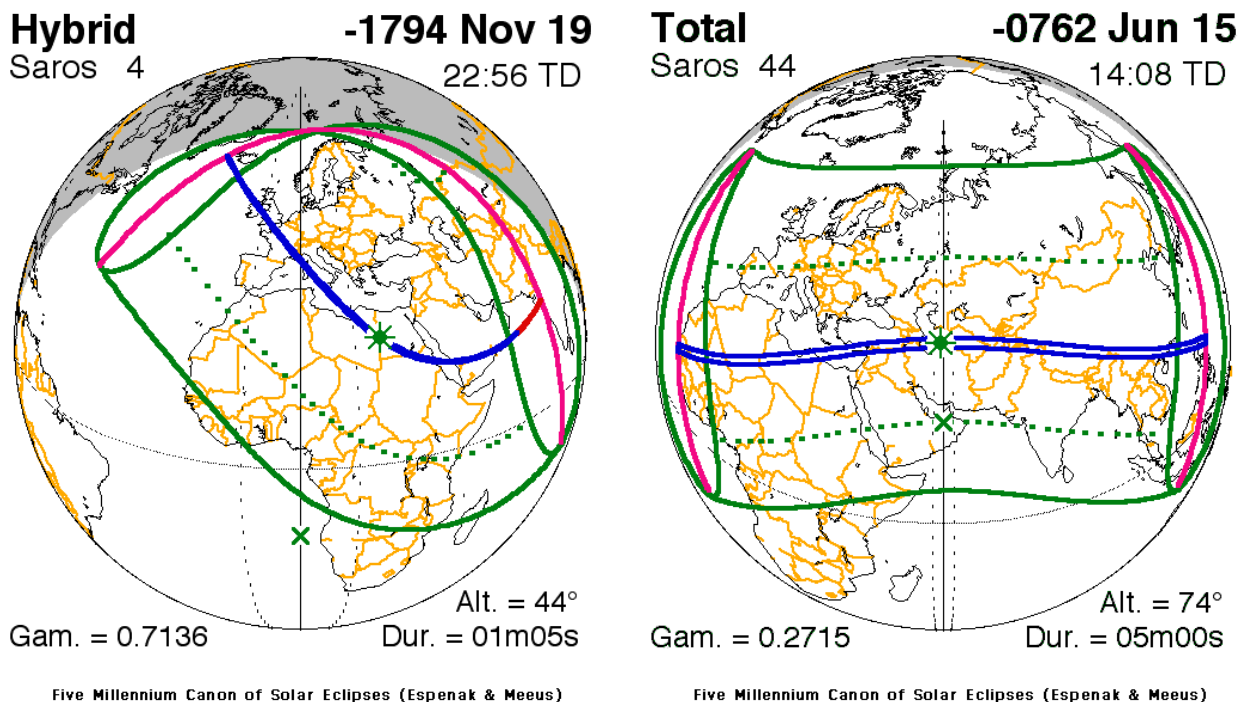
⁴⁷ The dating of the United Monarchy illustrates this bias in the ^{14}C dating method. The United Monarchy is the name given to the Israelite kingdom of Israel and Judah, during the reigns of Saul, David and Solomon, as depicted in the Hebrew Bible. However, as the Kingdom of Saul left no archaeological 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.

REL 165 and his death in REL 197 (a reign lasting 33 or 34 years), were found at the Sarıkaya Palace at Acemhöyük in Anatolia (...) We may compare the placement of the MBA tree-ring series against the date 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 Sarıkaya 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 Sarıkaya 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 Sarıkaya 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 Sarıkaya 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 Sarıkaya (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 carbon-14 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 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)*. The explanation for this paradox is simple: the timbers of this palace were reused, which artificially aged the building, and Šamši-Adad I died decades after the palace was built. Therefore, 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: 1997-2000, 111-126). Although this article was written to defend the Middle Chronology, it gives all the arguments to show that it is false.

- First, the selected solar eclipse in 1795 BCE was only visible outside Assyria (and Babylonia) over a very small portion of the Earth's surface (left image). 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 (-762*), and which took place over the city of Nineveh (image right). Consequently, there was no visible solar eclipse in Assyria in -1794*.



- The 1795 BCE eclipse contradicts the dating of the reign of Šamši-Adad I (1809-1776) according to the Middle Chronology. Indeed, since Šamši-Adad 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). If the equation: 1849 = 1795 +/- 55 makes sense for radiocarbonists it is absurd for astronomers because eclipses are always dated to the day.
- 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. The conclusion is therefore obvious: this eclipse never existed. How can one explain this incredible paradox since this solar eclipse is cited by radiocarbonists to justify their defence of the Middle Chronology. The explanation is simple, the term *na'duru* “darkened, obscured, eclipsed” used in the commentary does not mean “eclipse” but “darkening”. It means an eclipse in a metaphorical way and is different from the usual *antalù* “eclipse” used in Mari⁴⁸. Consequently, for the Assyrian copyist

⁴⁸ 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).

of that time, the birth of Šamšî-Adad I, from an Amorite dynasty, actually marked the end (or the eclipse) of the authentic Assyrian dynasty.

Contrary to what radiocarbonists claim, the “Ultra-Low” Chronology (below) is based on perfectly dated lunar eclipses (highlighted in sky blue) and is consistent with radiocarbon dating. Hammurabi's reign is rich in synchronisms (dates framed by a big black line) and historical events, which allows us to compare all the chronologies with each other. Since the chronologies of the Egyptian kings and Hazor can be determined by radiocarbon, this allows the chronology of Hammurabi to be determined indirectly through the synchronisms with Neferhotep I and Ibni-Addu.

TABLE 34

BCE	N°	Assyrian eponym	[A]	[B]	[C]	[D]	[E]	[F]	[G]	
1706	172	Abî-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	Iddin-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-[îlu 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
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	Ili-ellatî	8	24	8	38		6	1	[G] Sobekhotep IV king of Egypt
1688	191	Rigmānum	9	25	9	39		7	2	
1687	192	Ikūn-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
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
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] Zimrî-Lîm 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	Ili-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] Yâpaḫ-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] Bēlu-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 (around 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 hereafter).

Radiocarbon dating can be accurate to within plus or minus 20 years if the synchronism between the historical event to be dated and the wooden object that was associated with that event occurred over a short period of less than 20 years. For example, the construction of the Sarikaya Palace (1774 +4/-7 BCE) and the death of Šamši-Adad I (in 1680 BCE) were in fact separated by many decades (ten or so), which makes it a poor candidate for radiocarbon dating, whereas the “Greater Hazor” period is an excellent candidate. These two examples are used to determine the chronology of Hammurabi's reign and since the reign of this Babylonian king is crucial in deciding between the “Middle Chronology” and the “Ultra-Low Chronology”, these two examples must be examined in detail.

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 carbon-14 and those of the corresponding Egyptian period are dated c. -1710 +/- 20, this implies that the corresponding Mesopotamian period (Hammurabi) should also be dated in the same period. The reign of Neferhotep I (1721-1710) was dated through radiocarbon measurements by Rolf Kraus.

TABLE 35

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	1721–1710	Ibni-Addu	1700–1680	Hammurabi	1697–1654	Ultra-Low

Therefore, as the conventional Egyptian chronology of this period is in agreement to +/- 20 years with the carbon-14 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” (ULC), which fixes Šamši-Adad I's death in 1680 BCE. The chronology of the reigns of Neferhotep I (Dessoudeix: 2008, 197) and Abni-Addu obtained by radiocarbon 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 radiocarbon dating in the period 2000-1600 BCE. However, the reign of Ibni-Addu (1685-1665) is 15 years lower than the reign measured by radiocarbon (1700-1680) and that of Neferhotep I (1701-1690) is 20 years lower (1721-1710). How can such a discrepancy be explained? 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 radiocarbon 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 Egypt⁴⁹ (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 36

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]) (Thebes)	Yes		
	1750–1680				Yes	14 (Hyksos)	Tanis
MB IIC	1680–1613	400	68		-	15 (Great Hyksos) Apopi	Avaris
	1613–1572		40		-		
	1572–1544			17 (Thebes)	-	16 (Theban kings)	Edfu?
	1544–1533			Seqenenre Taa	-		
LB AI	1533–1530			Kamose	-	(‘War of the Hyksos’)	
	1530 – –1505			18 (Thebes) Ahmose	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. Its reconstruction is easier, 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 surprising⁵⁰. 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 documentation⁵¹. The reign of Sihornedjherkef Hotepibre having 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 around 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 8 reigns lasted 197 years (25 years = 197 years/8). Given that the historical sequence of kings of Byblos is known⁵² (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).

⁴⁹ 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).

⁵⁰ 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 Ahmose I, 6) King Siamun A, 11) Crown Prince Ahmose 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.

⁵¹ 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.

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

The following chronological reconstruction shows that the agreement between reign dates, including $^{14}\text{C}^*$ 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 37

King of Mari	Reign	King of Byblos	Reign	King of Egypt	Reign	#
?		Abi-Shemu	1815-1790 [25]	Amenemhat III ($^{14}\text{C}^*$)	1836-1791	45
?		Ip-Shemu-Abi	1790 - [25]	Amenemhat IV ($^{14}\text{C}^*$)	1791-1782	9
?			-1765	Neferu-sobek. ($^{14}\text{C}^*$)	1782-1778	4
?				Sobekhotep I	1778-1775	4
?		Yakin-el	1765-1740 [25]	[Hotepibre	1753-1741 [12]	
?		Ilimi-yapi ?	1740 - [20]	[-] Sewadjkare	1741-1737	[4]
Yaggid-Lîm	1738 -			Sobekhotep II	1737-1733	[4]
				Hor I	1732-1728	[4]
				Amenemhat VII	1728-1724	[4]
			-1720	Wegaf ($^{14}\text{C}^*$)	1724-1722	2
	-1716	Yakin-[ilu II?]	1720 - [25]	Khendjer	1722-1717	[4]
Yahdun-Lîm	1716 -			Imyremeshaw	1717-1713	[4]
				Antef V	1713-1709	[4]
				Seth	1709-1705	[4]
	-1699			Sobekhotep III	1705-1701	[4]
Sûmû-Yamam	1699-1697		-1695	Neferhotep I	1701 -	11
Samsî-Addu	1697-1687	Yantin-Ammu	1695 - [25]		-1690	
Yasmah-Addu	1687-1680			Sobekhotep IV	1690-1681	9
Zimrî-Lîm	1680 -			Sobekhotep V	1681-1679	2
	-1667			Sobekhotep VI	1679-1676	3
			-1670	Ibiaw	1676 -	11
Yapaḥ-šumu-Abu	1667-1664	‘Egel?	1670 -		-1665	

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

TABLE 38

Egypt	Reign		Hazor	Reign		Babylon	Reign	Chronology
Wegaf	1768-1765	^{14}C					1793-1750	Middle
	1721-1710	^{14}C		1700-1680	^{14}C			
Neferhotep I	1701-1690	$^{14}\text{C}^*$	Ibni-Addu	1685-1665	$^{14}\text{C}^*$	Hammurabi	1697-1654	Ultra-Low

The results of this table (above) show the following:

- The ^{14}C 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 ^{14}C dating of the reign of Neferhotep I (1710–1700 BCE) agrees with the conventional Egyptian chronology: 1721–1710 BCE according to Krauss, but 1742–1731 BCE according to Ryholt (Dessoudeix: 2008, 197), 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 ^{14}C dates are on average 20 years higher ($^{14}\text{C}^*$), 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.

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 ^{14}C 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 40 years between the scholars, with Kim Ryholt dating the beginning of his reign c. 1740 BCE

and Thomas Schneider c. 1700 BCE. 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 I⁵³. For the internal chronology of the 13th Dynasty, Ryholt relied partly on the Turin King-list (TKL) and partly on dates preserved in contemporary sources (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 radiocarbon) 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 earlier⁵⁴. 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. In fact, Seth is completely absent from the titular 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 well⁵⁵. 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] Chenephres⁵⁶ (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

⁵³ 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. Despite this, Neferhotep I named his brother Sihathor as coregent in the last months of his reign and when both Sihathor and Neferhotep I died around the same time, they were succeeded by another brother, Sobekhotep IV, whose reign marks the apex of the 13th Dynasty; Mentions on a stela (JE 51911) that was placed in the temple of Amun at Karnak indicate that he was born in Thebes.

⁵⁴ The interpretation of this stele is controversial because it represents the vizier Sety (grandfather of Sety I, father of Ramses II), commemorating the event (Pritchard: 1969, 252-253), but Ramses II seems to have connected his reign to his predecessor whose name Sethos I referred to the god Seth.

⁵⁵ The Egyptian priest Manetho, who wrote around 280 BCE, indicates that the Hyksos ruled Egypt from Pharaoh Toutimaïos (Doudimes?) and they were expelled by the Pharaoh Ahmose (1530-1505).

⁵⁶ 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).

Sobekhotep IV (1690-1681), attest a peaceful contact between the Hyksos (15th Dynasty)⁵⁷ 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 years⁵⁸ between Sobekhotep III and Sobekhotep V (1705 = 1679 + 27 - 1).

Dyn	EGYPT	TKL	¹⁴ C date	#	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 brother⁵⁹. Paralleling ¹⁴C dates (Bronk Ramsey, Dee, Rowland, Higham, Harris, Brock, Quiles, Wild, Marcus, Shortland: 2010, 1554-1557) with astronomy-based dates.

TABLE 39

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	
	6 Amenemhat III	46	1825-1781		-11	1836-1791	
	7 Amenemhat IV	9 years 4 months	1781-1773		-10	1791-1782	
	8 Neferu-sobek (¹⁴ C*)	3 years 10 months	1773-1768		-9	1782-1778	
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

⁵⁷ In fact, 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, then Ahmose and Amenhotep I.

⁵⁸ (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).

⁵⁹ 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]).

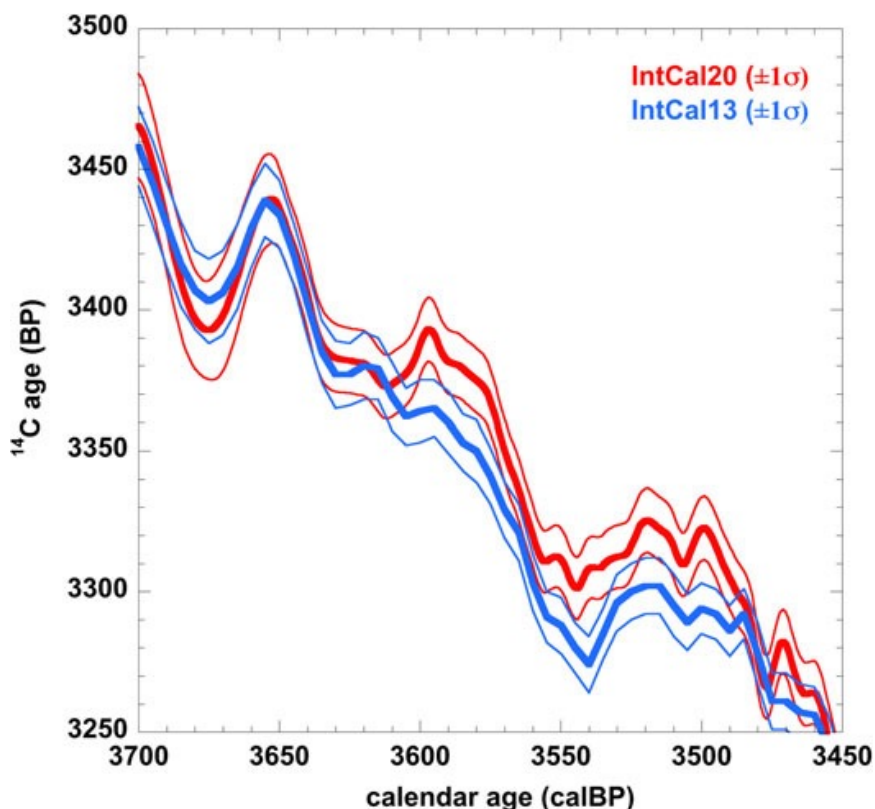
	14	Hor I	[4] years	1777-1775		+45	+20	1732-1728
	15	Amenemhat VII	[4] years	1769-1766		+41	+16	1728-1724
	16	Wegaf (¹⁴ C*)	2 years 3 months	1766-1764		+42	+17	1724-1722
	17	Khendjer	5 I Akhet 15	1764-1759		+42	+17	1722-1717
	18	Imyremeshaw	[4] years	1759-1755		+42	+17	1717-1713
	19	Antef V	[3] years	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*?						1615-1590
(16)	50	?		-1580				-1572
17	1	Rahotep		1580-1576		40	+8	1572-1568
	2	Sobekemsaf I		1576-1573			+8	1568-1566
	3	Sobekemsaf II	7					1566-1556
	4	Antef VI		1573-1571			+15	1556-1554
	5	Antef VII	3 III Peret 25	1571-1566			+17	1554-1545
	6	Antef VIII	0	1566-1566			+21	1545-1545
	7	Ahmoose (Iahmes)		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	Ahmoose (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
	13	Aÿ	4 IV Akhet 1	1333-1330			+6	10/1327-11/1323
	14	Horemheb I/II (¹⁴ C*)	27 I Shemu 9	1330-1302			+7	11/1323-01/1295

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).

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 ^{14}C 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 \pm 25 BCE by ^{14}C . However, as the accuracy of the ^{14}C measurements had been improved to \pm 8 years (instead of \pm 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 ^{14}C had to be recalibrated by 18 years! (Van Der Plicht, Bronk Ramsey, Heaton, 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 (below).



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 +/- 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 +/- 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).

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 ($\Delta 2$) 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 ^{14}C ($\Delta 2$) have no connection with those from the Egyptian king lists ($\Delta 0$). 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) ^{14}C dates of the Egyptian dynasties (Berger: 1970, 23-36) were much lower than later results.

^{14}C dating in:	(1970)	(1992)	(2013)	(2019)
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 ^{14}C measurements is not an absolute chronology, contrary to the claims of radiocarbonists, but only a relative chronology that must be recalibrated more rigorously.

All Mesopotamian synchronisms over the period 2040-1050

BCE	URUK IV		MARI		GUTIUM		ASSYRIA		ELAM	
2040	Puzur-ilî	3	Išdub-El	9	Jarlaganda	6	Hayâni	12	Ĥita (AWAN)	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°12/n°1	2
2037	Ur-Utu	1	Iškun-Addu	1		2	Ilu-Mer	1		3
2036		2		2		3		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-ĥegal	1		7				7		9
2030		2	n°7	8				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				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	[Ĥie?]-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				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-Ilum	1				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	Ilum-Iš'ar	1				7	Kudu[ur-Lagamar]	1
1988		14		2				8	n°1 /Girnamme	2
1987		15		3				9	(SIMASKI)	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				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		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	35
1954	n°3	48		4		22	n°27	14	Tazitta I/Ebarat I 36
1953	Amar-Sîn	1		5		23	Sulili	1	SIMĀŠKI 2
1952		2		6		24		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	Naplânum	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-luḥḥan 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		85	23		3
1751		34		15		4		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			99	37		
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	Urdukuḡa	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	Ērišu 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	<i>Neferhotep I</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	<i>Yantin-Ammu</i>	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	<i>Ibni-Addu</i>	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	Zimrî-Lîm	1		48	İšme-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-Naḥunte 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
1629		25		6		19		53	9		16
1628		26		7		20		54	10		17
1627		27		8		21		55	11		18
1626		28		9		22	n°51	56	12		19
1625		29		10		23	Puzur-Sîn	57	1		20
1624		30		11		24		58	2		21
1623		31		12		25		59	3		22
1622		32		13		26		60	4		23
1621		33		14		27		61	5		24
1620		34		15		28		62	6		25
1619		35		16		29		63	7	Temti-Agun II	1
1618		36		17		30		64	8		2
1617		37		18		31		65	9		3
1616	n°8	38		19		32		66	10		4
1615	Abi-ešuh	1		20		33		67	11		5
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1603		13		10		45	80	12	17	
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1595		21		18		53	88	20	25	
1594		22		19		54	89	21	Kutir-Silḫaḫa 1	
1593		23		20		55	90	22	2	
1592		24		21		56	91	23	3	
1591		25	n°4	22		57	92	24	4	
1590		26	Kaštīliašu II	1		58	93	25	5	
1589		27		2		59	94	26	6	
1588	n°9	28		3		60	95	27	7	
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1582		6	Abi-Rattaš	1		6		101	5	13
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1566		22		17	Iškibal	22		118	2	4
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1545		6		18		4	Išme-Dagan II	1		25

1544		7		19		5		140	2	Kudu-zuluš II	1
1543		8		20		6		141	3		2
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1529	Samsuditana	1		14		20		156	2		16
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1525		5		2		24		160	6		20
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1523		7		4		26		162	8		2
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1515		15		12	meš	34	n°60	170	16		10
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1488		12		7		11		198	2		17
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1477		23		2		22		210	14		8
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1473		27		6		26		214	18		12
1472		28		7	Ea-gamil	1		215	19		13
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1466		34		13		7	Enlil-nâsir I	221	1		19
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1462		38	Kaštiliašu III	1				225	5		3
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1452		3		11				235	2		13
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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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1437		18		2				251	6		3
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1429	Išar-Lim	1		10				259	4		6
1428		2		11				260	5		7
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1425		5		14				263	8		10
1424		6		15				264	9	Tepti-aḫar	1
1423		7	n°15	16			n°67	265	10		2
1422		8	Kadašman-	1			Enlil-našir II	266	1		3
1421		9	Harbe I	2				267	2		4
1420		10		3				268	3		5

1419		11		4			269	4		6
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1390		15	Kurigalzu I	1			299	4		15
1389		16		2			300	5		16
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1383		22		8			307	2		2
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1378		2		13			312	7		7
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1375		5	n°18	16			315	10		10
1374		6	Kadašman-	1			316	11	Attar-Kittaḥ	1
1373		7	Enlil I	2			317	12		2
1372		8		3			318	13		3
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1363		17		12			327	22		2
1362		18		13			328	23		3
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1359		21	Burna-Buriaš	1			331	26	Kidin-Ḫutran I	1

1358		22	II	2		n°73	332	27		2
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1332		23		1			359	27		13
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1323		7		10		n°74	368	36		22
1322		8		11		Enlil-nênârî	369	1		23
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1313		17		20		Arik-dên-ili	379	1		32
1312		18		21			380	2		33
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1309		21		24			383	5		36
1308		22	n°23	25			384	6		37
1307		23	Nazi-Maruttaš	1			385	7		38
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1304	Pagiru	1		4			388	10	Kidin-Ḫutran II	1
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1246		n°27	9			14	26		29
1245		Šagarakti-	1			15	27		30
1244		šuriaš	2			16	28	Kidin-Ḫutran III	1
1243			3			17	29		2
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1241			5		Tukultī-Ninurta I	1			4
1240			6			20	2		5
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1229			4			31	13		16
1228			5			32	14		17
1227			6			33	15		18
1226			7			34	16		19
1225		n°29	8			35	17		20
1224	n°30	Enlil-nâdin-	1			36	18		21
1223	Kadašman-	šumi	1			37	19		22
1222	Harbe II	Adad-šuma-	1			38	20		23
		iddîna				39	21		
1221		n°31	2			40	22		24
1220			3			41	23		25
1219			4			42	24		26
1218			5			43	25		27
1217		n°32	6			44	26		28
1216		Adad-šuma-	1			45	27		29
1215		ușur	2			46	28		30
1214			3			47	29	Hallutaš-Inšușinak	1
1213			4			48	30		2
1212			5			49	31		3
1211			6			50	32		4
1210			7			51	33		5
1209			8			52	34		6
1208			9			53	35		7
1207			10			54	36		8
1206			11		n°79	55	37		9
1205			12		Aššur-nâdin-apli	1			10
1204			13			57	2		11
1203			14			58	3		12
1202			15		n°80	59	4		13
1201			16		Aššur-nêrârî III	1			14
1200			17			61	2		15
1199			18			62	3		16
1198			19			63	4		17
1197			20			64	5		18
1196			21		n°81	65	6		19
1195			22		Enlil-kudurri-	1			20
1194			23		ușur	67	2		21
1193			24			68	3		22
		Ist Nisannu		=	Ist Šippu	69	4		
1192			25		n°82	70	5		23
1191			26		Ninurta-apil-Ekur	1			24
1190			27			72	2		25
1189			28			73	3	Šutruk-Nahhunte I	1
1188			29			74	4		2
1187		n°33	30			75	5		3
1186		Meli-Šipak	1			76	6		4
1185			2			77	7		5
1184			3			78	8		6
1183			4			79	9		7
1182			5			80	10		8
1181			6			81	11		9
1180			7			82	12		10
1179			8		n°83	83	13		11
1178			9		Aššur-dân I	84	1		12
1177			10			85	2		13
1176			11			86	3		14
1175			12			87	4		15
1174			13			88	5		16

1173			14			89	6		17
1172		n°34	15			90	7		18
1171		Marduk-apla-	1			91	8		19
1170		iddina	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		Eponym	101	18		29
1160		n°35	12		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
1151			8			111	28		4
1150			9			112	29		5
1149			10			113	30		6
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			136	7		29
1125		chadnezzar I	2			137	8		30
1124			3			138	9	Ḫutelutuš-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
1118			9			144	15		7
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	Šilhina-hamru-
1103		apli	2			158	12	Lagamar
1102			3			159	13	?
1101		n°42	4			160	14	
1100		Marduk-	1			161	15	
1099		nâdin-aḥḥê	2			162	16	
1098			3			163	17	
1097			4			164	18	
1096			5			165	19	
1095			6			166	20	
1094			7		eponym	166	21	
1093			8		Adad-apla-iddina	166	22	
1092			9			168	23	
1091			10			169	24	
1090			11			170	25	
1089			12			171	26	
1088			13			172	27	
1087			14			173	28	
1086			15			174	29	
1085			16			175	30	
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	184	1	
1074			9		n°89	186	2	
1073			10		Aššur-bêl-kala	186	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	
1065			5			195	9	
1064			6			196	10	
1063			7			197	11	
1062			8			198	12	
1061			9			199	13	
1060			10			200	14	
1059			11			201	15	
1058			12			202	16	
1057			13			203	17	
1056			14		n°90	204	18	
1055			15		Erība-Adad II	204	1	
1054			16		n°91	206	2	
1053			17		Šamšî-Adad IV	206	1	
1052			18			208	2	
1051			19			209	3	
1050			20		n°92	210	4	
1049			21		Aššurnaširpal I	210	1	
1048		n°45	22			212	2	

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