Mesopotamian chronology over the period 2340-539 BCE through astronomically dated synchronisms and comparison with carbon-14 dating 1 (Gérard Gertoux)

Gerard Gertoux

Mesopotamian chronology over the period 2340-539 BCE through astronomically dated synchronisms and comparison with carbon-14 dating[1] (Gérard Gertoux)

Chronology is the backbone of history. An accurate chronology is the only way to access historical truth[2].

The Mesopotamian chronology of the 1st millennium before the Christian era (BCE) is well established, in contrast that of the 2nd millennium remains highly controversial, until today (2020), even if the "Middle Chronology", anchored on the reign of Hammurabi (1793-1750), is favoured by the majority of scholars. Although H. Gasche, J.A. Armstrong and S. W Cole proposed in 1998 to anchor the reign of Hammurabi (1697-1654) on two lunar eclipses during the reigns of Ur III Dynasty as well as the Ammisaduqa tablet on Venus, this new Mesopotamian chronology (called Ultra-Low by its detractors) was strongly contested by several Assyriologists who relied on statisticians and also physicists specialised in carbon-14 dating. Paradoxically, these specialists who are highly qualified in their field of expertise (statistics and carbon dating) are "illiterate" 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 chronologies: Ultra-Low (13 days), Low (-5 days), Middle (-6 days) and High (-3 days), logically concluded that the worst agreement (gap of 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 (13 days, which is an error for 3 days) while the reverse is true for the other three chronologies (the date was observed before the calculated date!). Similarly, Huber calculated a large number of lunar eclipses in order to verify that they were the ones that best matched the two dated 14 Simanu at the end of the reign of Shulgi (14/III/**48**) and 14 Addaru at the end of the reign of Ibbi-Sin (14/XII/**24**), without taking into account two essential data that imposed a unique choice, in perfect agreement with the Ultra-Low chronology: 1) these two lunar eclipses are separated exactly by 42 years and 9 months, according to the Babylonian King lists, furthermore, as they were bad omens signifying the death of the king, and not a usual astronomical observation, these two lunar eclipses had to be total (partial lunar eclipses are frequent and generally have no particular significance). Physicists specialising in carbon-14 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). 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 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)*. 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 if 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. Second contradiction: the reign of Neferhotep I was measured precisely (at +/- 20 years) by carbon-14, because in Egypt carbonaceous remains are abundant (papyri, wooden sarcophagi, mummies, etc.). As there is a synchronism between Neferhotep I

[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!

(1721-1710) and Ibni-Addu (1700-1680), the king of Hazor, and another synchronism between Ibni-Addu (1700-1680) 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 C14 dates by dendrochronology is not yet well established[3].

This long preamble is necessary in order 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, taking into account 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 when 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 show a (big) lack of knowledge about historical data. For example, Emil Khalisi's article entitled "The Double Eclipse at the Downfall of Old Babylon (2020)" develops technical astronomical calculations 1) without giving the means to verify them, 2) without linking them to any well-referenced historical event, 3) does not take into account any of the 116 Assyrian reigns, 4) nor the 137 Babylonian and Kassite kings, and 5) does not propose 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 (Ehursagkurkurra) has been rebuilt several times. The durations between each reconstruction being known: 159, 434 and 580 years (Pruzsinsky: 2009, 140–143), this makes it possible to verify (below) if 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	∑ eponyms	
33	Ērišu I	1872	Year 1, eponym Šu-Ištar son of Abila (**N°1**)	**40**	**40**
34	Ikunum	1834	**Year 1**, eponym Iddin-Suen brother of Šuli (**N°41**)	**14**	14
35-38				**(112)**	
39	Šamšî-Adad I	1680	Death of Šamšî-Adad I, eponym Ṭab-ṣilli-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-aḫḫē-ēreš	**24**	**580**
112	Esarhaddon	680	**Year 1**, eponym Danânu (N°1213)	**1**	**1**
		679	Year 2, eponym Issi-Adad-anênu (N°1214)	**11**	**11**

We note that the first period from Iddin-Suen (eponym N°41) to Ṭab-ṣilli-Aššur (eponym N°199) does include 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 (eponym Ilî-qarrad?). This first calculation shows that the eponymous chronicles are accurate and reliable and that there is a total of 614 eponyms[4] 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), but some eponymous lists give some different durations.

[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 ^{14}C 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 ^{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* (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-uṣur 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).

According to the AKL, the reign of Ninurta-apil-Ekur (n°82) had 13 eponyms, while other lists indicate 3 eponyms (Pruzsinsky: 2009, 51-52). There is a simple way to know the values of reigns with variants (n°82 and others) because the sum of these reigns is known, which implies the following equation (63 = 580 – sum of the eponymous years having an undisputed value):

63 = **4**/3 (Aššur-nâdin-apli n°79) + **13**/3 (Ninurta-apil-Ekur n°82) + **46**/36 (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. The majority of studies on the Assyrian King Lists assume that the Assyrian calendar has not changed over time and has remained similar to the Babylonian calendar, but this assumption is false. Several researchers had indeed noticed that, before Aššur-dân I (1179-1133), the Assyrian inscriptions never mention intercalary months[5], unlike the Babylonian calendar. Moreover, before this Assyrian king, the synchronisms between the Assyrian and Babylonian chronologies became approximate, because the number of eponyms sometimes exceeds the duration of the reign (Pruzsinsky: 2009, 42-67). The choice to ignore this change has consequences on the Assyrian chronology as well as on synchronisms with the Babylonian chronology. For example, there are 614 eponyms between the first year of Šamšî-Adad I's reign and the first year of Tiglath-pileser I's reign (1115-1076), which makes it possible to date Šamšî-Adad I's reign (1728-1695) because he died in the 17th year of King Hammurabi. This makes it possible to establish the reign of this Babylonian king as 1712-1669* (or 1697-1654 with lunar years). This dating poses a problem because the reign of Hammurabi is linked to the reign of Ammisaduqa, which is anchored in an astronomical phenomenon (Venus tablet). Astronomy offers four possibilities over this period, but none of them corresponds to the reign calculated with the 614 solar years.

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, so this synchronism fixes the dating of this Babylonian king (1697-1654). This dating does not correspond to the "Middle Chronology" but, on the other hand, exactly satisfies the astronomical dating of the Ammisaduqa tablet on Venus, according to the "Ultra-Low Chronology". In addition, two tablets of astronomical omens (*Enuma Anu Enlil* 20 & 21) mentions a lunar eclipse dated 14 Simanu at the end of the reign of Šulgi (14/III/**48**, total eclipse dated 27 June 1954 BCE), and a lunar eclipse dated 14 Addaru at the end of the third dynasty Ur, which ended with the reign of Ibbi-Sin (14/XII/**24**, total eclipse dated 6 March 1911 BCE). These two total lunar eclipses are separated by 42 years of reign (= 9 years of Amar-Sin + 9 years of Šu-Sîn + 24 years of Ibbi-Sin) and 9 months (=XII - III). During the period 2200-1850 BCE, there was only one couple of lunar eclipses spaced 42 years and 9 months apart, and visible at Ur, corresponding to the description of the astronomical omens. These two eclipses confirm the absolute dating of the reign of Hammurabi (1697-1654) and also allow 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 (Pruzsinsky: 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-uballiṭ II (612-609), are all known. The chronology of these Assyrian kings is anchored on six synchronisms with the Babylonian chronology and by a total solar eclipse, visible in Assyria, dated from the month of Simanu in the 10th year of Aššur-dân III (773-755), in 763 BCE. The synchronism between the Assyrian king Adad-nêrârî II (912-891) and the Babylonian king Šamaš-mudammiq (921-900) makes it possible to fix the Mesopotamian chronology in an absolute way on the period **912-539 BCE** and to

[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).

note the following points: 1) the chronological data of the eponymous lists are rigorously accurate; 2) the first year of Babylonian reigns (counted by the number of luni-solar years) began in the 1st Nisan, as did Assyrian reigns (counted by the number of eponyms); 3) co-regencies were removed and integrated into the reigns of official kings in order not to modify the chronology.

2) The durations of the Babylonian reigns, from Ninurta-nâdin-šumi (1133-1127) to Ninurta-kudurri-uṣur 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 on 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 eponyms[6] 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**), Ammiṣaduqa (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-Nammu (**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 Ammiṣaduqa (1551-1530), but these studies do not take into account 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 eclipses[7] to a unique choice: **27 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-Sin + 9 years of Šu-Sîn + 24 years of Ibbi-Sin) and 9 months (=XII - III). Moreover, lunar eclipses were always interpreted as a bad omen, usually the death of a king[8], when they were total (partial

[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-uṣur) + 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-Sin (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).

eclipses were too frequent to receive such an interpretation). If one looks for two separate total lunar eclipses of 42 years and 9 months over the period 2200-1850 BCE, there is only one solution, the same as previously. The lunar eclipse dated: *Year 38 that Babylon was resettled (...) Month of Abu (V), Day 10*[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 ^{14}C dates. For example, the reign of Neferhotep I was measured precisely (at +/- 20 years) by ^{14}C. As there is a synchronism between Neferhotep I (1721-1710) and Ibni-Addu (1700-1680), and another synchronism between Ibni-Addu (1700-1680) and Hammurabi (1697-1654), this reign could be determined indirectly by ^{14}C and is again in perfect agreement with the Ultra-Low chronology. As radiocarbonists claim that carbon-14 dating is in favor 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 reconstruct over the period 912–609 BCE, using the eponyms. The list of Assyrian eponyms is anchored on the solar eclipse which occurred on Simanu in the eponymy of Bur-Sagale (15/06/763 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). The chronological reconstruction of the Assyrian reigns based on the order of eponyms is slightly different from that given in the Assyrian King lists as can be seen in the table below:

TABLE 3

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

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

The presence of co-regencies modifies the dating of some synchronisms. For example, in the Assyrian King List there (AKL) is a synchronism between year 1 of the Assyrian king Aššur-etel-ilâni and year 22 of the

[9] The lunar eclipse was total since it is an economic text and Day 10 is a mistake because eclipses always take place on the 14th-15th of the month.

Babylonian king Kandalanu in 626 BCE, but in the list of eponyms 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 as long as the presence of one or two co-regencies does not modify the chronology of the reigns. Despite the absence of co-regencies, King lists can be anchored on absolute dates calculated by astronomy. Several parts of these King lists can also be verified (areas highlighted in grey) by the:

- lengths of reigns that are known (#);
- position of eponyms (all known over the period 912–609 BCE);
- synchronisms between the Assyrian and Babylonian reigns (highlighted in grey);
- absolute dates calculated by astronomy (highlighted in sky blue);

TABLE 4

n°	ASSYRIAN KING	#	Reign	n°	BABYLONIAN KING	#	Reign	
99	Adad-nêrârî II	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	Aššurnaṣirpal II	25	884-859	**60**	Nabû-apla-iddina	33	888-855	
102	Shalmaneser III	35	859-824	**61**	Marduk-zâkir-šumi I	36	855-819	
103	Šamšî-Adad V	13	824-811	**62**	Marduk-balâssu-iqbi	6	819-813	
104	Adad-nêrârî III	28	811 -	**63**	Bâba-ah-iddina	-	813-*801*	
				64	5 unknown kings	-	*801-800*	
				69	Ninurta-apla-[…]	-	*800-790*	
			-783	**70**	Marduk-bêl-zêri	-	*790-780*	
105	Shalmaneser IV	10	783-773	**71**	Marduk-apla-uṣur	-	*780*-770	
106	Aššur-dân III	18	**773-755**	**72**	Erîba-Marduk	9	770-761	
107	Aššur-nêrârî V	10	755-745	**73**	Nabû-šum-iškun	13	761-748	
108	Tiglath-pileser III	18	745 -	**74**	Nabû-naṣir	14	748-734	
				75	Nabû-nâdin-zêri	2	734-732	
				76	Nabû-šum-ukîn II	1	732-731	
				77	Nabû-mukîn-zêri	2	**731-729**	**BM 35789**
			-727	**78**	Pûlu (Tiglath-pileser III)	2	729-727	
109	Shalmaneser V	5	727-722	**79**	Ulûlaiu (Shalmaneser V)	5	727-722	
110	Sargon II	17	722 -	**80**	Merodachbaladan II	12	**722-710**	**Almagest IV:6**
			-705	**81**	Sargon II	5	710-705	
111	Sennacherib	24	705 -	**82**	Sennacherib	2	705-703	
				83	Marduk-zâkir-šumi II	0	703-703	
				84	Bêl-ibni	3	703-700	
				85	Aššur-nâdin-šumi	6	700-694	
				86	Nergal-ušezib	1	694-693	
				87	Mušezib-Marduk	4	693-689	
			-681	**88**	Sennacherib	8	689-681	
112	Esarhaddon	12	681-669	**89**	Esarhaddon	12	681-669	
113	Aššurbanipal	42	669-627	**90**	Šamaš-šum-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, Aššur-rabi I (n°65) and Aššur-nâdin-aḫḫe I (n°66), are not known. The following inscriptions of Tiglath-pileser I with several double dates can be used to synchronize the ancient Assyrian calendar:

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

Assyrian kings performing a traditional military campaign each year[10]. 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 month 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 Ṣippu or 13 January[11]. 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)[12].

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**)
1090	1	X	Tebêtu	*xii*	Ḫubur		[24]	
	2	XI	Šabâtu	*i*	Ṣippu	25		
	3	XII	Addâru	*ii*	Qarrâtu			
	4	I	Nisannu	*iii*	Kalmartu		[25]	*Aššur-šuma-êriš* (MARV V 43)
	5	II	Ayyaru	*iv*	^{d}Sin			
	6	III	Simanu	*v*	Kuzallu			
	7	IV	Du'ùzu	*vi*	Allanâtu			
	8	V	Abu	*vii*	Belêt-ekalli			
	9	VI	Ulûlû	*viii*	Ša sarrâte			
	10	VII	Tašrîtu	*ix*	Ša kênâte			
	11	VIII	Araḫsamna	*x*	Muḫḫur ilâni			
	12	IX	Kisilimu	*xi*	Abû šarrâni			
1089	1	X	Tebêtu	*xii*	Ḫubur			
	2	XI	Šabâtu	*i*	Ṣippu	26		
	3	XII	Addâru	*ii*	Qarrâtu			
		XIIa	Addâru2	*iii*	Kalmartu			
	4	I	Nisannu	*iv*	^{d}Sin		[26]	*Ninuaya son of Aššur-aplu-lišir* (RIMA 2, A.0.87.3)
	5	II	Ayyaru	*v*	Kuzallu			
	6	III	Simanu	*vi*	Allanâtu			
	7	IV	Du'ùzu	*vii*	Belêt-ekalli			
	8	V	Abu	*viii*	Ša sarrâte			
	9	VI	Ulûlû	*ix*	Ša kênâte			
	10	VII	Tašrîtu	*x*	Muḫḫur ilâni			
	11	VIII	Araḫsamna	*xi*	Abû šarrâni			
	12	IX	Kisilimu	*xii*	Ḫubur			
1088	1	X	Tebêtu	*i*	Ṣippu	27		
	2	XI	Šabâtu	*ii*	Qarrâtu			
	3	XII	Addâru	*iii*	Kalmartu			
	4	I	Nisannu	*iv*	^{d}Sin		[27]	*Taklak-ana-Aššur*
	5	II	Ayyaru	*v*	Kuzallu			
	6	III	Simanu	*vi*	Allanâtu			
	7	IV	Du'ùzu	*vii*	Belêt-ekalli			
	8	V	Abu	*viii*	Ša sarrâte			
	9	VI	Ulûlû	*ix*	Ša kênâte			
	10	VII	Tašrîtu	*x*	Muḫḫur ilâni			
	11	VIII	Araḫsamna	*xi*	Abû šarrâni			(RIMA 2, A.0.87.4)
	12	IX	Kisilimu	*xii*	Ḫubur			

A study on 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 Ṣippu) 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,

[10] For reasons of stewardship, the army on campaign had to be fed. In addition, the movements should be done of practicable grounds. Military campaigns took place outside the rainy season between the spring and autumn equinoxes.

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

[12] 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).

725-739) and before Aššur-dân I's reign (Jeffers: 2017, 151-191). The eponym marking each new Assyrian year was, therefore, chosen from the month of Nisan and not from the month of Ṣippu. 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 systems[13]. 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'ùzu*, 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 Ḫubur. The intercalary Babylonian month (Addarû2) is highlighted in brown and Assyrian month Ṣippu 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*	Ṣippu	1	**[0]**	*Ninurta-nâdin-apli*
	11	VIII	Araḫsamna	*ii*	Qarrâtu			
	12	IX	Kisilimu	*iii*	Kalmartu			
1114	1	X	Tebêtu	*iv*	^{d}Sin			
	2	XI	Šabâtu	*v*	Kuzallu			
	3	XII	Addâru	*vi*	Allanâtu			
		XIIa	Addâru2	*vii*	Belêt-ekalli			
	4	I	Nisannu	*viii*	Ša sarrâte		**[1]**	*Tiglath-pileser*
	5	II	Ayyaru	*ix*	Ša kênâte			
	6	III	Simanu	*x*	Muḫḫur ilâni			
	7	IV	Du'ùzu	*xi*	Abû šarrâni			
	8	V	Abu	*xii*	Ḫubur			
	9	VI	Ulûlû	*i*	Ṣippu	2		
	10	VII	Tašrîtu	*ii*	Qarrâtu			
	11	VIII	Araḫsamna	*iii*	Kalmartu			
	12	IX	Kisilimu	*iv*	^{d}Sin			
1113	1	X	Tebêtu	*v*	Kuzallu			
	2	XI	Šabâtu	*vi*	Allanâtu			
	3	XII	Addâru	*vii*	Belêt-ekalli			

[13] For example, in 1088 BCE, 1st Nisan was 12 April for Babylonians and Judeans (years with accession). 1st Ṣippu 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 Ṣippu, began on 1st Nisan (10 April 1114 BCE) and accession year began after April 1115 BCE.

	4	I	Nisannu	*viii*	Ša sarrâte		[2]	*Ištu-Aššur-ašamšu son of Aššur-aḫa-iddina*
	5	II	Ayyaru	*ix*	Ša kênâte			
	6	III	Simanu	*x*	Muḫḫur ilâni			
	7	IV	Du'ùzu	*xi*	Abû šarrâni			
	8	V	Abu	*xii*	Ḫubur			
	9	VI	Ulûlû	*i*	Ṣippu	3		
	10	VII	Tašrîtu	*ii*	Qarrâtu			
	11	VIII	Araḫsamna	*iii*	Kalmartu			
	12	IX	Kisilimu	*iv*	^{d}Sin			
1112	1	X	Tebêtu	*v*	Kuzallu			
	2	XI	Šabâtu	*vi*	Allanâtu			
	3	XII	Addâru	*vii*	Belêt-ekalli			
	4	I	Nisannu	*viii*	Ša sarrâte		[3]	*Aššur-šallimšunu*
	5	II	Ayyaru	*ix*	Ša kênâte			
	6	III	Simanu	*x*	Muḫḫur ilâni			
	7	IV	Du'ùzu	*xi*	Abû šarrâni			
	8	V	Abu	*xii*	Ḫubur			
	9	VI	Ulûlû	*i*	Ṣippu	4		
	10	VII	Tašrîtu	*ii*	Qarrâtu			
	11	VIII	Araḫsamna	*iii*	Kalmartu			
	12	IX	Kisilimu	*iv*	^{d}Sin			
1111	1	X	Tebêtu	*v*	Kuzallu			
	2	XI	Šabâtu	*vi*	Allanâtu			
	3	XII	Addâru	*vii*	Belêt-ekalli			
	4	I	Nisannu	*viii*	Ša sarrâte		[4]	*Šamaš-apla-êriš son of Aššur-šezibanni*
	5	II	Ayyaru	*ix*	Ša kênâte			
	6	III	Simanu	*x*	Muḫḫur ilâni			
	7	IV	Du'ùzu	*xi*	Abû šarrâni			
	8	V	Abu	*xii*	Ḫubur			
	9	VI	Ulûlû	*i*	Ṣippu	5		
	10	VII	Tašrîtu	*ii*	Qarrâtu			
	11	VIII	Araḫsamna	*iii*	Kalmartu			
	12	IX	Kisilimu	*iv*	^{d}Sin			
1110	1	X	Tebêtu	*v*	Kuzallu			
	2	XI	Šabâtu	*vi*	Allanâtu			
	3	XII	Addâru	*vii*	Belêt-ekalli			
		XIIa	Addâru2	*viii*	Ša sarrâte			
	4	I	Nisannu	*ix*	Ša kênâte		[5]	*Ḫiyašânu*
	5	II	Ayyaru	*x*	Muḫḫur ilâni			
	6	III	Simanu	*xi*	Abû šarrâni			
	7	IV	Du'ùzu*	*xii*	Ḫubur			
	8	V	Abu	*i*	Ṣippu	6		
	9	VI	Ulûlû	*ii*	Qarrâtu			
	10	VII	Tašrîtu	*iii*	Kalmartu			
	11	VIII	Araḫsamna	*iv*	^{d}Sin			
	12	IX	Kisilimu	*v*	Kuzallu			
1109	1	X	Tebêtu	*vi*	Allanâtu			
	2	XI	Šabâtu	*vii*	Belêt-ekalli			
	3	XII	Addâru	*viii*	Ša sarrâte			
	4	I	Nisannu	*ix*	Ša kênâte		[6]	*Ina-ilîya-allak (rab šaqe)*
	5	II	Ayyaru	*x*	Muḫḫur ilâni			
	6	III	Simanu	*xi*	Abû šarrâni			
	7	IV	Du'ùzu	*xii*	Ḫubur			
	8	V	Abu	*i*	Ṣippu	7		
	9	VI	Ulûlû	*ii*	Qarrâtu			
	10	VII	Tašrîtu	*iii*	Kalmartu			
	11	VIII	Araḫsamna	*iv*	^{d}Sin			
	12	IX	Kisilimu	*v*	Kuzallu			
1108	1	X	Tebêtu	*vi*	Allanâtu			
	2	XI	Šabâtu	*vii*	Belêt-ekalli			
	3	XII	Addâru	*viii*	Ša sarrâte			
	4	I	Nisannu	*ix*	Ša kênâte		[7]	*Šadânâyu*
	5	II	Ayyaru	*x*	Muḫḫur ilâni			
	6	III	Simanu	*xi*	Abû šarrâni			
	7	IV	Du'ùzu	*xii*	Ḫubur			
	8	V	Abu	*i*	Ṣippu	8		
	9	VI	Ulûlû	*ii*	Qarrâtu			
	10	VII	Tašrîtu	*iii*	Kalmartu			
	11	VIII	Araḫsamna	*iv*	^{d}Sin			
	12	IX	Kisilimu	*v*	Kuzallu			
1107	1	X	Tebêtu	*vi*	Allanâtu			
	2	XI	Šabâtu	*vii*	Belêt-ekalli			

	3	XII	Addâru	*viii*	Ša sarrâte			
		XIIa	Addâru2	*ix*	Ša kênâte			
	4	I	Nisannu	*x*	Muḫḫur ilâni		[8]	*?*
	5	II	Ayyaru	*xi*	Abû šarrâni			
	6	III	Simanu	*xii*	Ḫubur			
	7	IV	Du'ùzu	*i*	Ṣippu	9		

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-šarrâni (which is) the month Simânu (instead of Du'ùzu*), day 28, the eponym year of Ḫiyašânu*. 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-aḫa-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	Ḫiyašânu		5th	[5]	15 April		Ša kênâte
1109	Ina-ilîya-allak (rab šaqe)		6th	[6]	3 April		Ša kênâte
1108	Šadânâyu		7th	[7]	24 March	Addar2	Ša kênâte
1107	?		8th	[8]	12 April		Muḫḫur ilâni
1106	Aššur-mudammeq		9th	[9]	1 April	Addar2	Muḫḫur ilâni
1105	Ibri-šarre		10th	[10]	19 April		Abû šarrâni
1104	Aššur-kêtti-šêṣṣi		11th	[11]	8 April	Addar2	Abû šarrâni
1103	Mutakkil-Aššur		12th	[12]	27 April		Ḫubur
1102	Mušêzib-Aššur		13th	[13]	16 April		Ḫubur
1101	Ippitte		14th	[14]	4 April	Addar2	Ḫubur
1100	Mudammeq-Bêl		15th	[15]	23 April		Ṣippu
1099	Aššur-apla-iqîša		16th	[16]	13 April		Ṣippu
1098	Ṣahhutu		17th	[17]	3 April	Addar2	Ṣippu
1097	Bêl-libûr		18th	[18]	21 April		Qarrâtu
1096	Nusku-âlik-pânî		19th	[19]	10 April		Qarrâtu
1095	Aplaya		20th	[20]	30 March	Addar2	Qarrâtu
1094	Ninurta-aha-iddina		21th	[21]	18 April		Kalmartu
1093	Adad-apla-iddina		22th	[22]	6 April		Kalmartu
	No eponym		23th				
1092	Aššur-šuma-êriš		24th	[23]	26 March	Addar2	Kalmartu
1091	Ninuaya	Aššur-aplu-lišir	25th	[24]	14 April		^{d}Sin
1090	Taklak-ana-Aššur		26th	[25]	4 April	Addar2	^{d}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 Ṣippu) 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" (Jeffers: 2017, 151 n. 7) an eponym dated 1160 BCE (Bloch: 2010c, 43-44), a year that should have had two eponyms if they were named in the 1st Ṣippu (because 1160 BCE= 1092 BCE + 2 x 34 lunar years).

TABLE 9

BCE	ASSYRIAN KING		(C)	(**Y**)			
1115	**Aššur-reš-iši I**		18	**18/0**		Addar2	Belêt-ekalli
1114	**Tiglath-pileser I**		1st	**1**		Nisannu	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)[14], followed by Aššur-reš-iši I (1133-1115) whose year 1 began with the eponym Sîn-šêya. 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 Ṣippu (June 16 in 1132 BCE). Consequently, during the reign of Aššur-dân I (1179-1133) eponyms still began on 1st Nisan, instead of 1 Ṣippu, 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*	Ṣippu	**45**	**Aššur-dân I**	*Marduk-aḫa-ēriš*	**7 Itti-Marduk-balaṭu**
	7	IV	*ii*	Qarrâtu				
	8	V	*iii*	Kalmartu				
	9	VI	*iv*	^{d}Sin				
	10	VII	*v*	Kuzallu				
	11	VIII	*vi*	Allanâtu				
	12	IX	*vii*	Belêt-ekalli				
1133	1	X	*viii*	Ša sarrâte				
	2	XI	*ix*	Ša kênâte				
	3	XII	*x*	Muḫḫur ilâni				
	4	I	*xi*	Abû šarrâni	**46**		*Pišqīya s. of Kaššu*	**8**
	5	II	*xii*	Ḫubur				
	6	III	*i*	Ṣippu				
	7	IV	*ii*	Qarrâtu				
	8	V	*iii*	Kalmartu				
	9	VI	*iv*	^{d}Sin				
	10	VII	*v*	Kuzallu				**0**
	11	VIII	*vi*	Allanâtu				
	12	IX	*vii*	Belêt-ekalli				
1132	1	X	*viii*	Ša sarrâte				
	2	XI	*ix*	Ša kênâte	**0**	**Ninurta-tukultî-Aššur**	*Aššur-šēzibanni s. of Pa'uzu*	
	3	XII	*x*	Muḫḫur ilâni				
	4	I	*xi*	Abû šarrâni	**1**	**Mutakkil-Nusku**	*Sîn-šēya s. of Urad-ilâne*	**Ninurta-nâdin-šumi**
	5	II	*xii*	Ḫubur		**Aššur-reš-iši I**		
	6	III	*i*	Ṣippu				
	7	IV	*ii*	Qarrâtu				
	8	V	*iii*	Kalmartu				
	9	VI	*iv*	^{d}Sin				
	10	VII	*v*	Kuzallu				
	11	VIII	*vi*	Allanâtu				
	12	IX	*vii*	Belêt-ekalli				
1131	1	X	*viii*	Ša sarrâte				
	2	XI	*ix*	Ša kênâte				
	3	XII	*x*	Muḫḫur ilâni				
	4	I	*xi*	Abû šarrâni	**2**		*Aššur-rēš-iši*	**2**
	5	II	*xii*	Ḫubur				

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 Ṣippu, not on 1st Nisan. Actually, the capture of Babylon and the replacement of its king, Kaštiliašu IV, are dated to (Ina)-Aššur-šuma-aṣbat (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-aṣbat (N°18), Ninu'aju (N°19), Bêr-nâdin-apli (N°20), Abi-ili son of Katiri (N°21), Šalmanu-šuma-uṣur (N°22). Counting reigns by Babylonian scribes seems incorrect since Tukultî-Ninurta I regimented Babylonia (not reigned) through three successive Viceroys 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

[14] Mutakkil-Nusku's victory over his brother was short-lived. According to one tablet: "(he) held the throne for ṭuppišu (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 Ṣippu or 27 March in 1225 BCE)[15]. 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	Uṣur-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-aṣbat	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-uṣur	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-uṣur	6/0
1216	Qarrad-Aššur (?)	Aššur-iddin	27th	[26]		1
1215	Sarniqu (?)		28th	[27]		2
1214	Ninurta-nâdin-apli (?)	Bukruni	29th	[28]		3
1213	Urad-Kube (?)	Aššur-bel-ilani	30th	[29]		4
1212	Mudammiq-Nusku (?)	Ibašši-ili	31th	[30]		5
1211	Kidin-Aššur (?)		32th	[31]		6
1210	Sin-uballiṭ (?)		33th	[32]		7
1209	Nabu-bela-uṣur (?)		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	Erīb-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-uṣur (?), but the Babylonians settled upon Adad-šuma-uṣur (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:

[15] N = 1225, (N – 1088)x365,24219 = (141)x12x29,530588 + 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-uṣur	30	1217 - -1187
80	Aššur-nêrârî III	6	1203-1197				
81	Enlil-kudurri-uṣur	5	1197-1192				

TABLE 12

BCE	Month			Assyrian	[A]	[B]	**King** / *eponym*
1225	1	X	*x*	Muḫḫur ilâni	17	**7**	[A] **Tukultî-Ninurta I** Assyrian [B] **Kaštiliašu IV** Babylonian
	2	XI	*xi*	Abû šarrâni			
	3	XII	*xii*	Ḫubur			
	4	I	*i*	Ṣippu	18	**8**	*Ina-Aššur-šuma-aṣbat*
	5	II	*ii*	Qarrâtu			
	6	III	*iii*	Kalmartu			
	7	IV	*iv*	^{d}Sin		**0**	(*Babylon taken*) [B] **Enlil-nâdin-šumi** (Babylonian Viceroy)
	8	V	*v*	Kuzallu			
	9	VI	*vi*	Allanâtu			
	10	VII	*vii*	Belêt-ekalli			
	11	VIII	*viii*	Ša sarrâte			
	12	IX	*ix*	Ša kênâte			
1224	1	X	*x*	Muḫḫur ilâni			
	2	XI	*xi*	Abû šarrâni			
	3	XII	*xii*	Ḫubur			
	4	I	*i*	Ṣippu	19	**1**	*Ninu'aju son of Aššur-iddin*
	5	II	*ii*	Qarrâtu			
	6	III	*iii*	Kalmartu			
	7	IV	*iv*	^{d}Sin			
	8	V	*v*	Kuzallu			
	9	VI	*vi*	Allanâtu			
	10	VII	*vii*	Belêt-ekalli			
	11	VIII	*viii*	Ša sarrâte			
	12	IX	*ix*	Ša kênâte			
1223	1	X	*x*	Muḫḫur ilâni			
	2	XI	*xi*	Abû šarrâni		**0**	[B] **Kadašman-Harbe II** (Babylonian Viceroy)
	3	XII	*xii*	Ḫubur			
	4	I	*i*	Ṣippu	20	**1**	*Abi-ili (?)*
	5	II	*ii*	Qarrâtu			

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), which was 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-anînu (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 Šamšî-Adad I. Shalmaneser I rebuilt the temple again 434 years later, followed 580 years later when 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 Šamšî-Adad I being 1014 years (= 580 solar + 434 lunar or 1001 solar years), the end of the reign of Šamšî-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, Gurzadyan: 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	∑ eponyms	
33	Êrišu 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	Êrišu II	[-]	Šamšî-Adad I conquers Assyria, eponym Ibni-Ištar (N°157)	**10**	126
39	**Šamšî-Adad I**	**33**	Death of Šamšî-Adad I, eponym Ṭab-ṣilli-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 eponyms[16] beginning in Êrišu 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 Êrišu 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 Šamšî-Adad during the eponymy of Ṭab-ṣilli-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 is in 1774 BCE and the death of Erišu II is 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 is [-]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 "Šamšî-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 Šamšî-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 Šamšî-Adad I (who became an Assyrian king).

[16] http://cdli.ox.ac.uk/wiki/doku.php?id=list_of_old_assyrian_limmu_officials

TABLE 14

BCE	N°	eponym	son of	Comments in chronicles		
1873				accession of **Erišu I** (king n°33)	0	
1872	1	**Šu-Ištar**	**Abila**	year 1 (beginning of the list KEL A)	**1**	
1871	2	Šukkuttum	Išuhum		2	
	3	Iddin-ili	Kurub-Ištar		3	
1870	4	Šu-Anum	Isaliya		4	
1869	5	Anah-ilī	Kiki		5	
1868	6	Suetaya	Ir'ibum		6	
1867	7	Daya	Išuhum		7	
1866	8	Ilī-ellītī			8	
1865	9	Šamaš-ṭab			9	
1864	10	Agusa			10	
1863	11	Idnaya	Šudaya		11	
1862	12	Quqādum	Buzu		12	
1861	13	Puzur-Ištar	Bedaki		13	
1860	14	Lā-qēpum	Babidi		14	
1859	15	Šu-Laban	Kurub-Ištar		15	
1858	16	Šu-Bēlum	Išuhum		16	
1857	17	Nabi-Suen	Šu-Ištar		17	
1856	18	Hadaya	Elāli		18	
1855	19	Ennam-Aššur	Begaya		19	
1854	20	Ikūnum	Šudaya		20	
1853	21	Iṣmid-ilum	Idida		21	
1852	22	Buzutaya	Išuhum		22	
1851	23	Šu-Ištar	Ammaya		23	
1850	24	Iddin-Aššur	*i.e. kumrum*		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	Šûli	Uphakum		32	
1841	33	Lā-qēpum	Zukua		33	
1840	34	Puzur-Ištar	Erisua		34	
1839	35	Agua	Adad-rabi		35	
1838	36	Šu-Suen	Ṣilliya		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**	*brother of* Šuli	Šuli son of Šalim-ahum, year 1 **1**	**1**	
1833	42	Ikūnum	Šudaya	**2**	2	
1832	43	Dan-Wēr	Ahuahi	**3**	3	
1831	44	Šu-Anum	Nērabtim	**4**	4	
1830	45	Ilī-massu	Aššur-ṭab	**5**	5	
1829	46	Šu-Hubur	Šuli	**6**	6	
1828	47	Idua	Ṣulilī	**7**	7	
1827	48	Lā-qēpum	Puzur-Laba	**8**	8	
1826	49	Šu-Anum	of *hapirum*	**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	Pišaḫ-Ilī	Adin	**20**	6	
1814	61	Asqūdum	Lā-qēpum	**21**	7	

1813	62	Ilī-pilaḫ	Damqum SEP		**22**	8	
1812	63	Qulali	[-]		**23**	9	
1811	64	Susaya SEP	[-]		**24**	10	
1810	65	Amaya	*the Armourer*		**25**	11	
1809	66	Ipḫurum	Ilī-ellat		**26**	12	
1808	67	Kudānum	Lā-qēpum		**27**	13	
1807	68	Ilī-bāni	Ikūnum		**28**	14	
1806	69	Šu-Kūbum	Susaya		**29**	15	
1805	70	Quqidi	Amur-Aššur		**30**	16	
	71	Abiya	Nūr-Suen		**31**	17	
1804	72	Šu-Ištar	Šukkutum		**32**	18	
1803	73	Baziya	Šēp-Alim		**33**	19	
1802	74	Šu-Ištar	Ikūnum, *the Star*		**34**	20	
1801	75	Abiya	Šu-Dagan		**35**	21	
1800	76	Salliya	Šabakurā(num)	**Babylonian king**	**36**	22	
1799	77	Ibni-Adad	Baqqunum	accession of **Sumu-abum**	**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	Pilaḫ-Aššur/haya		**42**	28	**5**
1793	83	Aššur-damiq	Abarsisum		**43**	29	**6**
1792	84	Puzur-Niraḫ	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	Inaḫ-ilī		**49**	35	**12**
1786	90	Ṭāb-Aššur	Suḫarum		**50**	36	**13**
1785	91	Elāli	Ikūnum *the sangu*	accession of **Sumu-a-il**	**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	Ṣilulu	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	Šuli		**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-ahum		**64**	2	**13**
	105	Aššur-imittī	Ilī-bāni		**65**	3	
1771	106	Enna-Suen	Šu-Aššur *the priest*		**66**	4	**14**
1770	107	Akutum	Ali-ahum		**67**	5	**15**
1769	108	Maṣī-Ilī	Erišum		**68**	6	**16**
1768	109	Iddin-ahum	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	Buṣiya	Abiya		**84**	22	**32**
1752	125	Dādiya	Šu-Ilabrat	Birth of Šamšî-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 **Sabium**	**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-imittī			**102**	40	**13**
1735	143	Dadaya		accession of **Apil-Sîn**	**103**	41	**14**
1734	144	Dadaya			**104**	42	**1**
1733	145	Ah-šalim			**105**	43	**2**
1732	146	Uṣur-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 **Êrišu 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		Êrišu II	**120**	4	**17**
1717	161	Amur-Aššur		Êrišu II accession of **Sîn-muballit**	**121**	5	**18**
1716	162	Aššur-nīšu		Êrišu II (end of the list MEC B)	**122**	6	**1**
1715	163	Manawwirum		(beginning of the list C L2)	**123**	7	**2**
1714	164	Idnaya	Aššur-imittī		**124**	8	**3**
1713	165	Dadaya	Šarrum-Adad?	(end of the list C L2)	**125**	9	**4**
1712	166	Puzur-Nirah			**126**	**10**	**5**
1711	167	Abiya		(Assyrian reign year 1 of **Šamšî-Adad I**)	**127**	1	**6**
1710	168	Edīnum	Bēlu-rabi		**128**	2	**7**
1709	169	Aššur-taklāku			**129**	3	**8**
1708	170	Išim-Suen			**130**	4	**9**
1707	171	Adad-bāni			**131**	5	**10**
1706	172	Abī-šagiš			**132**	6	**11**
	173	Ṭab-ṣilla-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	Uṣranum		**144**	18	**2**
1694	185	Ennam-Aššur			**145**	19	**3**
1693	186	Suen-muballiṭ	Aššur-iddinam		**146**	20	**4**
1692	187	Rēš-Šamaš	Anum-piša?		**147**	21	**5**
1691	188	Ibni-Adad	Aššur-tukultī		**148**	22	**6**
1690	189	Aššur-imittī			**149**	23	**7**

1689	190	Ilī-ellatī	Aššur-nišu		**150**	24	**8**
1688	191	Rigmānum			**151**	25	**9**
1687	192	**Ikūn-pīya**	**Šalim-Aššur**	(Yasmah-Addu becomes vice-roy of Mari)		26	**10**
1686	193	Ašqūdum			**153**	27	**11**
1685	194	Aššur-malik			**154**	28	**12**
1684	195	Aḫiyaya*	Lā-qēpum	(end of the list MEC E)	**155**	29	**13**
1683	196	Awīliya			**156**	30	**14**
1682	197	Nimar-Suen	Aššur-nīšu		**157**	31	**15**
1681	198	Adad-bāni	Puzur-ilī		**158**	32	**16**
1680	199	**Ṭab-ṣilli-Aššur**		death of **Šamšî-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 rulers)		**6**	**33**
1663	216	Ayā		(year 1 of **Bêlu-bâni** 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 Šamšî-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 list KEL A did.
- The darkening of the sun mentioned during the Puzur-Ištar eponym (N°126), the year just after the birth of Šamšî-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 BCE[17]. Moreover, the term used *na'duru* "darkened, obscured, eclipsed" means an eclipse in a metaphorical way and is different from the usual *antalù* "eclipse" used in Mari[18]. Consequently, for the Assyrian copyist of that time, the birth of Šamšî-Adad I actually 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 Šamšî-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).

[17] 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 Šamšî-Adad I (1758-1725) contradicts that obtained by the Middle Chronology!

[18] 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 Šamšî-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 **Šamšî-Adad I**	Ṭab-ṣilli-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	Šerrîya		3	**425**	[3]		14
1267	Aššur-kâšid		4	**426**	[4]		15
1266	Aššur-mušabši	Iddin-Mêr	5	**427**	[5]		16
1265	Aššur-mušabši	Anu-mušallim	6	**428**	[6]		17
1264	Qibi-Aššur	Šamaš-aḫa-iddina	7	**429**	[7]	Kadašman-Enlil II	18/0
1263	Aššur-nâdin-šumê	Aššur-lē'i	8	**430**	[8]		1
1262	Abî-ilî	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	Ilî-qarrad (?)		12	**434**	[12]		5
1258	Qibi-Aššur	Ṣilli-Marduk	13	**1**	[13]		6
1257	Ina-pî-Aššur-lišlim	Bābu-aḫa-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-ilî	18	**6**			
1253	Ištar-êriš	Salmanu-qarrâd	19	**7**	[18]		2
1252	Bêr-bêl-lîte		20	**8**	[19]		3
1251	Lullâyu	Adad-šumu-iddina	21	**9**	[20]		4
1250	Aššur-da'issunu	Lullâyu	22	**10**	[21]		5
1249	Riš-Adad	Nabû-[-]?	23	**11**	[22]		6
1248	Aššur-kettî-îde	Abî-ilî	24	**12**	[23]		7
1247	Ekaltâyu	Abî-ilî	25	**13**	[24]		8
1246	Nabû-bêla-uṣur		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-uṣur	23	**579**	23	**Sennacherib**	7
681		Nabû-aḫḫē-ēreš	**24**	**580**	**24**		**8**
680	**Esarhaddon** (n°112)	Danânu	1	**1**	1	**Esarhaddon**	1
679		Issi-Adad-anênu	2	**2**	2		2
678		Nergal-šarru-uṣur	3	**3**	3		3
677		Abî-râmu	4	**4**	4		4
676		Banbâ	5	**5**	5		5
675		Nabû-aḫḫē-iddin	6	**6**	6		6
674		Šarru-nûrî	7	**7**	7		7
673		Atar-ilu	8	**8**	8		8

672		Nabû-bêlu-uṣur	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 lists[19] (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 ṭuppi-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 taken into account 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 ṭuppi-šu* means that the king reigned but that there is no eponym associated with his reign (*bāb ṭuppi-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-naṣir 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 actually 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*. 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 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).

[19] 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 AND HITTITE REIGNS OVER THE PERIOD 1750–1350 BCE

Among the 36 Kassite kings (Grayson: 2000, 157-170), only the duration of 13 reigns, from n°5 to n°17, is missing (Pritchard: 1969, 272; Brinkman: 1976, 128). There are some synchronisms between the Assyrian and Kassite kingdoms as well as between the Kassite and Babylonian kingdoms:

- 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.
- The appearance of Kassite king Ulam-Buriaš coincides with the end of the resettling 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 actually the first Kassite king of Babylon (Freu, Mazoyer: 2007, 114).

Putting all these synchronisms in parallel shows that the 5th Kassite king, Abirattaš, 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 Abirattaš and Kadašman-Enlil I (1375-1360), this average duration being 16 years = (1582 - 1375)/13.

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 - **-1680**
				Hammurabi	1697-**1680**	17		
					1680 - -1654	26	Išme-Dagan I	1680-1670
							Bêlu-bâni	1664-1654
1	Gandaš	*1661 - -1635*	[2]6	Samsu-iluna	1654-1645	9	Libbaya	1654 - -1638
2	Agum I	*1635 - -1613*	22		**1645** - -1616	29	Šarma-Adad I	1638-1626
							Puzur-Sîn	1626-1615
3	Kaštiliaš I	*1613-1591*	22	Abi-ešuḫ	1616-1588	28	Bazaya	1615-1588
4	Ušši	*1591-1583*	8	Ammiditana	1588 -	37	Lullaya	1588-1582
5	Abirattaš	*1583 - -1567*	*[16]*				Šû-Ninûa (n°54)	**1582**-1568
							Šarma-Adad II	1568-1565
6	Kaštiliaš II	*1567-1551*	*[16]*		-1551		Ērišu III	1565-1553
7	Urzigurumaš	*1551 - -1535*	*[16]*	Ammiṣaduqa	**1551 - -1530**	21	Šamšî-Adad II	1553-1547
							Išme-Dagan II	1547-1531
8	Ḫurba(šihu)	*1535-1519*	*[16]*	Samsuditana	1530 -	31	Šamšî-Adad III	1531-1516
9	Tiptakzi (Šipta'ulzi)	*1519-1503*	*[16]*		**-1499**		Aššur-nêrârî I	1516-1491
10	Agum II	*1503-1487*	*[16]*	*Resettling of*	1499 -	41	Puzur-Aššur III	1491 -
11	Burna-Buriaš I	*1487-1471*	*[16]*	*Babylon*	-1462			**-1467**
12	Kaštiliaš III	*1471-1455*	*[16]*	Years 38-41	**1462-1459**		Enlil-nâṣir I	1467-1455
13	Ulam-Buriaš	*1455 - -1439*	*[16]*				Nûr-ili	1455-1443
							Aššur-šadûni	1443-1443
							Aššur-rabi I	1443-1433
14	Agum III	*1439-1423*	*[16]*				Aššur-nâdin-aḫḫe I	1433-1424
15	Kadašman-Harbe I	*1423 - -1407*	*[16]*				Enlil-naṣir II	1424-1418
							Aššur-nêrârî II	1418-1411
16	Kara-indaš	*1407 - -1391*	*[16]*				Aššur-bêl-nišešu	**1411**-1403
							Aššur-rê'im-nišešu	1403-1395
17	Kurigalzu I	*1391 - -1375*	*[16]*				Aššur-nâdin-aḫḫe II	1395-1385
							Erîba-Adad I	1385 -
18	Kadašman-Enlil I	**1375**-1360	15					**-1358**
19	Burna-Buriaš II	1360-1333	27				Aššur-uballiṭ I	1358-1323

We note that the synchronism between Year 9 of Samsu-iluna (1654–1616), in 1645 BCE, and Gandaš's reign (1661-1635) is verified. The Kassite chronology can also be verified by synchronisms with the Sealand chronology[20], which is itself anchored on several synchronisms in the Babylonian chronology (Grayson: 2000, 156). A Synchronistic King List (Pritchard: 1969, 271-272) and a tablet (KAV 216, Assur 14616c) indicate that the first king of Sealand (among 11 kings), Ilî-ma-ilu, ruled around Year 29 of Samsu-iluna

[20] Agum II (of Chaldean origin) began to dominate northern Babylonia (land of Akkad) and the Sealand kings (of Sumerian origin) began to dominate southern Babylonia (land of Sumer) up to Ulam-Buriaš who defeated them (c. 1450 BCE).

(1654-1616), in 1625 BCE, and the last king, Ea-gâmil, ended his reign with Ulam-Buriaš (1455-1439). Consequently, it can be calculated that the average duration of a Sealand reign was 16 years[21] = (1625 - 1455)/11. This value is comparable to the average duration of Kassite or Isinian reigns (16 years)[22]. The synchronisms of the reigns with the Babylonian kings, as well as the number of years of reign that are known (Boivin: 2018, 74-75,241-250), make it possible to specify the duration of the Kassite reigns (figures in brackets).

TABLE 17

	(GUTIUM)	reign	#	BABYLONIAN	reign	#			
	(vassal of ELAM)	2024 -		Ur-Nammu	**2020**-2002	18			
				Šulgi	**2002-1954**	48			
				Amar-Sîn	1954-1945	9			
				Šu-Sîn	1945-1936	9			
				Ibbi-Sîn	**1936 -**	24	ISINIAN	reign	#
		-1912			**-1912**		Išbi-Erra	**1923**-1890	33
							Šû-ilîšu	1890-1880	10
							Iddin-Dagân	1880-1859	21
							Išme-Dagân	1859-1839	20
							Lipit-Eštar	1839-1828	11
							Ur-Ninurta	1828-1800	28
				Sumu-abum	**1799**-1785	14	Bûr-Sîn	**1800**-1779	21
				Sumu-la-Il	1785 -	36	Lipit-Enlil	1779-1774	5
							Erra-imittî	1774-1767	7
					-1749		Enlil-Bâni	1767-1743	24
				Sâbium	1749 -	14	Zambîya	1743-1740	[3]
							Iter-piša	1740-1736	[4]
					-1735		Ur-dukuga	1736-1732	[4]
				Apil-Sîn	1735-1717	18	Sîn-mâgir	1732-1721	11
				Sîn-muballiṭ	1717-1697	20	Damiq-ilîšu I	1721-**1698**	23
	KASSITE	reign	#	Hammurabi	**1697**-1654	43			
1	Gandaš	*1661-1635*	[2]6	Samsu-iluna	1654 -	38	SEALAND	reign	#
2	Agum I	*1635-1613*	22		-1616		Ilî-ma-ilu	*1627-1607*	*[20]*
3	Kaštiliaš I	*1613-1591*	22	Abi-ešuḫ	1616-1588	28	Itti-ili-nîbî	*1607-1587*	*[20]*
4	Ušši	*1591-1583*	8	Ammiditana	1588 -	37	Damiq-ilišu II	*1587 -*	*[20]*
5	Abirattaš	*1583-1567*	*[16]*					*-1567*	
6	Kaštiliaš II	*1567-1551*	*[16]*		-1551		Iškibal	*1567 -*	*[20]*
7	Urzigurumaš	*1551 -*	*[16]*	Ammiṣaduqa	**1551 -**	21		*-1547*	
		-1535			**-1530**		Šušši	*1547-1532*	*[15]*
8	Ḫurba(šihu)	*1535-1519*	*[16]*	Samsuditana	1530 -	31	Gulkišar	*1532-1517*	*[15]*
9	Ṭiptakzi (Šipta'ulzi)	*1519-1503*	*[16]*		**-1499**		Pešgaldarameš	*1517-1487*	*[30]*
10	Agum II	*1503-1487*	*[16]*	*Resettling of*	1499 -	41	Ayadaragalama	*1487-1477*	*[10]*
11	Burna-Buriaš I	*1487-1471*	*[16]*	*Babylon*			Akurduana	*1477-1471*	*[6]*
12	Kaštiliaš III	*1471 -*	*[16]*		-1462		Melamkura	*1471-1464*	7
		-1455		Years 38-41	**1462-1459**		Ea-gâmil	*1464-1455*	9
13	Ulam-Buriaš	*1455-1439*	*[16]*						
14	Agum III	*1439-1423*	*[16]*						
15	Kadašman-Harbe I	*1423-1407*	*[16]*						
16	Kara-indaš	*1407-1391*	*[16]*						
17	Kurigalzu I	*1391-1375*	*[16]*						
18	Kadašman-Enlil I	**1375**-1360	15						
19	Burna-Buriaš II	1360-1333	27						

The chronology of the 11 kings of Sealand Dynasty has many unresolved issues, but all synchronisms are in accordance with the "Ultra Low" chronology (Boivin: 2018, 72-85). However, most Hittitologists reject this chronology because they consider it to be about a century too short compared to their own (Freu: 2008, 5-8) and because there would have been "too many" kings of Hana during the period 1600-1500 called « Dark Ages » (Freu, Mazoyer: 2007, 111-117). The traditional chronology of the 29 Hittite kings is divided into three periods: Old Kingdom (n°1 to n°9); Middle Kingdom (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:

[21] If we add up the 11 Sealand reigns from the Babylonian King List (BM 33332), 368 years instead of 170 years (1625-1455), which would imply an average duration of 33 years (= 368/11) for the reigns instead of 16 years (= 170/11).
[22] The average duration between Išbi-Erra (1923-1890) and Damiq-ilîšu I (1721-1698) is 16 years = (1923 - 1698)/14.

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, Pfirsch: 2012, 212). According to a well-known tradition, Naram-Sin 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 reign of those kings over a period covering the reign of Agum II (1503-1487). Contrary to what believed Freu, an eminent Hittitologist, 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 king[23], Ḫurmeli, who appears in the Assyrian documents of Mari was, therefore, a contemporary of the oldest list of Assyrian eponymous names 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 in 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 Assyrian merchants letters (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.

The chronology of the Hittites is not incompatible with the "Ultra-Low" chronology, quite the contrary since all synchronisms are in harmony with the Babylonian and Kassite reigns.

[23] The existence of 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 18

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	Êrišu II	1722-1712	10
3	Inar	*1710 -*	*[20]*	Yahdun-Lîm	1716-1699	17	Šamšî-Adad I	1712 -	33
				Sumu-Yamam	1699-1697	2			
		-1690		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	Piṯḫana	*1670-1650*	*[20]*	Yâpaḫ-Šumu-Abu	1667-*1654*	*13*	BABYLONIA	reign	
6	Anitta	*1650 -*	*[20]*	Iṣi-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]*	Šunuḫru-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	*1503 -*	*16*
6	Zidanta I	*1494-1494*	<1	Hanaya / Ya'usa	*1495 -*	*[15]*			
7	Ammuna	*1494-1484*	*[10]*	MITANNIAN	*-1485*			*-1487*	
8	Ḫuzziya II	*1484-1484*	<1	Sinia/ Šutarna I	*1485 -*		Burna-Buriaš I	*1487 -*	*16*
9	Telipinu	*1484-1479*	*[5]*	(Sa'itarna)	*-1480*				
10	Alluwamna	*1479-1474*	*[5]*	Qiš-Addu /	*1480 -*	*[25]*			
11	Ḫantili II	*1474-1469*	*[5]*	Barattarna I	*-1475*			*-1471*	
12	Taḫurwaili I	*1469-1469*	<1				Kaštiliaš III	*1471 -*	*16*
13	Zidanza (II)	*1469-1462*	*[7]*						
14	Ḫuzziya III	*1462-1455*	*[7]*						
15	Muwatalli I	*1455-1448*	*[7]*		*-1455*			*-1455*	
16	Tuṯḫaliya I	*1448-1428*	*[20]*	Iddin-Kakka	*1455-1430*	*[25]*	Ulam-Buriaš	*1455-1439*	*16*
17	Ḫattušili II	*1428-1413*	*[15]*	Išar-Lim	*1430 -*	*[25]*	Agum III	*1439-1423*	*16*
18	Tuṯḫaliya II	*1413-1383*	*[30]*		*-1405*				
19	Arnuwanda I	*1393-1368*	*[25]*	Iggid-Lim	*1405-1380*	*[25]*			
20	Tuṯḫaliya 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	Tuṯḫaliya 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) and 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.

TABLE 19

n°	ASSYRIAN KING	#	#	Reign		n°	BABYLONIAN KING	#	Reign
23	Yakmeni		*14*	*2010-1996*		**1**	Ur-Nammu (UR)	18	**2020**-2002
24	Yazkur-El		*14*	*1996-1982*		**2**	Šulgi	48	**2002 -**
25	Ila-kakkabû		*14*	*1982-1968*					
26	Amînum		*14*	*1968-1954*					**-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)	33	**1923** - -1890
31	Šalim-ahum		*14*	*1900-1886*					
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	20	1859-1839
34	Ikunum	**159**	14	1834-1821	**5**		Lipit-Eštar	11	1839-1828
35	Sargon I		40	1821 - -1782	**6**		Ur-Ninurta	28	1828-**1800**
					7	**1**	Sumu-abum	14	**1799**-1785
36	Puzur-Aššur II		8	1782-1774	**8**	**2**	Sumu-la-Il	36	1785 - -1749
37	Naram-Sîn		54	1774 - -1722	**9**				
					10				
					11	**3**	Sâbium	14	1749 - -1735
					12				
					13				
38	Ērišu 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** - -1654
41	Aššur-dugul		6	1670-1664					
42	Aššur-apla-idi		0	1664-1664					
43	Nâṣir-Sîn		0	1664-1664					
44	Sîn-namir		0	1664-1664					
45	Ipqi-Ištar		0	1664-1664					
46	Adad-ṣalûlu		0	1664-1664					
47	Adasi		0	1664-1664					
48	Bêlu-bâni		10	1664-1654					
49	Libbaya		17	1654-1638	**1**	**7**	Samsu-iluna	38	1654 - -1616
50	Šarma-Adad I		12	1638-1626	**2**				
51	Puzur-Sîn		12	1626-1615					
52	Bazaya		28	1615-1588	**3**	**8**	Abi-ešuḫ	28	1616-1588
53	Lullaya		6	1588-1582	**4**	**9**	Ammiditana	37	1588 - -1551
54	Šû-Ninûa		14	1582-1568	**5**				
55	Šarma-Adad II		3	1568-1565	**6**				
56	Ērišu III		13	1565-1553	**7**				
57	Šamšî-Adad II		6	1553-1547	**8**	**10**	Ammiṣaduqa	21	**1551 - -1530**
58	Išme-Dagan II		16	1547-1531					
59	Šamšî-Adad III		16	1531-1516	**9**	**11**	Samsuditana	31	1530 - **-1499**
60	Aššur-nêrârî I		26	1516-1491			*Fall of Babylon*		
61	Puzur-Aššur III		24	1491 - -1467	**10**		Agum II (KASSITE)	*16*	*1503-1487*
					11		Burna-Buriaš I	*16*	*1487-1471*
62	Enlil-nâṣir I		13	1467-1455	**12**		Kaštiliaš III	*16*	*1471-1455*
63	Nûr-ili		12	1455-1443	**13**		Ulam-Buriaš	*16*	*1455 - -1439*
64	Aššur-šadûni		0	1443-1443					
65	Aššur-rabi I		*10*	1443-*1433*	**14**		Agum III	*16*	*1439 - -1423*
66	Aššur-nâdin-aḫḫe I		*10*	*1433*-1424					
67	Enlil-naṣir 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-aḫḫe 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 - -1323	**19**		Burna-Buriaš II	27	1360-1333
					20		Kara-ḫardaš	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	Shalmaneser 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

				-1206	**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
79	Aššur-nâdin-apli		4	1206-1203	**32**		Adad-šuma-uṣur	30	1217 - -1187
80	Aššur-nêrârî III		6	1203-1197					
81	Enlil-kudurri-uṣur		5	1197-1192					
82	Ninurta-apil-Ekur		13	1192-1179	**33**		Meli-Šipak	15	1187 - -1172
83	Aššur-dân I		46	**1179** -	**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	14	**1155**-1141
				-1133		**38**	Itti-Marduk-balaṭu	8	1141 - **-1133**
84	Ninurta-tukultî-Aššur		0	1133-1133					
85	Mutakkil-Nusku		0	1133-**1133**					
86	Aššur-rêš-iši I		18	**1133**-1115		**39**	Ninurta-nâdin-šumi	6	**1133**-1127
87	Tiglath-pileser I		39	1115 - -1076		**40**	Nebuchadnezzar I	22	1127-1105
						41	Enlil-nâdin-apli	4	1105-1101
						42	Marduk-nâdin-aḫḫê	18	1101-1083
88	Ašared-apil-Ekur		2	1076-1074		**43**	Marduk-šapik-zêri	13	1083-1070
89	Aššur-bêl-kala		18	1074-1056		**44**	Adad-apla-iddina	22	1070-1048
90	Erîba-Adad II		2	1056-1054		**45**	Marduk-aḫḫê-erîba	1	1048-1047
91	Šamšî-Adad IV		4	1054-1050		**46**	Marduk-zêr-[…]	12	1047-1035
92	Aššurnaṣirpal I		19	1050-1031		**47**	Nabû-šum-libur	8	1035-1027
93	Shalmaneser II		12	1031-1019		**48**	Simbar-šipak	18	1027-1009
94	Aššur-nêrârî IV		6	1019-1013		**49**	Ea-mukîn-zêri	1	1009-1008
95	Aššur-rabi II		41	1013 - -972		**50**	Kaššu-nâdin-ahi	2	1008-1006
						51	Eulmaš-šakin-šumi	17	1006-989
						52	Ninurta-kudurri-uṣur I	3	989-986
						53	Širiki-šuqamuna	1	986-985
						54	Mâr-bîti-apla-uṣur	5	985-980
96	Aššur-rêš-iši II		5	972-967		**55**	Nabû-mukîn-apli	36	980-944
97	Tiglath-pileser II		32	967-935		**56**	Ninurta-kudurri-uṣur II	3	944-941
98	Aššur-dân II		23	935-912		**57**	Mâr-bîti-aḫḫê-iddin	*20*	941-*921*
99	Adad-nêrârî II		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	Aššurnaṣirpal II		25	884-859		**60**	Nabû-apla-iddina	33	888-855
102	Shalmaneser III		35	859-824		**61**	Marduk-zâkir-šumi I	36	855-819
103	Šamšî-Adad V		13	824-811		**62**	Marduk-balâssu-iqbi	6	819-813
104	Adad-nêrârî III		28	811 - -783		**63**	Bâba-ah-iddina	-	813-*801*
						64	5 unknown kings	-	*801-800*
						69	Ninurta-apla-[…]	*10*	*800-790*
						70	Marduk-bêl-zêri	*10*	*790-780*
105	Shalmaneser IV		10	783-773		**71**	Marduk-apla-uṣur	*10*	*780*-770
106	Aššur-dân III		18	**773-755**		**72**	Erîba-Marduk	9	770-761
107	Aššur-nêrârî V		10	755-745		**73**	Nabû-šum-iškun	13	761-748
108	Tiglath-pileser III		18	745 - -727		**74**	Nabû-naṣir	14	748-734
						75	Nabû-nâdin-zêri	2	734-732
						76	Nabû-šum-ukîn II	1	732-731
						77	Nabû-mukîn-zêri	2	**731-729**
						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**
						81	Sargon II	5	710-705
111	Sennacherib		24	705 -		**82**	Sennacherib	2	705-703
						83	Marduk-zâkir-šumi II	0	703-703
						84	Bêl-ibni	3	703-700
						85	Aššur-nâdin-šumi	6	700-694
						86	Nergal-ušezib	1	694-693
						87	Mušezib-Marduk	4	693-689
				-681		**88**	Sennacherib	8	689-681
112	Esarhaddon	**72**	12	**681**-669		**89**	Esarhaddon	12	**681**-669
113	Aššurbanipal		42	669-627		**90**	Šamaš-šum-ukîn	20	**668-648**
114	Aššur-etel-ilâni		1	627-626		**91**	Kandalanu	22	648-626

115	Sin-šar-iškun	14	626-612	
116	Aššur-uballiṭ II	3	612-**609**	

92	Nabopolassar	21	**626 - -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 calendar (or Amorite) was lunar while the calendar of Mari was lunisolar[24] like the calendar of Babylon. Synchronization among various calendars of the past is made difficult by these changing paradigms (unreported). For instance, on the death of Šamšî-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 Šamšî-Adad I's reign is dated[25] 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-ṣilla-Aššur")[26].

TABLE 20

	BABYLONIAN		JULIAN		MARIOTE		AMORRITE	PALEO-ASSYRIAN
X	Tebêtu	1	January (*winter*)	*xi*°	*Abum (IV)*	*xi**	*Abum*	*Ab šarrâni (v*)*
XI	Šabâtu	2	February	*xii*°	*Ḫibirtum (V)*	*xii**	*Tîrum*	*Ḫubur (vi*)*
XII	Addâru	3	March	*i*°	*Ḫubur (Ḫilib)*	*i**	*Niqmum*	*Ṣip'im (vii*)*
I	Nisannu	4	April (*spring*)	*ii*°	*Kinûnum (VII)*	*ii**	*Kinûnum*	*Qarrâtim (viii*)*
II	Ayyaru	5	May	*iii*°	*Dagan (VIII)*	*iii**	*Tamhîrum*	*Kanwarta (ix*)*
III	Simanu	6	June	*iv*°	*Lîlîatum (IX)*	*iv**	*Nabrûm*	*Te'inâtim (x*)*
IV	Du'ùzu	7	July (*summer*)	*v*°	*Bêlet-bîrî (X)*	*v**	*Mammîtum*	*Kuzallu (xi*)*
V	Abu	8	August	*vi*°	*Kiskissum (XI)*	*vi**	*Mana*	*Allanâtim (xii*)*
VI	Ulûlû	9	September	*vii*°	*Ebûrum (XII)*	*vii**	*Ayyarum*	*Bêltî-ekallim (i*)*
VII	Tašrîtu	10	October (*autumn*)	*viii*°	*Urâḫum (I)*	*viii**	*Niggalum*	*Ša sarratim (ii*)*
VIII	Araḫsamna	11	November	*ix*°	*Malkânum (II)*	*ix**	*Maqrânum*	*Narmak Aššur (iii*)*
IX	Kisilimu	12	December	*x*°	*Laḫḫum (III*	*x**	*Du'uzum*	*Maḫḫurili (iv*)*

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 Urâḫum; 3) the year of the Amorrite calendar was lunar and began on the 1st Niqmum; 4) the year of the paleo-Assyrian calendar was also lunar but began on the 1st Ṣip'im. The presence or the absence of intercalation further complicates synchronizations among calendars[27]. 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 Šamšî-Adad I's reign (1712–1680). Before King Ninurta-apil-Ekur (1192–1179), Assyrian eponyms started on 1st Ṣippu and from Ninurta-apil-Ekur they started on 1st Nisannu[28].

Δ = year (BCE) – 1088 (for example in 1679 BCE: Δ = 1679 – 1088 = 591)
Julian day = Δ x 365.2422 – [[Δ x 1.0307]] x 354.36 + 13 + 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 Ṣippu in the year 1679 BCE:
Δ = 1679 – 1088 = 591; Δ x 1.0307 = 609.14; [[Δ x 1.0307]] = 609; Assyrian day = 1.
Julian day = Δ x 365.2422 – [[Δ x 1.0307]] x 354.36 + 13 + Assyrian day
Julian day = 52.9 + 13 + 1 = 67 = (31) + (28) + 8 = 8 March (3rd month).
Consequently: 1 Ṣippu = 8 March in 1679 BCE (-1678*), or 7 March according to astronomy[29].

[24] The day 30 could be 29 or 1 (Sasson: 1984, 246-252).
[25] An exorcist priest (*mašipum*) 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 Ṣip'im March 7. It is interesting to note that the year 33 of Šamšî-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 Rîm-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 Ṣippu 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 21

BCE	month				Assyrian	[A]	[B]	[C]	[D]	King / *eponym*
1680	1	*IV*	*xi°*	X	Ab šarrâni	**6**	**32**	**16**	**46**	*Adad-bāni*
	2	*V*	*xii°*	XI	Ḫubur					
	3	*VI*	*i°*	XII	Sip'im		**33**			*Ṭab-ṣilli-Aššur (N°199)*
	4	*VII*	*ii°*	I	Qarrâtim			**17**	**47**	
	5	*VIII*	*iii°*	II	Kanwarta					
	6	*IX*	*iv°*	III	Te'inâtim					
	7	*X*	*v°*	IV	Kuzallu					
	8	*XI*	*vi°*	V	Allanâtim					
	9	*XII*	*vii°*	VI	Bêltî-ekallim					
	10	*I*	*viii°*	VII	Ša sarratim	**7**				[A] **Yasmah-Addu** king of Mari
	11	*II*	*ix°*	VIII	Narmak Aššur					[B] **Šamšî-Adad I** king of Assyria (n°39)
	12	*III*	*x°*	IX	Maḫḫurili					[C] **Hammurabi** king of Babylon
1679	1	*IV*	*xi°*	X	Ab šarrâni					[D] **Rîm-Sîn I** king of Larsa
	2	*V*	*xii°*	XI	Ḫubur		**0**			
	3	*VI*	*i°*	XII	Sip'im	**0**	**1**			*after Ṭab-ṣilli-Aššur*
	4	*VII*	*ii°*	I	Qarrâtim			**18**	**48**	
	5	*VIII*	*iii°*	II	Kanwarta					
	6	*IX*	*iv°*	III	Te'inâtim					[A] **Zimrî-Lîm** king of Mari
	7	*X*	*v°*	IV	Kuzallu					[B] **Išme-Dagan I** king of Assyria (n°40)
	8	*XI*	*vi°*	V	Allanâtim					
	9	*XII*	*vii°*	VI	Bêltî-ekallim					
	10	*I*	*viii°*	VII	Ša sarratim	**1**				*Ennam-Aššur (N°200)*
	11	*II*	*ix°*	VIII	Narmak Aššur					
	12	*III*	*x°*	IX	Maḫḫurili					
1678	1	*IV*	*xi°*	X	Ab šarrâni					*(Feast of Ištar in month xi° Ab Šarrani)*
	2	*V*	*xii°*	XI	Ḫubur					
	3	*VI*	*i°*	XII	Sip'im		**2**			*Aššur-emūqī (N°201)*
	4	*VII*	*ii°*	I	Qarrâtim			**19**	**49**	
	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 Shabatu 15 and after 3 days **rises on Shabatu 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 Shabatu 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 Arahsamnu 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 (*calculated*)	14-Feb 1549	0	24-Feb 1581	0	14-Mar 1645	0	31-Mar 1701	0
Shabatu 18 Year 1 (*observed*)	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). 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, another way of dating is used, it is based on the Venus cycle. 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 exactly the same time each year it will be noted with an advance of 2 days[30] at the end of 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 Venus[31] across the Sun takes place when the planet Venus 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 similar to 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 years[32]. 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 follows[33] (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	

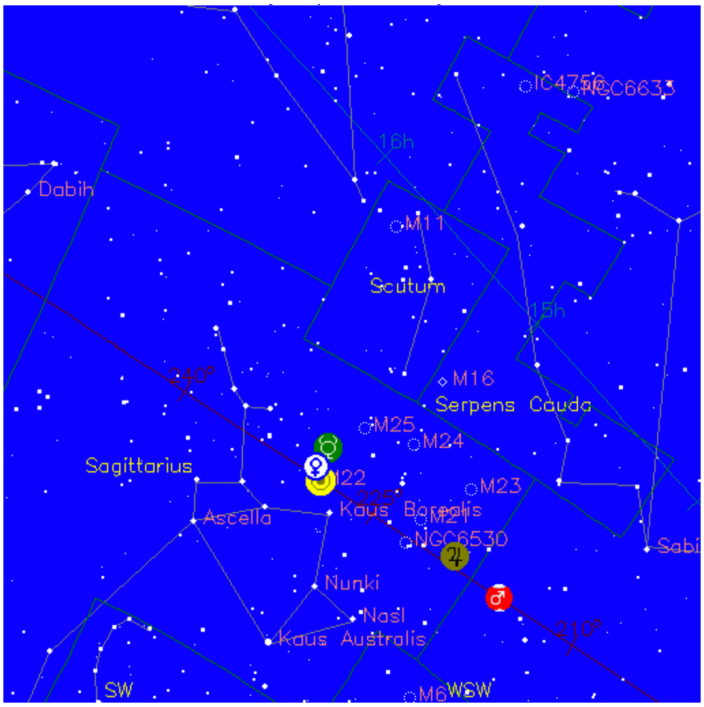
[30] 2 days = 8 x 365.24519 days – (8 x 12 + 3) x 29.530588 days (= -1.6 days)

[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 Babylon[34]. Teije de Jong regards Šamšî-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 Acemhöyüke palace requires locating the death of Šamšî-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 Šulgi[35] (14/III/**48**) and another (Enuma Anu Enlil 21) mentions a (total) lunar eclipse[36], dated 14 Addaru (month XII), at the end of the Ur III dynasty ending with the reign of Ibbi-Sin (14/XII/**24**). These two lunar eclipses were separated by 42 years of reign (= 9 years of Amar-Sin + 9 years of Šu-Sîn + 24 years of Ibbi-Sin) and 9 months (= month XII – month III). Over the period 2200-1850 there were only one couples of eclipses[37], spaced by 42 years and 9 months, matching the description of astronomical omens (Huber: 2000, 159-176).

TABLE 22

BCE	month			King
1954	1	X	**47**	**Šulgi** (Ur III n°2)
	2	XI		
	3	XII		(1/I/**48** = 7 April)
	4	I	**48**	
	5	II		*Total lunar eclipse dated*
	6	**III**		14/III/**48** (27 June)
	7	IV	**0**	**Amar-Sin** (Ur III n°3)
	8	V		
	9	VI		
	10	VII		
	11	VIII		
	12	IX		
1953	1	X		
	2	XI		
	3	XII		
	4	I	**1**	
	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		
	2	XI		*Total lunar eclipse dated*
	3	**XII**		14/XII/**24** (6 March)
	4	I		**Fall of Ur**
	5	II	**12**	**Išbi-Erra** (Isin n°1)
	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 result is irrefutable, there is no lunar eclipse according to the Low, Middle, and High chronology, neither at the end of Shulgi's reign, nor at the end of Ibbi-Sin'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 27 June 1954 BCE (27/06/-1953*) the second eclipse on 6 March 1911 BCE (06/03/-1910*).

TABLE 23

Fall of Babylon	Chronology	Date (BCE)	Lunar eclipse	Date (BCE)	Lunar eclipse
(Venus Tablet)		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	27/06/1954	**27/06/1954**	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 and, 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 Shulgi and at the end of the reign of Ibbi-Sîn (marking the fall of Babylon), definitively eliminates the other three chronologies (High, Middle and Low). Despite the excellent agreement with the reign of Šamšî-Adad I (1712-1680) the Ultra-Low chronology is considered too low compared to Kassite and Hittite chronologies. This criticism is unfounded (Gasche: 2003, 205-221), because these chronologies are very approximate: most durations of reigns are unknown, and they have no link with any astronomical events. The lunar eclipse dated: *Year 38 that Babylon was resettled (...) Month of Abu (July-August), Day 10*, mentioned in the economic texts from Tell Muhammad (Gasche, Armstrong, Cole: 1998, 86) confirms definitively the Ultra-Low Chronology (the lunar eclipse dated 16/09/1614 is not suitable because there is a difference of two months with the date, month V, mentioned in the text). In addition, the lunar eclipse was total since it is an economic text (Day 10 is a mistake because eclipses always take place on the 14th-15th of the month).

TABLE 24

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 moon 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 breaks 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 he king (Šamšî-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 Šamšî-Adad's service and that he pursued his career during the reign of Yasmah-Addu and the first 8 years of Zimrî-Lîm. Ašqūdum must have played an important role in Yasmah-Addu's career since Šamšî-Adad I appointed him as eponym (N°193) at the beginning of his reign in 1686 BCE. Šamšî-Adad I became king of Mari for 10 years, after the death of Sumu-Yamam, under the name of Samsî-Addu, then named his son Yasmah-Addu as his successor (Ziegler /Charpin: 2001, 496-501).

TABLE 25

KING OF MARI	reign	KING OF ASSYRIA	reign	KING OF BABYLON	reign
Yaggid-Lîm[38]	1738-1716	Êrišu II	1722-1712	Apil-Sîn	1735-1717
Yahdun-Lîm	1716-1699	Šamšî-Adad I	**1712** -	Sîn-muballiṭ	1717 -
Sumu-Yamam	1699-1697				-1697
Samsî-Addu	**1697**-1687			Hammurabi	**1697** -
Yasmah-Addu	1687-**1680**		**-1680**		
Zimrî-Lîm	1680-1667	Išme-Dagan I	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) Šamšî-Adad having died in 1680 BCE the king concerned was to be Yasmah-Addu at the beginning of his reign or Šamšî-Adad himself; 2) the total visible eclipses[39] 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 moon eclipses (but only one was visible in Mari), which could have been a very bad omen for the King of Mari, but this was not the case because of the omens taken from the liver. The comparison of all the reigns of the time shows that Šamšî-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 26

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**			*Ikūn-pīya son of Šalim-Aššur (N°192)*
	2	*V*	*ii°*	XI					*Total lunar eclipse dated 19/02/-1686**
	3	*VI*	*iii°*	XII					
	4	*VII*	*iv°*	I			**10**	**40**	[A] **Šamšî-Adad** king of Mari
	5	*VIII*	*v°*	II					[B] **Šamšî-Adad I** king of Assyria
	6	*IX*	*vi°*	III					[C] **Hammurabi** king of Babylon
	7	*X*	*vii°*	IV					[D] **Rîm-Sîn I** king of Larsa
	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					
1686	1	*IV*	*i°*	X		**27**			*Ašqūdum (N°193)*
	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					
	12	*III*	*xii°*	IX					

CHRONOLOGY OF MESOPOTAMIAN REIGNS OVER THE PERIOD 2340–1912 BCE

The period 2243-1912 BCE has only one reign dated by astronomy, that of Shulgi (2002–1954). The chronology of the Sumerian kings, starting from Sargon of Akkad (2243–2187), can be reconstructed exactly because the durations of their reign are all known through several Chronicles (Pruzsinsky: 2009, 111–124). The only way to verify the accuracy of this chronology is the presence of several synchronisms (highlighted

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

[39] 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

in grey) with the chronology of the kings of Ebla and Mari, which can itself be reconstructed exactly by the duration of their reign. Considering all known synchronisms and durations of reign, the Mesopotamian chronology can be reconstructed until 2340 BCE. The chronology of this period confirms that Sargon destroyed the city of Mari (Durand: 2012, 117-132).

TABLE 27

n°	KING OF MARI	#	Reign	KING OF EBLA	#	Reign	SUMERIAN KING	#	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
				Ibbi-Damu	*6*	*2312-2306*	E-anatum	30	2318 -2288
	Iški-Mari	*12*	*2306-2294*	Baga-Damu	*12*	*2306-2294*			
	Anubu	*12*	*2294-2282*	Enar-Damu	*12*	*2294-2282*	En-anatum I	[6]	2288-2282
	Sa'umu	*6*	*2282-2276*	Iš'ar-Malik	*6*	*2282-2276*	En-metena	30	2282 -
	Itup-Išar	*4*	*2276-2272*	Kun-Damu	*6*	*2276-2270*			
	Iblul-Il	*20*	*2272 -2252*	Adub-Damu	*6*	*2270-2264*			
				Igriš-Halab	12	2264-2252			-2252
	Nizi	3	2252-2249	Irkab-Damu/Tir	5	2252-2247	En-anatum II	7	2252 -
	Enna-Dagan	4	2249-2245	/Arrukun	2	2247-2245			-2245
				Iš'ar-Damu	15	2245 -	En-entarzi	5	2245-2240
	ASSYRIAN KING			/Ibrium		-2230	Sargon (AKKAD)	56	**2243** -
1	Tudiya	*9*	*2235-2226*						
2	Adamu	*9*	*2226-2217*	/Ibbi-zikir	17	2230 -			
3	Yangi	*9*	*2217-2208*			**-2213**			
4	Lillâmu	*9*	*2208-2199*						
5	Harharu	*9*	*2199-2190*						-2187
6	Mandaru	*9*	*2190-2181*				Rimuš	9	2187-2178
7	Imṣu	*9*	*2181-2172*				Maništusu	15	2178 -
8	Harṣu	*9*	*2172-2163*	KING OF MARI	#	Reign			-2163
9	Didânu	*9*	*2163-2154*	Ididiš	60	**2164** -	Narâm-Sîn	37	**2163** -
10	Hanû	*9*	*2154-2145*						
11	Zuabu	*9*	*2145-2136*						
12	Nuabu	*9*	*2136-2127*						-2126
13	Abazu	*9*	*2127-2118*				Šar-kali-šarri	25	2126 -
14	Belû	*9*	*2118-2109*			-2104			-2101
15	Azarah	*9*	*2109-2100*	Šu-Dagan	5	2104 -			
16	Ušpia	*9*	*2100 -2091*			-2099	Irgigi/ Imi/ Nanum/ Ilulu	3	2101 - -2098
17	Apiašal	*9*	*2091-2082*	Išmah-Dagan	45	2099 -	Dudu	21	2098-2077
18	Halê	*14*	*2082-2068*				Šu-Turul	15	2077-2062
19	Samânu	*14*	*2068-2054*			-2054	Ur-Nigin (URUK)	7	2062-2055
20	Hayâni_	*14*	*2054 -2040*	Nûr-Mêr	5	2054-2049	Ur-Gigir	6	2055-2049
				Išdub-El	11	2049 -	Kuda	6	2049-2043
						-2038	Puzur-ili	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-hegal	11	2032-2021
23	Yakmeni	*14*	*2010-1996*			-1995	Ur-Nammu (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** -			**-1954**
27	Sulili/Zariqum	*14*	*1954-1940*				Amar-Sîn	9	1954-1945
28	Kikkia	*14*	*1940 -1927*			-1933	Šu-Sîn	9	1945-1936
				Hitlal-Erra	7	1933-1926	Ibbi-Sîn	24	1936 -
29	Akia	*14*	*1927 -*	Hanun-Dagan	8	1926-1918			
			-1913	Iṣi-Dagan	6	1918-1912			**-1912**
30	Puzur-Aššur I	*14*	***1913 -***	Itûr ?-[-]	6	1912-1906	Išbi-Erra (ISIN)	33	1923 -
			-1899	Amer-Nunnu	6	1906-1900			
31	Šalim-ahum	*14*	*1899 -1885*	Têr-Dagan	8	1900-1892			-1890
				Dagan-[-]	6	1892-1886	Šû-ilîšu		1890-1880

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

- The Assyrian King List specifies that these first 17 rulers were "kings under tents", which means that these tribal kings were established not according to their royal lineage but according to their wisdom. Therefore, the duration of their reign had to have been shorter since they began to reign at an advanced age. The average duration of 9 years (instead of 14) was chosen because of the synchronism of Tudiya (2235-2226) with Ibrium (2245-2230).
- Tudiya's synchronism with Ibrium can be deduced from the trade treaty between Ibrium, king of Ebla (in fact vizier of Iš'ar-Damu) and an anonymous king of Abarsal. According to Enna-Dagan, king of Mari: *Iblul-Il, king of Mari, took possession of Gallab'i, [of ...] and the Ganum (of Ebla) and conquered Abarsal at Zahiran* (Liverani: 2013, 119-126). Iblul-Il conquered Abarsal, an unknown city. However, 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 Igriš-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 the Battle of Nineveh between Babylonian and Assyrian armies that: in the month Âbu 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 had to have been an important city, so at that time and in the Zahiran region there were two cities, Ashur and Nineveh. At that time the name (c. 2270 BCE) Ashur did not refer to a city but to the "region of the god Ashur". In his report on the conquest of Abarsal, Enna-Dagan (2249-2245) does not mention any king of Abarsal, but Ibrium (2245-2230) does, which could, therefore, correspond to the first Assyrian king, Tudiya (2235-2226).

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 28

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*
				Elulu (25)	5	*2300-2294*
	Anubu	Enar-Damu			6	*2294-2288*
En-anatum I (6?)					7	*2288-2282*
En-metena (30)	Sa'umu	Iš'ar-Malik			8	*2282-2276*
	Itup-Išar	Kun-Damu		Balulu (36)	9	*2276-2270*
	Iblul-Il (20?)	Adub-Damu			10	*2270-2264*
		Igriš-Halab (12)	Darmia		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[40] (25)	Išqi-Mari (9)		Ibbi-Zikir			-2213

Iš'ar-Damu (2245-2213), king of Ebla, reigned 32 years and his two viziers: Ibrium who ruled 15 years (2245-2230) and Ibbi-zikir 17 years (2230-2213). 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);

[40] Lugalzagesi's reign is approximate (2240-2215), we only know that it encompasses Urukagina's reign.

- Ur-Nammu's reign, king of Ur (2020-2002), is included in Apil-Kîn's reign (2030-1995), king of Mari.

TABLE 29

LAGAŠH I		Reign	MARI	Reign		EBLA	Reign	
Ur-Nanše	18	*2340-2322*	Ikun-Šamaš	*2340-2318*		Abur-Lîm	*2340-2318*	
Akurgal	4	*2322-2318*	Ikun-Šamagan	*2318 -2306*		Agur-Lîm	*2318-2312*	
E-anatum	30	*2318 -2288*	Iški-Mari	*2306-2294*		Ibbi-Damu	*2312-2306*	
En-anatum I	6?	*2288-2282*	Anubu (Ianupu)	*2294-2282*		Baga-Damu	*2306-2294*	
En-metena	30	*2282 -2252*	Sa'umu	*2282-2276*		Enar-Damu	*2294-2282*	
			Itup-Išar	*2276-2270*		Iš'ar-Malik	*2282-2276*	
			Iblul-Il	*2270 -2252*	20?	Kun-Damu	*2276-2270*	
En-anatum II	7	*2252 -2245*	Nizi	2252-2249	3	Adub-Damu	*2270-2264*	
			Enna-Dagan	2249-2245	4?	Igriš-Halab	*2264-2252*	12?
AKKAD			Ikun-Išar	2245-2245	-	Irkab-Damu	2252 -2245	7
Sargon	56	**2243 -2187**	Hida'ar	2245-2210	35	Iš'ar-Damu	2245-**2213**	32
			Išqi-Mari	2210-**2201**	9	*Fall of Ebla*		
			Fall of Mari	**2201** -				
Rimuš	9	2187-2178						
Maništusu	15	2178-**2163**	*military governor*	**-2164**				
Narâm-Sîn	37	2163-2126	Ididiš	**2164** -	60			
Šar-kali-šarri	25	2126-2101		-2104				
LAGASH II			Šu-Dagan	2104-2099	5			
Pirig-me		*2101-2091*	Išmah-Dagan	2099 -	45			
Lu-Ba'u		*2091-2081*		-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-Nammu (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 30

ASSYRIA	Reign	BABYLON	Reign	ELAM	Reign
Šamšî-Adad I	1712 -**1680**	Sîn-muballiṭ	1717-1697	Širuk-tuḫ	*1715-1695*
		Hammurabi	**1697** -	Siwe-palar-ḫuppak	*1695 -1670*
Išme-Dagan I	1680-1670				
Aššur-dugul	1670-1664			Kudu-zuluš I	*1670 -1645*
Bêlu-bâni	1664-1654		-1654		
Libbaya	1654 -1638	Samsu-iluna	1654 -	Kutir-Naḫḫunte I	*1645 -1620*
Šarma-Adad I	1638-1626				
Puzur-Sîn	1626-1615		-1616		
Bazaya	1615-1588	Abi-ešuḫ	1616-1588	Temti-Agun II	*1620-1595*
Lullaya	1588-1582	Ammiditana	1588 -	Kutir-Silḫaḫa	*1595 -1570*
Šû-Ninûa	1582-1568				
Šarma-Adad II	1568-1565				
Ērišu III	1565-1553		-1551	Kuk-Našur II	*1570 -1545*
Šamšî-Adad II	1553-1547	Ammiṣaduqa	**1551 -1530**		
Išme-Dagan II	1547-1531			Kudu-zuluš II	*1545-1525*
Šamšî-Adad III	1531-1516	Samsuditana	1530 -	Tan-Uli	*1525-1505*
Aššur-nêrârî I	1516-1491	*Fall of Babylon*	**-1499**	Temti-ḫalki	*1505 -1485*
Puzur-Aššur III	1491 -1467	Agum II	*1503-1487*		
		Burna-Buriaš I	*1487-1471*	Kuk-Našur III	*1485-1465*
Enlil-nâṣir I	1467-1455	Kaštiliaš III	*1471-1455*	Kidinu	*1465-1450*
Nûr-ili	1455-1443	Ulam-Buriaš	*1455 -1439*	Inšušinak-sunkir-nappipir	*1450 -1440*
Aššur-šadûni	1443-1443				
Aššur-rabi I	1443-1433	Agum III	*1439* -	Tan-Ruḫuratir II	*1440-1435*

Aššur-nâdin-aḫḫe I	1433-1424		*-1423*	Šalla	*1435-1425*
Enlil-naṣir II	1424-1418	Kadašman-Harbe I	*1423 -1407*	Tepti-aḫar	*1425 -1405*
Aššur-nêrârî II	1418-1411				
Aššur-bêl-nišešu	1411-1403	Kara-indaš	*1407 -1391*	Igi-halki	*1405 -1385*
Aššur-rê'im-nišešu	1403-1395				
Aššur-nâdin-aḫḫe II	1395-1385	Kurigalzu I	*1391 -1375*	Pahir-iššan	*1385-1375*
Erîba-Adad I	1385 -1358	Kadašman-Enlil I	**1375** -1360	Attar-Kittaḫ	*1375-1365*
				Unpaḫaš-Napiriša	*1365-1360*
Aššur-uballiṭ I	1358 -	Burna-Buriaš II	1360 -1333	Kidin-Ḫutran I	*1360-1355*
				Ḫumban-numena I	*1355-1345*
				Untaš-Napiriša	*1345 -1305*
		Kara-ḫardaš	1333		
		Nazi-Bugaš	1333		
	-1323	Kurigalzu II	1333 -1308		
Enlil-nêrârî	1323-1313				
Arik-dên-ili	1313-1302	Nazi-Maruttaš	1308 -1282	Kidin-Ḫutran II	*1305 -1275*
Adad-nêrârî I	1302 -1271	Kadašman-Turgu	1282 -1264	Napiriša-untaš	*1275 -1245*
Shalmaneser I	1271 -	Kadašman-Enlil II	1264-1255		
	-1242	Kudur-Enlil	1255-1246		
Tukultî-Ninurta I	1242 -	Šagarakti-šuriaš	1246-1233	Kidin-Ḫutran III	*1245 -1215*
		Kaštiliašu IV	1233-1225		
		Enlil-nâdin-šumi	1225-1224		
		Kadašman-Harbe II	1224-1223		
		Adad-šuma-iddina	1223-1217		
	-1206	Adad-šuma-uṣur	1217 -1187	Ḫallutaš-Inšušinak	*1215 -1190*
Aššur-nâdin-apli	1206-1203				
Aššur-nêrârî III	1203-1197				
Enlil-kudurri-uṣur	1197-1192				
Ninurta-apil-Ekur	1192-1179	Meli-Šipak	1187-1172	Šutruk-Naḫḫunte	*1190 -1160*
Aššur-dân I	1179 -	Marduk-apla-iddina	1172-1159		
		Zababa-šuma-iddina	1159-1158		
		Enlil-nâdin-aḫi	1158-1155	Kutir-Naḫḫunte II	*1160-1155*
		Marduk-kabit-aḫḫešu	1155-1141	Šilhak-Inšušinak	*1155 -1125*
	-1133	Itti-Marduk-balaṭu	1141 **-1133**		
Ninurta-tukultî-Aššur	1133				
Mutakkil-Nusku	1133				
Aššur-rêš-iši I	**1133**-1115	Ninurta-nâdin-šumi	**1133**-1127		
Tiglath-pileser I	1115 -	Nebuchadnezzar I	1127-1105	Ḫutelutuš-Inšušinak	*1125-1105*
		Enlil-nâdin-apli	1105-1101	Šilḫinahamru-Lagamar	*1105 -1080?*
	-1076	Marduk-nâdin-aḫḫê	1101-1083		
Ašared-apil-Ekur	1076-1074	Marduk-šapik-zêri	1083-1070	Ḫumban-numena II	*1080? -1050?*
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. Before the reign of Šar-kali-šarri (2126-2101), the Elamite reigns lasted an average of 25 years.

TABLE 31

ELAM (AWAN)	reign			LAGASH I (SUMER)	reign
Pieli	*2390-2365*			En-ḫegal	*2370-2355*
Tari	*2365-2340*			Lugal-šagengur[41]	*2355-2340*
Ukku-taḫiš	*2340 -2315*			Ur-Nanše	**2340**-2322
				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** -2187
Luḫḫi-iššan	*2215-2190*				
Hišep-ratep	*2190-2175*			Rimuš	2187-2178
Ešpum (*governor*)	*2175-2165*			Maništusu	2178-2163
Ili-išmani (*vassal*)	*2165-2140*			Narâm-Sîn	2163 -

[41] These two Lords (ENSI) do not appear in King (LUGAL) Lists but only in inscriptions.

Epir-mupi (*vassal*)	*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	
	-2015	[unnamed]	*2020 -*	Ur-Nammu	2020-2002
[Ḫie?]-lu	*2015*-1990		*-1990*	Šulgi	**2002 -**
Kudu$_7$[ur-Lagamar][42]	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-luḫḫan	*1925-1915*		
		Kindadu	*1915-1905*	*(Collapse of Ur)*	**-1912**
		Idadu I	*1905-1890*	LARSA	
EPARTIDS		Tan-Ruḫuratir I	*1890-1875*	Iemṣium	1910-1882
Ebarti II	*1875-1855*	Ebarat II	*1875-1855*	Samium	1882-1847
Šilḫaḫa	*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*	Abî-sarê	1811-1800
Kuk-Kirmaš	*1795-1775*	Idadu-temti	*1795 -*	Sumu-El	1800-1771
Kuk-Naḫudi	*1775-1755*		*-1765*	Nûr-Adad	1771-1755
Kuk-Našur I	*1755-1735*				
Atta-ḫušu	*1735-1715*	BABYLON		ASSYRIA	
Širuk-tuḫ	*1715-1695*	Sîn-muballiṭ	1717-1697	**Šamšî-Adad I**	1712 -
Siwe-palar-ḫuppak	*1695 -*	**Hammurabi**	**1697 -**		**-1680**
	-1670			Išme-Dagan I	1680-1670
Kudu-zuluš I	*1670 -*			Aššur-dugul	1670-1664
			-1654	Bêlu-bâni	1664-1654
	-1645	Samsu-iluna	1654 -	Libbaya	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 sychronism with Hammurabi, to confirm 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 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 C14 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 ^{14}C DATES

An absolute date is a date known exactly and with no error percentage, even a small one. For example, since the reign of Psamtik is known to the nearest month Egypt (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 ^{14}C dates. Contrary to what they claim, ^{14}C dates are neither absolute nor historical for the following reasons: ^{14}C dates are known to have a percentage of error and the transformation of these ^{14}C 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 ^{14}C 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

[42] The name of the last king of the Awan dynasty, who reigned 36 years, is *ku-du$_7$[-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.

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 ^{14}C 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 errors[43].

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).

[43] 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, Piasetzky: 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.

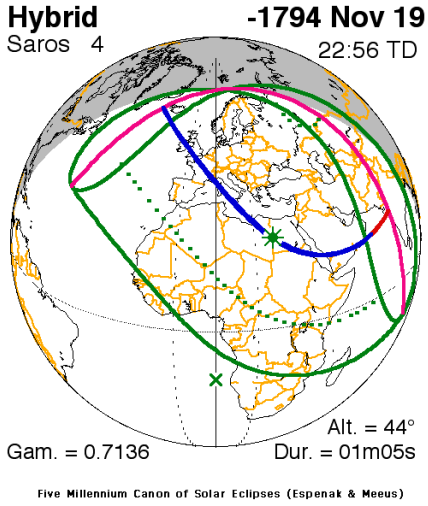
Is this statement really scientifically robust as the authors of this article assert? An examination of the arguments used leads to the conclusion that it is not, because while the accuracy of carbon-14 measurements is extremely rigorous from a scientific point of view, the interpretation of the dates 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):

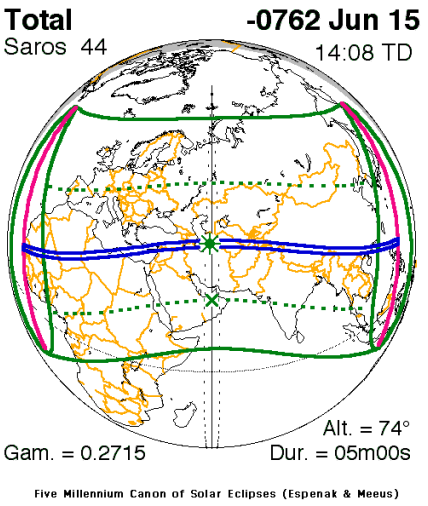
Alongside our knowledge of the Babylonian dynastic succession and the well-established synchronism of Šamši-Adad I's death in Hammurabi's 18th regnal year, this allows us to establish a relative chronological sequence of some 380 years between the ascent of the Assyrian ruler Erišum I and the destruction 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 in. But this assumption cannot itself form a fundamental link in the evidence chain and needs to be tested. A second site offers an independent starting point for doing so. A large number of bullae (sealed clay lumps) bearing e.g. the sealings of Šamši-Adad I, king of Upper Mesopotamia, and ruler of Aššur between REL 165 and his death in REL 197 (a reign lasting 33 or 34 years), were found at the Sarıkaya Palace at 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 I would be dead 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 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 (...) This importantly 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 ^{14}C 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-^{14}C 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-^{14}C dated constraints from the site of Acemhöyük, and also simultaneously creates a plausible historical linkage for the approximately associated dendrochronological-^{14}C 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-^{14}C 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-^{14}C 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.

It can be seen that, 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 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)*. 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 Šamšî-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), actually 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-ṣilli-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 Mari[44]. Consequently, for the Assyrian copyist 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 32

BCE	N°	Assyrian eponym	[A]	[B]	[C]	[D]	[E]	[F]	[G]	
1702	177	Dadaya	**14**	**11**	**15**	**25**		20	3	[A] **Yahdun-Lîm** king of Mari
1701	178	Ennam-[Aššur?]	**15**	**12**	**16**	**26**		20	4	[B] **Šamšî-Adad I** king of Assyria
1700	179	[?]-Aššur	**16**	**13**	**17**	**27**		21	1	[C] **Sîn-muballiṭ** king of Babylon
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	Accession of Hammurabi
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	
1694	185	Ennam-Aššur	**3**	**19**	**3**	**33**		1	7	[C] **Hammurabi** king of Babylon
1693	186	Suen-muballiṭ	**4**	**20**	**4**	**34**		2	8	[D] **Rîm-Sîn I** king of Larsa
1692	187	Rēš-Šamaš	**5**	**21**	**5**	**35**		3	9	[F] **Yantin-Ammu** king of Byblos
1691	188	Ibni-Adad	**6**	**22**	**6**	**36**		4	10	[G] **Neferhotep I** king of Egypt
1690	189	Aššur-imittī	**7**	**23**	**7**	**37**		5	11	
1689	190	Ilī-ellatī	**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	**Ṭab-ṣilli-Aššur**	**7**	**33**	**17**	**47**	5	15	1	Death of Šamšî-Adad I
1679	200	Ennam-Aššur	**1**	**1**	**18**	**48**	6	16	2	[A] **Zimrî-Lîm** king of Mari
1678	201	Aššur-emūqī	**2**	**2**	**19**	**49**	7	17		[B] **Išme-Dagan I** king of Assyria
1677	202	Abu-šalim	**3**	**3**	**20**	**50**	8	18		
1676	203	Puṣṣānum	**4**	**4**	**21**	**51**	9	19		
1675	204	Ikūn-pī-Ištar	**5**	**5**	**22**	**52**	10	20		
1674	205	Ahiyaya	**6**	**6**	**23**	**53**	11	21		
1673	206	Bēliya	**7**	**7**	**24**	**54**	12	22		
	207	Ilī-bāni		**8**						(*34 Assyrian years = 33 Babylonian years*)
1672	208	Aššur-taklāku	**8**	**9**	**25**	**55**	13	23		
1671	208	Sassāpum	**9**	**10**	**26**	**56**	14	24		
1670	209	Ahu-waqar	**10**	**11**	**27**	**57**	15	25		
1669	210	Kizurum	**11**	**1**	**28**	**58**	16	1		[B] **Aššur-dugul** king of Assyria
1668	211	Dādiya	**12**	**2**	**29**	**59**	17	2		
1667	212	Yam-aha?	**13**	**3**	**30**	**60**	18	3		Larsa is annexed by Hammurabi

[44] 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).

1666	213	Adad-bāni	**1**	**4**	**31**	[1]	19	4		[**A**] **Yâpaḫ-Šumu-Abu** king of Mari
1665	214	Ennam-Aššur	**2**	**5**	**32**	[2]	20	5		Mari is destroyed by Hammurabi
1664	215	Attaya	**3**	**6**	**33**	[3]		6		

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 Sarıkaya 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 ^{14}C 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 with regard to 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.

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 is in agreement 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 (similar to 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 Egypt[45] (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 33

Strata	Period	#1	#2	**Egyptian Dynasty**	Vizier	**Asiatic Dynasty**	Capital
MB IIA	1975–**1778**			**12** (Lisht/ [Memphis])	Yes		
MB IIB	**1778**–*1750*			**13** (Lisht/ [Memphis])	Yes		
	1750–1680				Yes	**14** (Hyksos)	Tanis
MB IIC	**1680**–1613	400	68	(Thebes)	-	**15** (Great Hyksos)	Avaris
	1613–**1572**		40		-	Apopi	
	1572–1544			**17** (Thebes)	-	**16** (Theban kings)	Edfu?
	1544–**1533**			Seqenenre Taa	-		
LB AI	**1533**–1530			Kamose	-	(‘*War of the Hyksos*’)	
	1530 –			**18** (Thebes)			
	–1505			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 surprising[46]. 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 documentation[47]. 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. Given that the historical sequence of kings of Byblos is known[48] (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). The following chronological reconstruction shows that the agreement between

[45] 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).

[46] 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.

[47] 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.

[48] 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.

reign 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 34

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

It can be seen that 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 35

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}C*	Ibni-Addu	1685–1665	^{14}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) is in agreement 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}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 I[49]. 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 (^{14}C date) and dates deduced from astronomy (Astro date). This date difference (D14 = ^{14}C 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 earlier[50]. 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 well[51]. 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] Chenephres[52] (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**), with the exception of 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

[49] 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. In spite of 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. Sobekhotep IV, whose reign marks the apex of the 13th Dynasty, mentions on a stela (Cairo JE 51911) that was placed in the temple of Amun at Karnak that he was born in Thebes.

[50] 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.

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

[52] 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)[53] 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 years[54] 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 *Sekemresewadjtawy*	4 years 2 m.	*1749-1742*	**27**	+44	+19	1705-1701
	22	Neferhotep I *Khasekhemre*	11 years 4 m.	*1742-1731*		+41	+16	1701-1690
	23	Sihathor *Menwadjre*	0 years X m.	*1732-1732*		+42	+17	1690-1690
	24	**Sobekhotep IV** *Khaneferre*	**9** II Akhet 3	*1732-1720*		+42	+17	1690-1681
(15)	25	Sobekhotep V *Merhotepre*	[3] years	*1720-1717*		+39	+14	1681-**1679**
	26	Sobekhotep VI *Khahotepre*	4 years 8 m.	*1717-1712*	**400**	**108**	+13	**1679**-1676
	27	Ibiaw *Wahibre*	10 years 8 m.	*1712-1701*			+11	1676-1665

The relatively short duration of the majority 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 brother[55]. Paralleling ^{14}C dates (Bronk Ramsey, Dee, Rowland, Higham, Harris, Brock, Quiles, Wild, Marcus, Shortland: 2010, 1554-1557) with astronomy-based dates.

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*
	14	Hor I	[4] years	*1777-1775*		+45	+20	*1732-1728*
	15	Amenemhat VII	[4] years	*1769-1766*		+41	+16	*1728-1724*

[53] 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.

[54] (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).

[55] 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]).

	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	Ahmose (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	Ahmose (^{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

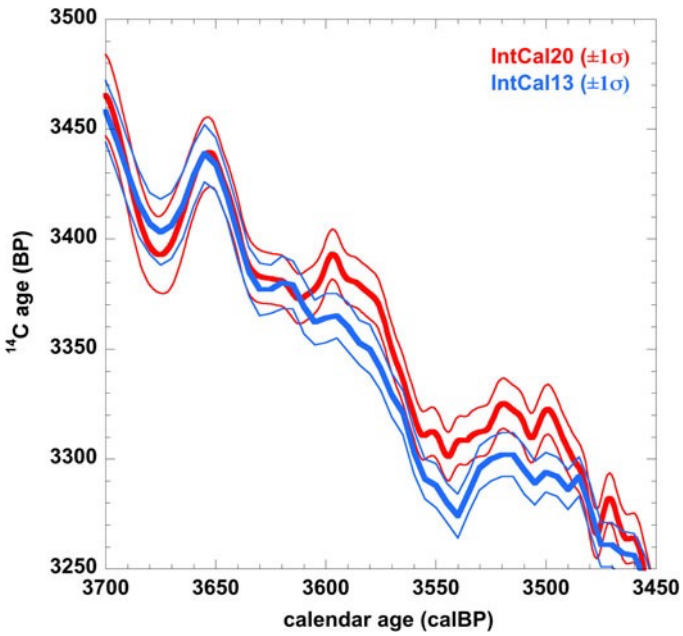
The dating of the reign of Neferhotep I (1701-1690) anchored on the absolute chronology confirms: 1) the quadruple synchronism between Hammurabi (**1697-1654**) and Neferhotep I.

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 +/- 25 BCE by ^{14}C. However, as the accuracy of the ^{14}C measurements had been improved to +/- 8 years (instead of +/- 25

years), it was no longer possible to match the two dates, which were approximately 18 years apart (= 1945 BCE - 1927 BCE). This conundrum was solved recently: it had to be admitted that the calibration curve of the ^{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 14C 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 taking into account the internal measurement processes only. When an assemblage of dates is then formed, it frequently becomes apparent that the scatter in the results from the individual laboratory is greater than had been imagined given the quoted uncertainties on the individual measurements (...) This development led to major ^{14}C (re)dating efforts of wood dated by dendrochronology for the relevant time range (...) The result is that indeed between ca. 3600 and 3500 calBP the calibration curve needs a shift of about 20 BP upwards in ^{14}C age, as can be seen in the figure (opposite). By itself, this confirms the original observation by Pearson et al. (2018) and so, after calibration, the calendar dates will, therefore, become younger by a certain amount (...) Summarized, the ^{14}C date of the eruption can be taken as 3350 ± 10 BP (1-σ), 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 14C 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-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.



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).

All Mesopotamian synchronisms over the period 2040-1050

BCE	URUK IV		MARI				ASSYRIA		ELAM	
2040	Puzur-ili	3	Išdub-El	9			Hayâni	*12*	Ḫita (AWAN)	*25*
2039		4		10				*13*	Puzur-Inšušinak	*1*
2038		**5**	n°6	11			n°21	*14*	n°12/n°1	*2*
2037	Ur-Utu	1	Iškun-Addu	1			Ilu-Mer	*1*		*3*
2036		2		2				*2*		*4*
2035		3		3				*3*		*5*
2034		4		4				*4*		*6*
2033		5		5				*5*		*7*
2032		**6**		6				*6*		*8*
2031	Utu-hegal	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**	**0**		10				*4*	/[king? of SUSA]	*20*
2019	Ur-Nammu	1		11				*5*		*21*
2018	n°1	2		12				*6*		*22*
2017		3		13				*7*		*23*
2016		4		14				*8*		*24*
2015		5		15				*9*	n°2	*25*
2014		6		16				*10*	[Ḫie?]-lu	*1*
2013		7		17				*11*		*2*
2012		8		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*	(SIMAŠKI)	3
1986		16		4				*10*		4
1985		17		5				*11*		5
1984		18		6				*12*		6
1983		19		7				*13*		7
1982		20		8			n°25	*14*		8
1981		21		9			Ila-kabkabû	*1*		9
1980		22		10				*2*		10
1979		23		11				*3*		11

1978		24	n°10	12				*4*		12
1977		25	Turâm-	1				*5*		13
1976		26	Dagan	2				*6*		14
1975		27		3				*7*		15
1974		28		4				*8*		16
1973		29		5				*9*		17
1972		30		6				*10*		18
1971		31		7				*11*		19
1970		32		8				*12*		20
1969		33		9				*13*		21
1968		34		10			n°26	*14*		22
1967		35		11			Amînum	*1*		23
1966		36		12				*2*		24
1965		37		13				*3*		25
1964		38		14				*4*		26
1963		39		15				*5*		27
1962		40		16				*6*		28
1961		41		17				*7*		29
1960		42		18				*8*		30
1959		43		19				*9*		31
1958		44	n°11	20				*10*		32
1957		45	Puzur-Eštar	1				*11*		33
1956		46		2				*12*		34
1955		47		3				*13*	n°2	35
1954	n°3	**48**		4			n°27	*14*	Tazitta I/Ebarat I	**36**
1953	Amar-Sîn	1		5			Sulili	*1*	SIMAŠKI	*2*
1952		2		6				*2*		*3*
1951		3		7				*3*		*4*
1950		4		8				*4*		*5*
1949		5		9				*5*		*6*
1948		6		10				*6*		*7*
1947		7		11				*7*		*8*
1946		8		12				*8*		*9*
1945	n°4	**9**		13				*9*		*10*
1944	Šu-Sîn	1		14				*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-luḫḫan	*1*
1923		13	**ISIN**	**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				12		20		*2*		*4*
1910				13	n°2	**21**		*3*		*5*
1909				14	Iemṣium	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			Šû-ilîšu	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-Dagân	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-Dagân	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				19		7			34		*15*
1839			n°5	**20**		8			35		*16*
1838			Lipit-Eštar	1	n°5	**9**			36		*17*
									37		
1837				2	Gungunum	1			38		*18*
1836				3		2			39		*19*
1835				4		3	n°34	0	40		*20*
1834				5		4	Ikunum	**1**	1	Temti-Agun I	*1*
1833				6		5		**2**	2		*2*
1832				7		6		**3**	3		*3*
1831				8		7		**4**	4		*4*
1830				9		8		**5**	5		*5*
1829				10		9		**6**	6		*6*
1828			n°6	**11**		**10**		**7**	7		*7*
1827			Ur-Ninurta	**1**		**11**		**8**	8		*8*
1826				2		12		**9**	9		*9*
1825				3		13		**10**	10		*10*
1824				4		14		**11**	11		*11*
1823				5		15		**12**	12		*12*
1822				6		16		**13**	13		*13*
1821				7		17	n°35	**14**	**14**		*14*
1820				8		18	Sargon I	**15**	1		*15*
1819				9		19		**16**	2		*16*
1818				10		20		**17**	3		*17*
1817				11		21		**18**	4		*18*
1816				12		22		**19**	5		*19*
1815				13		23		**20**	6		*20*
1814				14		24		**21**	7	Pala-iššan	*1*
1813				15		25		**22**	8		*2*
1812				16		26		**23**	9		*3*
1811				17	n°6	**27**		**24**	10		*4*
1810				18	Abî-sarê	1		**25**	11		*5*
1809				19		2		**26**	12		*6*
1808				20		3		**27**	13		*7*
1807				21		4		**28**	14		*8*
1806				22		5		**29**	15		*9*
1805				23		6		**30**	16		*10*
								31	17		
1804				24		7		**32**	18		*11*
1803				25		8		**33**	19		*12*
1802				26		9		**34**	20		*13*
1801				27		10		**35**	21		*14*
1800			n°7	**28**	n°7	**11**		**36**	22		*15*
1799	**BABYLON**	0	Bûr-Sîn	**1**	Sumu-El	**1**		**37**	23		*16*
1798	Sumu-abum	1		2		2		**38**	24		*17*
1797	n°1	2		3		3		**39**	25		*18*
1796		3		4		4		**40**	26		*19*
1795		4		5		5		**41**	27		*20*
1794		5		6		6		**42**	28	Kuk-Kirmaš	*1*
1793		6		7		7		**43**	29		*2*
1792		7		8		8		**44**	30		*3*
1791		8		9		9		**45**	31		*4*

1790		9		10		10		**46**	32		*5*
1789		10		11		11		**47**	33		*6*
1788		11		12		12		**48**	34		*7*
1787		12		13		13		**49**	35		*8*
1786		13		14		14		**50**	36		*9*
1785	n°2	**14**		15		15		**51**	37		*10*
1784	Sumu-la-Il	1		16		16		**52**	38		*11*
1783		2		17		17		**53**	39		*12*
1782		3		18		18	n°36	**54**	**40**		*13*
1781		4		19		19	Puzur-Aššur II	**55**	1		*14*
1780		5		20		20		**56**	2		*15*
1779		6	n°8	**21**		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-Naḫudi	*1*
1773		12	Erra-imittî	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	n°10	**7**		4		**70**	8		*8*
1766		19	Enlil-Bâni	1		5		**71**	9		*9*
1765		20		2		6		**72**	10		*10*
1764		21		3		7		**73**	11		*11*
1763		22		4		8		**74**	12		*12*
1762		23		5		9		**75**	13		*13*
1761		24		6		10		**76**	14		*14*
1760		25		7		11		**77**	15		*15*
1759		26		8		12		**78**	16		*16*
1758		27		9		13		**79**	17		*17*
1757		28		10		14		**80**	18		*18*
1756		29		11		15		**81**	19		*19*
1755		30		12	n°9	**16**		**82**	20		*20*
1754		31		13	Sîn-iddinam	1		**83**	21	Kuk-Našur I	*1*
1753		32		14		2		**84**	22		*2*
1752		33		15		3		**85**	23		*3*
1751		34		16		4		**86**	24		*4*
1750		35		17		5		**87**	25		*5*
1749	n°3	**36**		18		6		**88**	26		*6*
1748	Sâbium	1		19	n°10	**7**		**89**	27		*7*
1747		2		20	Sîn-irîbam	1		**90**	28		*8*
1746		3		21	n°11	**2**		**91**	29		*9*
1745		4		22	Sîn-iqišam	1		**92**	30		*10*
1744		5		23		2		**93**	31		*11*
1743		6	n°11	**24**		3		**94**	32		*12*
1742		7	Zambîya	1		4		**95**	33		*13*
1741		8		**2**	n°12	**5**		**96**	34		*14*
1740		9	n°12	3	Silî-Adad	**1**		**97**	35		*15*
1739		10	Iter-piša	1	Warad-Sîn	1		**98**	36		*16*
					n°13			**99**	37		
1738		11		2		2		**100**	38		*17*
1737		12		3		3		**101**	39		*18*
1736		13	n°13	**4**		4		**102**	40		*19*
1735	n°4	**14**	Ur-dukuga	1		5		**103**	41		*20*
1734	Apil-Sîn	1		2		6		**104**	42	Atta-ḫušu	*1*
1733		2		3		7		**105**	43		*2*
1732		3	n°14	**4**		8		**106**	44		*3*
1731		4	Sîn-mâgir	1		9		**107**	45		*4*

1730		5		2		10	**108**	46		*5*
1729		6		3		11	**109**	47		*6*
1728		7		4		12	**110**	48		*7*
1727		8		5	n°14	**13**	**111**	49		*8*
1726		9		6	Rîm-Sîn I	1	**112**	50		*9*
1725		10		7		2	**113**	51		*10*
1724		11		8		3	**114**	52		*11*
1723		12		9		4	**115**	53		*12*
1722		13		10		5	n°38 **116**	**54**		*13*
1721		14	n°15	**11**		6	Erišu II **117**	1		*14*
1720		15	Damiq-ilîšu	1		7	**118**	2		*15*
1719		16		2		8	**119**	3		*16*
1718		17		3		9	**120**	4		*17*
1717	(n°5)	**18**	**HANA**	4		10	**121**	5		*18*
1716	Sîn-muballiṭ	1	Yahdun-Lîm	5		11	**122**	6		*19*
1715		2	1	6		12	**123**	7		*20*
1714		3	2	7		13	**124**	8	Širuk-tuḫ	*1*
1713		4	3	8		14	**125**	9		*2*
1712		**5**	4	9		15	n°39 **126**	**10**		*3*
1711		6	5	10		16	Šamšî-Adad I	1		*4*
1710		7	6	11		17	**128**	2		*5*
1709		8	7	12		18	**129**	3		*6*
1708		9	8	13		19	**130**	4		*7*
1707		10	9	14		20	**131**	5		*8*
1706		11	10	15		21	**132**	6		*9*
							133	7		
1705		12	11	16		22	**134**	8		*10*
1704		13	12	17		23	**135**	9		*11*
1703		14	13	18		24	**136**	10		*12*
1702		15	14	19		25	**137**	11	(Egypt)	*13*
1701		16	15	20		26	**138**	12	*Neferhotep I*	*14*
1700		17	16	21		27	**139**	13	1	*15*
1699		18	**17**	22		28	**140**	14	2	*16*
1698		19	1	**23**		29	**141**	15	3	*17*
1697	n°6	**20**	**MARI**	**2**		30	**142**	16	4	*18*
1696	**Hammurabi**	1	Samsî-Addu	1		31	**143**	17	5	*19*
1695	(Byblos)	2		2		32	**144**	18	6	*20*
1694	*Yantin-Ammu*	**3**		3		33	**145**	19	Siwe-palar-ḫuppak	*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-	1		41	**153**	27	(Hazor)	*9*
1685	*10*	12	Addu	2		42	**154**	28	*Ibni-Addu*	*10*
1684	*11*	13		3		43	**155**	29	*1*	*11*
1683	*12*	14		4		44	**156**	30	*2*	*12*
1682	*13*	15		5		45	**157**	31	*3*	*13*
1681	*14*	16		6		46	**158**	32	*4*	*14*
1680	*15*	**17**		**7**		**47**	n°40 **159**	**33**	*5*	*15*
1679	*16*	18	Zimrî-Lîm	1		48	Išme-Dagan I **1**	1	*6*	*16*
1678	*17*	19		2		49	**2**	2	*7*	*17*
1677	*18*	20		3		50	**3**	3	*8*	*18*
1676	*19*	21		4		51	**4**	4	*9*	*19*
1675	*20*	22		5		52	**5**	5	*10*	*20*
1674	*21*	23		6		53	**6**	6	*11*	*21*
1673	*22*	24		7		54	**7**	7	*12*	*22*
							8	8		
1672	*23*	25		8		55	**9**	9	*13*	*23*
1671	*24*	26		9		56	**10**	10	*14*	*24*
1670	*25*	27		10		57	**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	Yapaḫ-šumu-	1				**15**	4	*19*	*4*
1665		32	Abu	2				**16**	5	*20*	*5*
1664		33		3			n°41	**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-Naḫḫunte I	*1*
1643		11		18				**38**	11		*2*
1642		12		19				**39**	12		*3*
1641		13		20				**40**	13		*4*
1640		14		21				**41**	14		*5*
								42	15		
1639		15		22				**43**	16		*6*
1638		16		23			n°50	**44**	**17**		*7*
1637		17		24			Šarma-Adad I	**45**	1		*8*
1636		18		25				**46**	2		*9*
1635		19	n°2	**26**				**47**	3		*10*
1634		20	Agum I	1				**48**	4		*11*
1633		21		2				**49**	5		*12*
1632		22		3				**50**	6		*13*
1631		23		4				**51**	7		*14*
1630		24		5				**52**	8		*15*
1629		25		6				**53**	9		*16*
1628		26		7				**54**	10		*17*
1627		27		8	**SEALAND**			**55**	11		*18*
1626		28		9	Ilî-ma-ilu	*1*	n°51	**56**	**12**		*19*
1625		**29**		10		*2*	Puzur-Sîn	**57**	1		*20*
1624		30		11		*3*		**58**	2		*21*
1623		31		12		*4*		**59**	3		*22*
1622		32		13		*5*		**60**	4		*23*
1621		33		14		*6*		**61**	5		*24*
1620		34		15		*7*		**62**	6		*25*
1619		35		16		*8*		**63**	7	Temti-Agun II	*1*
1618		36		17		*9*		**64**	8		*2*
1617		37		18		*10*		**65**	9		*3*
1616	n°8	**38**		19		*11*		**66**	10		*4*
1615	Abi-ešuḫ	1		20		*12*		**67**	11		*5*
1614		**2**		21		*13*	n°52	**68**	**12**		*6*
1613		3	n°3	**22**		*14*	Bazaya	**69**	1		*7*
1612		4	Kaštiliaš I	1		*15*		**70**	2		*8*
1611		5		2		*16*		**71**	3		*9*
1610		6		3		*17*		**72**	4		*10*
1609		7		4		*18*		**73**	5		*11*
1608		8		5		*19*		**74**	6		*12*

1607		9		6		*20*	**75**	7		*13*
							76	8		
1606		10		7	Itti-ili-nîbî	*1*	**77**	9		*14*
1605		11		8		*2*	**78**	10		*15*
1604		12		9		*3*	**79**	11		*16*
1603		13		10		*4*	**80**	12		*17*
1602		14		11		*5*	**81**	13		*18*
1601		15		12		*6*	**82**	14		*19*
1600		16		13		*7*	**83**	15		*20*
1599		17		14		*8*	**84**	16		*21*
1598		18		15		*9*	**85**	17		*22*
1597		19		16		*10*	**86**	18		*23*
1596		20		17		*11*	**87**	19		*24*
1595		21		18		*12*	**88**	20		*25*
1594		22		19		*13*	**89**	21	Kutir-Silḫaḫa	*1*
1593		23		20		*14*	**90**	22		*2*
1592		24		21		*15*	**91**	23		*3*
1591		25	n°4	22		*16*	**92**	24		*4*
1590		26	Ušši	1		*17*	**93**	25		*5*
1589		27		2		*18*	**94**	26		*6*
1588	n°9	**28**		3		*19*	**95**	27		*7*
1587	Ammiditana	1		4		*20*	n°53 **96**	**28**		*8*
1586		2		5	Damiq-ilišu	*1*	Lullaya **97**	1		*9*
1585		3		6	II	*2*	**98**	2		*10*
1584		4		7		*3*	**99**	3		*11*
1583		5	n°5	**8**		*4*	**100**	4		*12*
1582		6	Abirattaš	*1*		*5*	**101**	5		*13*
1581		7		*2*		*6*	n°54 **102**	**6**		*14*
1580		8		*3*		*7*	Šû-Ninûa **103**	1		*15*
1579		9		*4*		*8*	**104**	2		*16*
1578		10		*5*		*9*	**105**	3		*17*
1577		11		*6*		*10*	**106**	4		*18*
1576		12		*7*		*11*	**107**	5		*19*
1575		13		*8*		*12*	**108**	6		*20*
1574		14		*9*		*13*	**109**	7		*21*
							110	8		
1573		15		*10*		*14*	**111**	9		*22*
1572		16		*11*		*15*	**112**	10		*23*
1571		17		*12*		*16*	**113**	11		*24*
1570		18		*13*		*17*	**114**	12		*25*
1569		19		*14*		*18*	**115**	13	Kuk-Našur II	*1*
1568		20		*15*		*19*	n°55 **116**	**14**		*2*
1567		21	n°6	*16*		*20*	Šarma-Adad II	1		*3*
1566		22	Kaštiliaš II	*1*	Iškibal	*1*	**118**	2		*4*
1565		23		*2*		*2*	n°56 **119**	**3**		*5*
1564		24		*3*		*3*	Ḫrišu III **120**	1		*6*
1563		25		*4*		*4*	**121**	2		*7*
1562		26		*5*		*5*	**122**	3		*8*
1561		27		*6*		*6*	**123**	4		*9*
1560		28		*7*		*7*	**124**	5		*10*
1559		29		*8*		*8*	**125**	6		*11*
1558		30		*9*		*9*	**126**	7		*12*
1557		31		*10*		*10*	**127**	8		*13*
1556		32		*11*		*11*	**128**	9		*14*
1555		33		*12*		*12*	**129**	10		*15*
1554		34		*13*		*13*	**130**	11		*16*
1553		35		*14*		*14*	**131**	12		*17*
1552		36		*15*		*15*	n°57 **132**	**13**		*18*
1551	n°10	**37**	n°7	*16*		*16*	Šamšî-Adad II	1		*19*
1550	Ammiṣaduqa	**1**	Urzigurumaš	*1*		*17*	**134**	2		*20*
1549		2		*2*		*18*	**135**	3		*21*
1548		3		*3*		*19*	**136**	4		*22*
1547		4		*4*		*20*	**137**	5		*23*

1546		5		*5*	Šušši	*1*	n°58	**138**	**6**		*24*
1545		6		*6*		*2*	Išme-Dagan II		1		*25*
1544		7		*7*		*3*		**140**	2	Kudu-zuluš II	*1*
1543		8		*8*		*4*		**141**	3		*2*
								142	4		
1542		9		*9*		*5*		**143**	5		*3*
1541		10		*10*		*6*		**144**	6		*4*
1540		11		*11*		*7*		**145**	7		*5*
1539		12		*12*		*8*		**146**	8		*6*
1538		13		*13*		*9*		**147**	9		*7*
1537		14		*14*		*10*		**148**	10		*8*
1536		15		*15*		*11*		**149**	11		*9*
1535		16	n°8	*16*		*12*		**150**	12		*10*
1534		17	Ḫurba(šihu)	*1*		*13*		**151**	13		*11*
1533		18		*2*		*14*		**152**	14		*12*
1532		19		*3*		*15*		**153**	15		*13*
1531		20		*4*	Gulkišar	*1*	n°59	**154**	**16**		*14*
1530	n°11	**21**		*5*		*2*	Šamšî-Adad III		1		*15*
1529	Samsuditana	1		*6*		*3*		**156**	2		*16*
1528		2		*7*		*4*		**157**	3		*17*
1527		3		*8*		*5*		**158**	4		*18*
1526		4		*9*		*6*		**159**	5		*19*
1525		5		*10*		*7*		**160**	6		*20*
1524		6		*11*		*8*		**161**	7	Tan-Uli	*1*
1523		7		*12*		*9*		**162**	8		*2*
1522		8		*13*		*10*		**163**	9		*3*
1521		9		*14*		*11*		**164**	10		*4*
1520		10		*15*		*12*		**165**	11		*5*
1519		11	n°9	*16*		*13*		**166**	12		*6*
1518		12	Tiptakzi	*1*		*14*		**167**	13		*7*
1517		13	(Šipta'ulzi)	*2*		*15*		**168**	14		*8*
1516		14		*3*	Pešgaldara-	*1*		**169**	15		*9*
1515		15		*4*	meš	*2*	n°60	**170**	**16**		*10*
1514		16		*5*		*3*	Aššur-nêrârî I		1		*11*
1513		17		*6*		*4*		**172**	2		*12*
1512		18		*7*		*5*		**173**	3		*13*
1511		19		*8*		*6*		**174**	4		*14*
								175	5		
1510		20		*9*		*7*		**176**	6		*15*
1509		21		*10*		*8*		**177**	7		*16*
1508		22		*11*		*9*		**178**	8		*17*
1507		23		*12*		*10*		**179**	9		*18*
1506		24		*13*		*11*		**180**	10		*19*
1505		25		*14*		*12*		**181**	11		*20*
1504		26		*15*		*13*		**182**	12	Temti-ḫalki	*1*
1503		27	n°10	*16*		*14*		**183**	13		*2*
1502		28	Agum II	*1*		*15*		**184**	14		*3*
1501		29		*2*		*16*		**185**	15		*4*
1500		30		*3*		*17*		**186**	16		*5*
1499	*Fall of Babylon*	**31**	1	*4*		*18*		**187**	17		*6*
1498	*resettling of*	2		*5*		*19*		**188**	18		*7*
1497	*Babylon*	3		*6*		*20*		**189**	19		*8*
1496		4		*7*		*21*		**190**	20		*9*
1495		5		*8*		*22*		**191**	21		*10*
1494		6		*9*		*23*		**192**	22		*11*
1493		7		*10*		*24*		**193**	23		*12*
1492		8		*11*		*25*		**194**	24		*13*
1491		9		*12*		*26*		**195**	25		*14*
1490		10		*13*		*27*	n°61	**196**	**26**		*15*
1489		11		*14*		*28*	Puzur-Aššur III		1		*16*
1488		12		*15*		*29*		**198**	2		*17*
1487		13	n°11	*16*		*30*		**199**	3		*18*
1486		14	Burna-Buriaš	*1*	Ayadara-	*1*		**200**	4		*19*
1485		15	I	*2*	galama	*2*		**201**	5		*20*

1484		16		*3*		*3*		**202**	6	Kuk-Našur III	*1*
1483		17		*4*		*4*		**203**	7		*2*
1482		18		*5*		*5*		**204**	8		*3*
1481		19		*6*		*6*		**205**	9		*4*
1480		20		*7*		*7*		**206**	10		*5*
1479		21		*8*		*8*		**207**	11		*6*
								208	12		
1478		22		*9*		*9*		**209**	13		*7*
1477		23		*10*		*10*		**210**	14		*8*
1476		24		*11*	Akurduana	*1*		**211**	15		*9*
1475		25		*12*		*2*		**212**	16		*10*
1474		26		*13*		*3*		**213**	17		*11*
1473		27		*14*		*4*		**214**	18		*12*
1472		28		*15*		*5*		**215**	19		*13*
1471		29	n°12	*16*		*6*		**216**	20		*14*
1470		30	Kaštiliaš III	*1*	Melamkura	*1*		**217**	21		*15*
1469		31		*2*		*2*		**218**	22		*16*
1468		32		*3*		*3*		**219**	23		*17*
1467		33		*4*		*4*	n°62	**220**	**24**		*18*
1466		34		*5*		*5*	Enlil-nâṣir I	**221**	1		*19*
1465		35		*6*		*6*		**222**	2		*20*
1464		36		*7*		*7*		**223**	3	Kidinu	*1*
1463		37		*8*	Ea-gâmil	*1*		**224**	4		*2*
1462		**38**		*9*		*2*		**225**	5		*3*
1461		39		*10*		*3*		**226**	6		*4*
1460		40		*11*		*4*		**227**	7		*5*
1459		41		*12*		*5*		**228**	8		*6*
1458				*13*		*6*		**229**	9		*7*
1457				*14*		*7*		**230**	10		*8*
1456				*15*		*8*		**231**	11		*9*
1455			n°13	*16*		*9*		**232**	12		*10*
1454			Ulam-Buriaš	*1*			n°63	**233**	**13**		*11*
1453				*2*			Nûr-ili	**234**	1		*12*
1452				*3*				**235**	2		*13*
1451				*4*				**236**	3		*14*
1450				*5*				**237**	4		*15*
1449				*6*				**238**	5	Inšušinak-sunkir-	*1*
1448				*7*				**239**	6	nappipir	*2*
1447				*8*				**240**	7		*3*
								241	8		
1446				*9*				**242**	9		*4*
1445				*10*				**243**	10		*5*
1444				*11*			n°64	**244**	11		*6*
1443				*12*			Aššur-šadûni	**245**	**12**		*7*
1442				*13*			Aššur-rabi I	**246**	*1*		*8*
1441				*14*			n°65	**247**	*2*		*9*
1440				*15*				**248**	*3*		*10*
1439			n°14	*16*				**249**	*4*	Tan-Ruḫuratir II	*1*
1438			Agum III	*1*				**250**	*5*		*2*
1437				*2*				**251**	*6*		*3*
1436				*3*				**252**	*7*		*4*
1435				*4*				**253**	*8*		*5*
1434				*5*				**254**	*9*	Šalla	*1*
1433				*6*			n°66	**255**	*10*		*2*
1432				*7*			Aššur-nâdin-	**256**	*1*		*3*
1431				*8*			aḫḫe I	**257**	*2*		*4*
1430				*9*				**258**	*3*		*5*
1429				*10*				**259**	*4*		*6*
1428				*11*				**260**	*5*		*7*
1427				*12*				**261**	*6*		*8*
1426				*13*				**262**	*7*		*9*
1425				*14*				**263**	*8*		*10*
1424				*15*				**264**	*9*	Tepti-aḫar	*1*
1423			n°15	*16*			n°67	**265**	*10*		*2*

1422			Kadašman-	*1*			Enlil-naṣir II	**266**	1		*3*
1421			Harbe I	*2*				**267**	2		*4*
1420				*3*				**268**	3		*5*
1419				*4*				**269**	4		*6*
1418				*5*				**270**	5		*7*
1417				*6*			n°68	**271**	**6**		*8*
1416				*7*			Aššur-nêrârî II		1		*9*
								273	2		
1415				*8*				**274**	3		*10*
1414				*9*				**275**	4		*11*
1413				*10*				**276**	5		*12*
1412				*11*				**277**	6		*13*
1411				*12*			n°69	**278**	**7**		*14*
1410				*13*			Aššur-bêl-	**279**	1		*15*
1409				*14*			nišešu	**280**	2		*16*
1408				*15*				**281**	3		*17*
1407			n°16	*16*				**282**	4		*18*
1406			Kara-indaš	*1*				**283**	5		*19*
1405				*2*				**284**	6		*20*
1404				*3*				**285**	7	Igi-halki	*1*
1403				*4*				**286**	8		*2*
1402				*5*			n°70	**287**	**9**		*3*
1401				*6*			Aššur-rê'im-	**288**	1		*4*
1400				*7*			nišešu	**289**	2		*5*
1399				*8*				**290**	3		*6*
1398				*9*				**291**	4		*7*
1397				*10*				**292**	5		*8*
1396				*11*				**293**	6		*9*
1395				*12*				**294**	7		*10*
1394				*13*			n°71	**295**	**8**		*11*
1393				*14*			Aššur-nâdin-	**296**	1		*12*
1392				*15*			aḫḫe II	**297**	2		*13*
1391			n°17	*16*				**298**	3		*14*
1390			Kurigalzu I	*1*				**299**	4		*15*
1389				*2*				**300**	5		*16*
1388				*3*				**301**	6		*17*
1387				*4*				**302**	7		*18*
1386				*5*				**303**	8		*19*
1385				*6*				**304**	9		*20*
1384				*7*			n°72	**305**	**10**	Pahir-iššan	*1*
							Erîba-Adad I	**306**	1		
1383				*8*				**307**	2		*2*
1382				*9*				**308**	3		*3*
1381				*10*				**309**	4		*4*
1380				*11*				**310**	5		*5*
1379				*12*				**311**	6		*6*
1378				*13*				**312**	7		*7*
1377				*14*				**313**	8		*8*
1376				*15*				**314**	9		*9*
1375			n°18	*16*				**315**	10		*10*
1374			Kadašman-	**1**				**316**	11	Attar-Kittaḫ	*1*
1373			Enlil I	2				**317**	12		*2*
1372				3				**318**	13		*3*
1371				4				**319**	14		*4*
1370				5				**320**	15		*5*
1369				6				**321**	16		*6*
1368				7				**322**	17		*7*
1367				8				**323**	18		*8*
1366				9				**324**	19		*9*
1365				10				**325**	20		*10*
1364				11				**326**	21	Unpaḫaš-Napiriša	*1*
1363				12				**327**	22		*2*
1362				13				**328**	23		*3*

1361				14				**329**	24		*4*
1360			n°19	**15**				**330**	25		*5*
1359			Burna-Buriaš	1				**331**	26	Kidin-Ḫutran I	*1*
1358			II	2			n°73	**332**	**27**		*2*
1357				3			Aššur-uballiṭ I		1		*3*
1356				4				**334**	2		*4*
1355				5				**335**	3		*5*
1354				6				**336**	4	Ḫumban-numena I	*1*
1353				7				**337**	5		*2*
								338	6		
1352				8				**339**	7		*3*
1351				9				**340**	8		*4*
1350				10				**341**	9		*5*
1349				11				**342**	10		*6*
1348				12				**343**	11		*7*
1347				13				**344**	12		*8*
1346				14				**345**	13		*9*
1345				15				**346**	14		*10*
1344				**16**				**347**	15	Untaš-Napiriša	*1*
1343				17				**348**	16		*2*
1342				18				**349**	17		*3*
1341				19				**350**	18		*4*
1340				20				**351**	19		*5*
1339				21				**352**	20		*6*
1338				22				**353**	21		*7*
1337				23				**354**	22		*8*
1336				24				**355**	23		*9*
1335				25				**356**	24		*10*
1334			n°22	26				**357**	25		*11*
1333			Kurigalzu II	**27**				**358**	**26**		*12*
1332				1				**359**	27		*13*
1331				2				**360**	28		*14*
1330				3				**361**	29		*15*
1329				4				**362**	30		*16*
1328				5				**363**	31		*17*
1327				6				**364**	32		*18*
1326				7				**365**	33		*19*
1325				8				**366**	34		*20*
1324				9				**367**	35		*21*
1323				10			n°74	**368**	**36**		*22*
1322				11			Enlil-nênârî	**369**	1		*23*
1321				12				**370**	2		*24*
1320				13				**371**	3		*25*
								372	4		
1319				14				**373**	5		*26*
1318				15				**374**	6		*27*
1317				16				**375**	7		*28*
1316				17				**376**	8		*29*
1315				18				**377**	9		*30*
1314				19			n°75	**378**	**10**		*31*
1313				20			Arik-dên-ili	**379**	1		*32*
1312				21				**380**	2		*33*
1311				22				**381**	3		*34*
1310				23				**382**	4		*35*
1309				24				**383**	5		*36*
1308			n°23	**25**				**384**	6		*37*
1307			Nazi-Maruttaš	1				**385**	7		*38*
1306				2				**386**	8		*39*
1305				3				**387**	9		*40*
1304				4				**388**	10	Kidin-Ḫutran II	*1*
1303				5				**389**	11		*2*
1302				6			n°76	**390**	**12**		*3*
1301				7			Adad-nêrârî I	**391**	1		*4*
1300				8				**392**	2		*5*

1299				9			**393**	3		*6*
1298				10			**394**	4		*7*
1297				11			**395**	5		*8*
1296				12			**396**	6		*9*
1295				13			**397**	7		*10*
1294				14			**398**	8		*11*
1293				15			**399**	9		*12*
1292				16			**400**	10		*13*
1291				17			**401**	11		*14*
1290				18			**402**	12		*15*
1289				19			**403**	13		*16*
1288				20			**404**	14		*17*
							405	15		
1287				21			**406**	16		*18*
1286				22			**407**	17		*19*
1285				23			**408**	18		*20*
1284				24			**409**	19		*21*
1283				25			**410**	20		*22*
1282			n°24	**26**			**411**	21		*23*
1281			Kadašman-	1			**412**	22		*24*
1280			Turgu	2			**413**	23		*25*
1279				3			**414**	24		*26*
1278				4			**415**	25		*27*
1277				5			**416**	26		*28*
1276				6			**417**	27		*29*
1275				7			**418**	28		*30*
1274				8			**419**	29	Napiriša-untaš	*1*
1273				9			**420**	30		*2*
1272				10			**421**	31		*3*
1271				11			n°77 **422**	**32**		*4*
1270				12			Shalmaneser I	1		*5*
1269				13			**424**	2		*6*
1268				14			**425**	3		*7*
1267				15			**426**	4		*8*
1266				16			**427**	5		*9*
1265				17			**428**	6		*10*
1264			n°25	**18**			Collapse of **429**	**7**		*11*
1263			Kadašman-	1			Mitanni **430**	8		*12*
1262			Enlil II	2			**431**	9		*13*
1261				3			**432**	10		*14*
1260				4			**433**	11		*15*
1259				5			**434**	**12**		*16*
1258				6			**1**	13		*17*
1257				7			**2**	14		*18*
1256				8			**580** eponyms **3**	15		*19*
1255			n°26	**9**			to Esarhaddon **4**	16		*20*
1254			Kudur-Enlil	1			**5**	17		*21*
							6	18		
1253				2			**7**	19		*22*
1252				3			**8**	20		*23*
1251				4			**9**	21		*24*
1250				5			**10**	22		*25*
1249				6			**11**	23		*26*
1248				7			**12**	24		*27*
1247				8			**13**	25		*28*
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*
1242				4			n°78 **18**	**30**		*3*
1241				5			Tukultî-Ninurta I	1		*4*
1240				6			**20**	2		*5*
1239				7			**21**	3		*6*
1238				8			**22**	4		*7*

1237				9			**23**	5		*8*
1236				10			**24**	6		*9*
1235				11			**25**	7		*10*
1234				12			**26**	8		*11*
1233			n°28	**13**			**27**	9		*12*
1232			Kaštiliašu IV	1			**28**	10		*13*
1231				2			**29**	11		*14*
1230				3			**30**	12		*15*
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*
			iddina				**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			uṣur	2			**46**	28		*30*
1214				3			**47**	29	Ḫallutaš-Inšušinak	*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			uṣur **67**	2		*21*
1193				24			**68**	3		*22*
			1st Nisannu				= 1st Ṣippu **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-Naḫḫunte	*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-Naḫḫunte II	*1*
1158			šuma-iddina	**1**				**104**	21		*2*
1157			Enlil-nâdin-	1				**105**	22		*3*
1156			aḫi	2				**106**	23		*4*
1155			n°37	**3**				**107**	24		*5*
1154			Marduk-	1				**108**	25	Šilhak-Inšušinak	*1*
1153			kabit-aḫḫešu	2				**109**	26		*2*
1152				3				**110**	27		*3*
1151				4				**111**	28		*4*
1150				5				**112**	29		*5*
1149				6				**113**	30		*6*
1148				7				**114**	31		*7*
1147				8				**115**	32		*8*
1146				9				**116**	33		*9*
1145				10				**117**	34		*10*
1144				11				**118**	35		*11*
1143				12				**119**	36		*12*
1142				13				**120**	37		*13*
1141			n°38	**14**				**121**	38		*14*
1140			Itti-Marduk-	1				**122**	39		*15*
1139			balaṭu	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**			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		Šilḫinahamru-		*1*
1103			apli	2				**158**	12		Lagamar		*2*
1102				3				**159**	13				*3*
1101			n°42	**4**				**160**	14				*4*
1100			Marduk-	1				**161**	15				*5*
1099			nâdin-aḫḫê	2				**162**	16				*6*
1098				3				**163**	17				*7*
1097				4				**164**	18				*8*
1096				5				**165**	19				*9*
1095				6				**166**	20				*10*
1094				7				eponym **166**	21				*11*
1093				8				Adad-apla-iddina	22				*12*
1092				9				**168**	23				*13*
1091				10				**169**	24				*14*
1090				11				**170**	25				*15*
1089				12				**171**	26				*16*
1088				13				**172**	27				*17*
1087				14				**173**	28				*18*
1086				15				**174**	29				*19*
1085				16				**175**	30				*20*
1084				17				**176**	31				*21*
1083			n°43	**18**				**177**	32				*22*
1082			Marduk-aḫḫê-	1				**178**	33				*23*
1081			erîba	2				**179**	34				*24*
1080				3				**180**	35				*25*
1079				4				**181**	36		Ḫumban-numena II		*1*
1078				5				**182**	37				*2*
1077				6				**183**	38				*3*
1076				7				n°88 **184**	**39**				*4*
1075				8				Ašared-apil-Ekur	1				*5*
1074				9				n°89 **186**	**2**				*6*
1073				10				Aššur-bêl-kala	1				*7*
1072				11				**188**	2				*8*
1071				12				**189**	3				*9*
1070			n°44	**13**				**190**	4				*10*
1069			Adad-apla-	1				**191**	5				*11*
1068			iddina	2				**192**	6				*12*
1067				3				**193**	7				*13*
1066				4				**194**	8				*14*
1065				5				**195**	9				*15*
1064				6				**196**	10				*16*
1063				7				**197**	11				*17*
1062				8				**198**	12				*18*
1061				9				**199**	13				*19*
1060				10				**200**	14				*20*
1059				11				**201**	15				*21*
1058				12				**202**	16				*22*
1057				13				**203**	17				*23*
1056				14				n°90 **204**	**18**				*24*
1055				15				Erîba-Adad II	1				*25*
1054				16				n°91 **206**	**2**				*26*
1053				17				Šamšî-Adad IV	1				*27*
1052				18				**208**	2				*28*
1051				19				**209**	3				*29*
1050				20				n°92 **210**	**4**				*30*

Bibliography

Banjević, Boris
2006: Ancient Eclipses and Dating the Fall of Babylon, in: *Publ. Astron. Obs. Belgrade* N° 80.

Barjamovic, Gojko /Hertel, Thomas /Larsen, Mogens Trolle
2012: Ups and Downs at Kanesh. Chronology, History and Society in the Old Assyrian Period in: *PIHANS* CXX.

Ben-Tor, Daphna
2007 Scarabs, Chronology, and Interconnections: Egypt and Palestine in the Second Intermediate Period, in: *Orbis Biblicus et Orientalis* 27.
2009: Can Scarabs Argue for the Origin of the Hyksos, in: *Journal of Ancient Egyptian Interconnections* 1:1.

Ben-Tor, Amnon
2004: Hazor and Chronology, in: *Âgypten und Levante/Egypt and the Levant* Vol. 14.
2016: Hazor. Canaanite Metropolis, Israelite City.

Bietak, Manfred
1991: Egypt and Canaan During the Middle Bronze Age, in: *BASOR* 281.

Bloch, Yigal
2010: Solving the Problems of the Assyrian King List: Toward a Precise Reconstruction of the Middle Assyrian Chronology in: *Journal of Ancient Civilizations* Vol. 25.
2010b: The Order of Eponyms in the Reign of Tukultî-Ninurta I, in: *Orientalia* 79:1.
2010c: The Period of Activity of the Scribal Family of the Sons of Ninurta-uballissu in Aššur, in NABU 2010-2.
2012: Studies in Middle Assyrian Chronology and Its Implications for the History of the Ancient Near East in the 13th Century B.C.E. (PhD Hebrew University of Jerusalem).

Boivin, Odette
2018: The First Dynasty of the Sealand in Mesopotamia, in *Studies in Ancient Near Eastern Records* 20.

Brinkman, John A.
1976: Materials and Studies for Kassite History Vol. I.

Bronk Ramsey, Christopher /Dee, Michael W. /Rowland, Joanne M. /Higham, Thomas F. G. /Harris, Stephen A. /Brock, Fiona /Quiles, Anita /Wild, Eva M. /Marcus, Ezra S. /Shortland, Andrew J.
2010: Radiocarbon-Based Chronology for Dynastic Egypt, in: *Science* Vol 328.

Bryce, Trevor
2005: The Kingdom of the Hittites.

Cancik-Kirschbaum, Eva C.
1996: Zu den Eponymenfolgen des 13.Jahrhunderts v. Chr. in Dûr-Katlimmu in: *Berichte der Ausgrabung Tall Seh Hamad* 4.

Cancik-Kirschbaum, Eva C. / Johnson, J. Cale
2011-2012: Middle Assyrian Calendrics, in: *State Archives of Assyria Bulletin* XIX.

Charpin, Dominique
1997: Rapport sur les conférences 1995-1996, in: *Livret* 11 1995-1996 (EPHE).
2008: Mari au III^{e} millénaire d'après les sources écrites, in: *Supplément au dictionnaire de la Bible*. Fas 77-78.
2011: Le « pays de Mari et des Bédouins » à l'époque de Samsu-iluna de Babylone, in: *Revue d'Assyriologie et d'archéologie orientale* Vol. 105.

Charpin, Dominique /Ziegler, Nele
2003: Florilegium marianum V. Mari et le Proche-Orient à l'époque amorrite, in: *Mémoires de NABU* 6.

De Jong, Teije
2012-2013: Astronomical Fine-tuning of the Chronology of the Hammurabi Age, in: *Jaarbericht* N° 44.

Desroches Noblecourt, Christiane
1996: Ramsès II la véritable histoire.

Dessoudeix, Michel
2008: Chronique de l'Egypte ancienne.

Dodson, Aidan /Hilton, Dyan
2010: The Complete Royal Families of Ancient Egypt.

Durand, Jean-Marie
2012: Sargon a-t-il détruit la ville de Mari ?, in: Revue d'assyriologie et d'archéologie orientale 106:1.

Finkelstein, Israel /Piasetzky, Eli
2011: The Iron Age Chronology Debate: Is the Gap Narrowing?, in: *Near Eastern Archaeology* 74:1.

Franke, Detlef
2013: The 13th to 17th Dynasties: chronological framework, in: *Egyptian Stelae in the British Museum from the 13th to 17th Dynasties* Vol I:1.

Freu, Jacques
2003: Histoire du Mitanni.
2008: Note sur les sceaux des rois de Mitanni/Mittani, in: *Nouvelles Assyriologiques Brèves et Utilitaires* (mars).

Freu, Jacques /Mazoyer, Michel
2007: Des origines à la fin de l'Ancien royaume hittite.

Freu, Jacques /Mazoyer, Michel /Klock-Fontanille, Isabelle
2007: Des origines à la fin de l'ancien royaume hittite

Gasche, Hermann
2003: La fin de la première dynastie de Babylone: une chute difficile, in: Akkadica 124.

Gasche, Hermann /Armstrong J.A. /Cole S.W.
1998: Dating the Fall of Babylon in: Mesopotamian History and Environment.

Gasche, Hermann / Armstrong J.A. /Cole S.W. / Gurzadyan Vahe G.
1998: A correction to Dating the Fall of Babylon in: *Akkadica* 108.

Gerstenblith, Patty
1983: The Levant at the Beginning of the Middle Bronze Age.

Glassner, Jean-Jacques
2004: Chroniques mésopotamiennes.

Goetze, Albrecht
1964: The Kassites and near Eastern Chronology, in: *Journal of Cuneiform Studies* 18:4.

Gordon, Cyrus H. /Rendsburg, Gary A.
2002: Eblaitica: Essays on the Ebla Archives and Eblaite Language.

Gorny, Ronald L.
2006-2007: Çadir Höyük, in: 2006-2007 Annual Report.

Grayson, Albert Kirk
1991: Assyrian Rulers of the Early First Millennium BC I (1114-859 BC) in: *The Royal inscriptions of Mesopotamia. Assyrian periods*; Vol 2.
2000: Assyrian and Babylonian Chronicles.

Gurzadyan, Vahe G.
2000: On the Astronomical Records and Babylonian Chronology, in: *Akkadica* 119-120.
2003: The Venus Tablet and Refraction, in: *Akkadica* 124.

Heimpel, Wolfgang
2003: Letters to the King of Mari: A New Translation, With Historical Introduction, Notes, and Commentary.

Jeffers, Joshua
2017: The Nonintercalated Lunar Calendar of the Middle Assyrian Period, in: *Journal of Cuneiform Studies* 69.

Joannès, Francis
2001:Dictionnaire de la civilization mésopotamienne.

Khalisi Emil
2020: The Double Eclipse at the Downfall of Old Babylon.

Langdon, Stephen Herbert
1923: Oxford editions of cuneiform texts.

Liverani, Mario
2013: The Ancient Near East: History, Society and Economy.

Mahieu, Bieke
2018: The Old and Middle Assyrian Calendars, and the Adoption of the Babylonian Calendar by Tiglath-pileser I, in *State Archives of Assyrian Bulletin* XXIV.

Manning, Sturt W. /Griggs, Carol B. /Lorentzen, Brita /Barjamovic, Gojko /Ramsey, Christopher Bronk /Kromer, Bernd /Wild, Eva Maria
2016: Integrated Tree-Ring-Radiocarbon High-Resolution Timeframe to Resolve Earlier Second Millennium BCE Mesopotamian Chronology, in: PLOS ONE.

Margueron, Jean-Claude/ Pfirsch, Luc
2012: Le Proche-Orient et l'Égypte antique.

McAneney Jonny /Baillie Mile
2019: Absolute tree-ring dates for the Late Bronze Age eruptions of Aniakchak and Thera in light of a proposed revision of ice-core chronologies, in: *Antiquity* 93.

Michel, Cécile
2001: Correspondance des marchands de Kaniš au début du Ier millénaire avant J.-C., in: LIPO 19.

Michel, Cécile /Rocher, Patrick
1997-2000: La chronologie du IIe millénaire revue à l'ombre d'une éclipse de soleil, in: *Jaarbericht* 35-36.

Nahm, Werner
2018: Testing the MEC: the end of the Lower Diyala State, in NABU 2018-3.
2020: The eponym Enlil-nadin-apli and the capture of Kaštiliaš IV, in NABU 2020-1

Parpola, Simo Kaarlo Antero
1998: The Prosopography of the Neo-Assyrian Empire.
2007: Assyrian Chronology 681-648 BC in: Letters from Assyrian Scholars to the Kings Esarhaddon and Assurbanipal.

Podany, Amanda H.
2014: Hana and the Low Chronology, in: *Journal of Near Eastern Studies* Vol. 73:1.

Polz, Daniel
2010 The Second Intermediate Period, in: *Orientalia Lovaniensia Analecta* 192.

Pritchard, James B.
1969: Ancient Near Eastern Texts.

Pruzsinsky, Regine
2009: Mesopotamian Chronology of the 2nd Millennium B.C. An Introduction to the Textual Evidence and Related Chronological Issues.

Quirke, Stephen
2010: The Second Intermediate Period, in: *Orientalia Lovaniensia Analecta* 192.

Reiner, Erica /Pingree David Edwin
1975: Babylonian Planetary Omens. Part 1. The Venus Tablet of Ammisaduqa.

Rochberg-Halton, Francesca
1988: Aspects of Babylonian celestial divination: the lunar eclipse tablets of Enūma Anu Enlil, in: *Archiv für Orientforschung* 22

Ryholt, Kim S.B.
1997: The Political Situation in Egypt during the Second Intermediate Period.

Sasson, Jack M.
1984: Zimri-Lim Takes the Grand Tour, in: *Biblical Archaeologist* 47.

Schneider, Thomas
1998: Ausländer in Ägypten während des Mittleren Reiches und der Hyksoszeit in: *Ägypten und Altes Testament* 42.

Vallat, François
1999: L'hommage de l'élamite Untash-Napirisha au Cassite Burnaburiash, in: *Akkadica* 114-115.
2000: L'Elam du IIe millénaire et la chronologie courte, in: *Akkadica* 119-120.
2001: Dictionnaire de la civilisation mésopotamienne.
2006: La chronologie méso-élamite et la lettre de Berlin, in: *Akkadica* 127.
2007: Temti-Agun I. Un nouveau sukkalmak, in: *Akkadica* 128.

Vandersleyen, Claude
1995: L'Egypte et la vallée du Nil. Tome 2.

Van der Plicht, Johannes /Bronk Ramsey, Christopher /Heaton, T. J. /Scott, E.M. /Talamo, Sahra
2020: Recent developments in calibration for archaeological and environmental samples, in Radiocarbon.

Veenhof, Klass R.
2002: The Old Assyrian List of Year Eponyms from Karum Kanish and its Chronological Implications.

Veenhof, Klaas R. /Eidem, Jesper
2008: Mesopotamia: Annäherungen, *in Orbis Biblicus et Orientalis* 160/5.

Veenhof, Klass R. / Günbatti, Cahit / Kryszat, Guido
2008: Some displaced Tablets from Kârum Kanesh (Kültepe) /An Eponym List (KEL G) from Kültepe. Teil 3/1 in: *Altorientalische Forschungen* Band 38.

Vernus, Pascal /Yoyotte, Jean
1998: Dictionnaire des pharaons.

Wiener, Malcolm H.
2012: Problems in the measurement, calibration, analysis and communication of radiocarbon dates (with special reference to the prehistory of the Aegean World), in: *Radiocarbon* 54.

Ziegler, Nele /Charpin, Dominique
2001: Mari, in: Dictionnaire de la civilisation mésopotamienne.