

For the past three hundred years the Hebrew Bible, or Tanach¹, has been the subject of intense scrutiny. Few texts generate such extreme passions and prejudices. Researchers are not immune to the propensity to either *under* or *over* criticize this text. It takes many years of dedicated, hard work to master artfully a delicate balance in perspective.

The central issues of concern that must be addressed if we are to unravel history's true Gorgonian-knot, the perplexing puzzles of Jewish antiquity, are the duration of the Jerusalem temples. According in the Talmud,² the First Jerusalem Temple stood for 410 years and Second Temple stood for 420 years (Gittin 88b, Sanhedrin 38a, Yoma 9a, and Yerushalmi Megillah 1, 12).³ Yet, for more than a century it has been firmly established that the first stood for 373 years and the second for 585 years. Using Edwin Thiele's metaphor of chronology as the "backbone" of history,⁴ we might muse that traditional Jewish sources have provided the First Temple period with 37 too many "vertebrae," while the Second Temple period has been deprived of 165.

The Second Temple Era is well documented by the collateral, primary records of Roman consuls, Athenian archons, Olympiads, and sightings of both lunar and solar eclipses. It is, therefore, well established that 165 years are lacking in Talmudic sources and from the resulting Jewish calendar. However, the questions of where, how, and why they are missing intriguing

¹Tanach is an acronym for Torah (first five books of the Bible), Naviim (Prophetic writings), and K'tuvim (Writings, i.e. Ruth, Song of Songs, etc.).

²The Talmud was compiled from the first through the fifth centuries C.E., it recorded and explicated the orally transmitted Jewish traditions and laws.

³ *Talmud Bavli*, ed. Renov, Stahler, Rosenwald, and Perlysky, Schottenstein Edition (New York: Mesorah Publications, Ltd., 2001).

⁴ Edwin R. Thiele, *The Mysterious Numbers of the Hebrew Kings* (Chicago; University of Chicago Press, 1955) 33, 21.

and are worthy of exploration (Part VII). An exposition of the challenges of dating the period from the Exodus through the death of King David (Part VI) and from Solomon through the destruction of Jerusalem (Part V) are included as a complimentary study to the Temple Eras.

The dominant chronological schema used for ancient Near Eastern studies was not established by the early twentieth century Cultural History School, as is commonly believed. Actually, it was developed by Sir Henry C. Rawlinson, who control of the British Museum's collection for forty years, and was published first by him in 1863 in *The Athenæum*. Cuneiform tablets supporting his assertions did not surface until after George Smith, a professional engraver, was befriended by Rawlinson. During Smith's ten years tenure at the British Museum, he "discovered" with dizzying rapidity a stunning quantity of cuneiform inscription – all supporting Rawlinson's theories.

The Cultural History School was heavily influenced by Rawlinson and had full confidence in the authenticity of these discoveries and the validity of the resulting reconstruction of ancient Near Eastern history. Thus, Rawlinson's chronological system has taken on the aura of inerrancy and uncontested scholarly acclaim has elevated it to the equivalency of an academic orthodoxy.⁵

Over the last few decades several sensational, undocumented artifacts have surfaced bringing to public awareness the importance of authenticating unprovenanced artifacts.⁶ The controversies surrounding them have stirred heated debates, and consternations have rippled through all related fields. Scholars and laymen alike are increasingly skeptical of accepting, at face value, artifacts of unknown origins. Yet, other artifacts of equally dubious provenance, such as the SDAS Assyrian kings list that was discovered by Siegfried H. Horn and many inscriptions

⁵Thiele, 69-70.

⁶ The most notably unprovenanced artifacts are the "Jehoash" Inscription (2001) the "James" Ossuary (2002).

presented by Rawlinson and Smith, have been accepted as authentic without testing. Such double standards serve only to inhibit progressive scholarship. For the sake of academic transparency, a comprehensive re-evaluation of the discoveries that compose the basis of Near Eastern history would prove both timely and of academic value.

The foundation of science is the “pursuit of truth.” Periodic re-examination of long-standing theories is essential for candid scholarship.⁷ Without a spirit of openness to new perspectives we risk slipping back into a witch-burning, geocentric, flat world. Thus, the criteria for this task must be firmly rooted in the acumen of twenty-first century scientific methodology.

Due to the complexity of the subject, it is imperative to present the material in lucid and exacting manner. Instead of endless calculations and rationalizations, the approach is schematic. The *Time Tapestry* has been constructed to illustrate Jewish history in an easy to follow, color-coded spreadsheet format. As with any jigsaw puzzle, the solution is valid only the pieces fit smoothly together. *Table A*, an extensive time-line that covers the years from 1476 BCE thru 2075/6 CE, is designed to demonstrate how the components of the puzzle fit together. Each page contains one Jubilee cycle of fifty years and is numbered *A1-A54*. Each row of this “weave” equals one full year. The “warp” of the tapestry correlates the years of various calendar systems, color codes for the season in which the New Year began, to parallel columns of historic events. Astronomical records are the foundation of modern chronology. For each year-line in *Table A*, the first column gives the corresponding year in the nineteen year luni-solar cycle. *Table B*, the Syzygy Finder, correlates the luni-solar cycle with the Spring Equinox. It gives the approximate dates of “dark of the moon,” which precedes the first light of the ancient Near Eastern New Year, the first day of lunar month of Nissan. The margin of error of *Table B* is eliminated by

⁷ Kenneth L. Feder, *Frauds, Myths, and Mysteries: Science and Pseudoscience in Archaeology*, 4th Edition (Boston: McGraw-Hill Mayfield), 17-18.

correlating its dates with the data available on the National Aeronautics and Space Administration (NASA) website. The Assyrian Eponym Canons have been reconstruction on a comparative, vertical time-line in *Table C*. All three tables are correlated through a consistent color coded system.

The following data is essential to better understand the Key.

***In the Time Tapestry each line equals one year.**

Ancient Dating Systems

To solve the problems at hand, a sound understanding of the chronologic methodology is essential.⁸ One must have a working knowledge of the ancient dating systems and the methods used by historians to organize and validate recorded events.

Regal Years

The early historical records correlated events to a given year of the current ruler. For instance, in his fifth regal year (Yr 5) Ramesses II engaged the Hittites at the battle of Qadesh. In the Biblical text, Zerah, the Ethiopian, took power in Egypt and attacked Judah in the fifteenth year (Yr 15) of King Asa. The records of regal years are seldom complete. Since records rarely give the date of birth and death of a monarch, historians must be content with what is termed the “highest attested year” of rule. The Biblical Text does preserve the total years of rule and, for most of the kings of Judah, the kings’ age at coronation and sometimes at death is given. Regal years are counted in with each line representing one year of the king’s life.

⁸ Edwin Thiele called chronology the “backbone” of history.

The Beginning of a Reign

In the ancient Near East, the New Year was celebrated in the spring, on the first of the Babylonian month of Nisanu⁹, which was the traditional coronation day. The custom of counting regal years from the date of the king's official coronation is known as the *Ascension System*. Though the king may have assumed power upon his father's death, during the previous year, his reign did not officially begin until the New Year.

In the *Non-Ascension* or *Ante-dated System*, if a king began to reign before the first of Nissan, even by one day, both the new king and his predecessor included that entire year in his records. Thiele's chronological system correlated the reigns of the kings of ancient Israel and Judah by combining the two systems. In Rosh HaShannah 2a, the Talmud states that all Jewish kings used the Ante-dated System.

Eponym Years

One of the oldest dating systems was the custom of naming a year in honor of an official. This practice of assigning an *eponym* was common in Assyria, Greece and Rome. When the Assyrian cities were excavated, lists of years, named in honor of high ranking officials, were reconstructed from the imperial archives. These remarkable records enlightened the period from 893 BCE to 666 BCE.¹⁰

Each year the Romans elected two consuls to head the government. We have the names of the Roman Consuls from Brutus and Collatinus in 509 BCE, to Basilus in 541 CE. In this

⁹ In the Jewish lunar calendar it is called Nissan, which fluctuates between solar months of March and April.

¹⁰ E. J. Bickerman, *The Chronology of the Ancient World* (London: Thames and Hudson, 1980), p. 67.

amazing collection preserves an important portion of the history of Rome for 1050 continuous years.¹¹ Roman records are correlated with the list of the archons of Athens from 528 BCE thru 292 BCE.¹² In addition, some lists of Olympic champions have also been persevered.¹³

The Alexandrian Connection

After the death of Alexander of Macedon, his expansive empire was divided between his generals. Ptolemy Soter took Egypt and began a new dynasty of Pharaohs. His son, Ptolemy Philadelphus, in 282 BCE commanded his librarian, Demetrius Phalerius, to collect all copies of wisdom and translate them into Greek. Added to this collection was a Greek translation of the Biblical text known as the Septuagint. For 673 years all knowledge of the known world flowed through the great library of Alexandria, Egypt.¹⁴

Rome

Modern Chronology begins with Roman records. Their long, interactive history has been remarkably well preserved. The Romans form a bridge between the Ancient and Medieval

¹¹ Bickerman, pp. 170-192.

¹² Another way of defining a civil year was to begin it at the fixed date, when some major magistrate took office: Hectombeon for the (eponymous) archon in Athens; 15 March for the consuls in Rome, from 222 to 153 BC (Th. Mommsen *RSIR I*, 599); 13 Aiaru for the 'limmu' of the city of Ashur, and so on. This eponymous year became a chronological unit (of variable length by reason of intercalation), but with a definite beginning. The office-year, however, was not the same for all magistrates. The prytany year (divided into tenths) in Athens did not have to coincide with the archon's year (p. 34); similarly, the Roman consuls took office on 15 March and (from 153 BC) on 1 January, but the tribunes began their year on 10 December. The Roman emperors numbered the years of their tribunician power, which was renewed annually. From Augustus to Trajan, the tribunician years were reckoned from the accession; but from Trajan until the Severi, they were numbered from 10 December." (Bickerman, p. 64)

¹³ Bickerman, pp. 67-68.

¹⁴ George Sarton, *Ancient Science* (Cambridge: Harvard University Press, 1959), pp. 126, 477.

Worlds. They primarily used the eponym of a given consulship to date their records. However, on occasions, they also used *Ab urbe condita* (*A.U.C.*), the date of the founding of the city of Rome as an alternative reference point for important events. This epoch was not actually used on a daily bases. Instead, it marked a time distance between events. After careful examination of all related records, scholars have assigned the founding of **Rome** to the year 752 BCE.¹⁵

Diocletian Era

In his first year as Emperor of Rome, Diocletian began to persecute the Christians. He also forced the Egyptians to adopt the Julian calendar. The non-Christian Egyptians resented this foreign calendar, as much as the Christians resented the persecution. The Christian Coptic (lit. Egyptian) Church began counting the “Era of the Martyrs”, otherwise known as the Diocletian Era (**DE**),¹⁶ on 29 August 1037 AUC. The Coptic and Ethiopian Churches have continued this dating system down to the present.¹⁷

The Christian Era

In 247 DioE, Pope John I asked Dionysius Exiguus to compile a new set of tables for determining the date of Easter Sunday. Church tradition required that Easter fall on the first Sunday after the first full moon of the Vernal Equinox. Dionysius used the astronomical tables of the Church of Alexandria for his calculations, but was unwilling to reckon from the reign “of

¹⁵ Bickerman, p. 77.

¹⁶ The Diocletian Era is note as DE in historical text. However, in the Time Tapestry DE refers to the counting from the destruction of the 2nd Temple (summer-dark green column). Here DioE is used for the Diocletian Era.

¹⁷ E. G. Richards, *Mapping Time: The Calendar and its History* (Oxford: Oxford University Press, 1999), pp. 158-9; and Bickerman, pp. 72, 82.

an impious persecutor”, Emperor Diocletian. He devised a new system of counting that he hoped would “unite the world in the sanctity of the Christian Church”.

By using the writings of Clements of Alexandria, Dionysius determined that the twenty-eighth year of Emperor Augustus was the year in which King Herod died. He considered the year preceding Herod’s death as the date of the *ab incarnatione*, the year of gestation. *Anno Domini* “the Year of our Lord”, AD 1 he determined was equal to 754 AUC. He calculated Emperor Augustus’ reign from 13 January 727 AUC, the date on which the Romans gave Augustus the title of Emperor. Classical historians, and even Augustus himself, counted his rule from his victory over Marc Antony at Actium in 3 September 723 AUC. Most scholars believe this to be the origin of Dionysius’ error of four years in his BC/AD system.¹⁸

Dionysius also used the work of Victorius, Bishop of Aquataine, which had been published sixty-seven years earlier. Victorius had discovered that the dates of Easter Sunday, when calculated by the Alexandrian canon, repeated every 532 years.¹⁹ He thought “that 23 March 532 was the date of both a new moon and the vernal equinox. Working backwards, he then found that the first new moon of AD 325 fell on 1 January and that year, which coincidentally was the year of the Council of Nicaea; working even further back, he discovered that 1 BC, the year in which he believed Christ had been born (he was mistaken),²⁰ was also the first year of a cycle. He thus decided that the first Victorian cycle began in 1 BC and the second

¹⁸ Richards, pp. 158-9.

¹⁹ The *paschal cycle* is also known as the “Victorian cycle”.

²⁰ Jean Meeus, *Astronomical Tables of the Sun, Moon, and Planets*, 4th Edition (Richmond: Willmann-Bell, Inc. 1995), pp. 114, 208-211. It is interesting that the vernal equinox, of the year now known as AD 532, was not on 23 March, but on 18 March; therefore, it was not the beginning of a new cycle. However, in 527, both the vernal equinox and new moon were on 19 March. The difference between the two dates is five years, which accounts for the erroneous four years plus the year from the *ab incarnatione*.

in AD 532. He named the first full year of Christ's life as the first year of our Lord, or AD 1.²¹
Dionysius, therefore, decided that the AD 532 would follow DioE 247.²²

Ancient records of Astronomical sightings

Scattered throughout surviving records are notations of astronomical sightings. Since the movement of the Moon and planets follow predictable patterns, the dates on which a sighting could have taken place can be determined within a controllable margin of error. Records of solar and lunar eclipses and the positions of the planets, especially Venus, have provided valuable data for dating historical events.

In the eponym of Bur-Sagale, which was the in Yr 10 of AssurDan III, a solar eclipse was recorded. This record was unique in that it stated that the eclipses took place in the month of Simanu, the third month²³. Scholars have identified the solar eclipse of Bur Sagale with the one that took place on 15 June 763 BCE. It is from this record that the chronology of the kings of ancient Assyria was reconstructed. However, it should be noted that Henry Rawlinson and his assistant George Smith exhibit all of the characteristics of forgers and that their discoveries have never been authenticated.

²¹ Richards, pp. 350-1.

²² Bickerman, p. 81.

²³ The ancient Near Eastern solar/lunar calendar dates back at least to the time of Hammurabi (ca. 1790 BCE). This calendar is still used by the Jews today, but in it the third month is called Sivan. To determine the Julian date for the third month one must determine the date of the new moon of Nissan.

Assyrian Records

Of the two Assyrian king lists here published in transliteration, translation, and photographs, one known as the “Khorsabad King List,” came to light over twenty years ago, and the other designed as “SDAS King List,” is made public here for the first time.

The Khorsabad King List was found on the site of ancient Dur-Sarru-kin in the course of excavations conducted there in the season of 1932/33 by the Oriental Institute of the University of Chicago...

The second king list published here came to light under circumstance so unusual as to be almost unbelievable.” The present owner of this tablet inherited it from a relative who had bought it from natives in Mosul before the First World War. Toward the end of 1953 the owner of the tablet brought it to Dr. Siegfried H. Horn²⁴, professor at the Seventh-day Adventist Theological Seminary in Washington, D. C., and generously left it with the seminary on a permanent loan basis. As far as can be ascertained, the tablet had not been shown before to any competent scholar, nor had the value of its contents been recognized until Dr. Horn was given the opportunity to inspect the tablet. During the Christmas vacations of 1953 Dr. Horn brought the tablet to Chicago and entrusted it to the writer for publication, under the condition that it be published within the limits of one calendar year from the date of January 1, 1954. The new tablet was to be designated as the “SDAS King List.”²⁵ An extensive study of these issues can be accessed by clicking on *Reassessing the Cornerstone*.

²⁴ Horn was a former student of the author, Dr. Gelb.

²⁵ I. J. Gelb, Two Assyrian King Lists, *Journal of Near Eastern Studies* (Vol. XIII, No. 4, October 1954), pp. 209-10)

Babylonian Records

Fortunately, the many records of the ancient Babylonians astronomers have survived. They recorded the positions of the constellations and the movements of the visible planets across the night sky. They also left records of their rulers in king lists. These astronomical texts found their way into Library of Alexandria.

In the *Almagest* (ca. 145 CE) the famous astronomer Ptolemy of Alexandria condensed these records and combined them with his own contemporary sighting. They were preserved in Theon's commentary on the *Almagest*, known as the "Canon of Ptolemy" (*Almag.* III. 7).²⁶

In the Canon the reign of the Babylonian kings were coordinated with astronomically exact dates of the records of lunar eclipses. This resulted in the formation of the Nabonassar Era (NE), beginning with the accession of the Assyrian appointed king of Babylon, Nabonassar in – 747/6. It was expanded to include the successive reigns of the kings of Babylon, Persian, the Ptolemies of Egypt, and the emperors of Rome and Byzantine. These lists of rulers were maintained until the fall of Constantinople in AD 1453.²⁷

The Assyrians took control of Babylon in the final years of Tiglathpileser III. While his grandson, Sargon II, ruled the empire from Nineveh, he set, Mardukaplaiddin, as a vassal king in Babylon. The Canon's great importance to understanding Assyrian chronology became apparent when Mardokempados was identified as the Assyrian spelling for Mardukapladdin in the

²⁶ The table included below are from Thiele, Appendix H.

²⁷ Bickerman, pp. 23, 81- 82.

Ptolemy Canon	Year of the King	Nabonassar Era
March 19, -721/0	Yr 1 <i>Mardokempados</i>	27 N.E.
March 8, -720/19	Yr 2 Mardokempados	28 N.E.
August 1, -720/19	Yr 2 Mardokempados	28 N.E.
April 22, -621/0	Yr 5 Nabopolassar	127 N.E.
July 4, -568/7	Yr 37 Nebuchadnezzar	180 N.E.
July 16, -523/2	Yr 7 Cambyses	225 N.E.
Sept 19, -503/2	Yr 20 Darius	246 N.E.
April 25, -491/0	Yr 31 Darius	257 N.E.

Assyrian King List

Tiglathpileser III -
Tiglathpileser III -
Tiglathpileser III (Pul – II Kings 5:19)
Shalmanser IV
Sargon II -721 to -705
Sargon II
Sennecherib -705/4 to -681/0

Babylonian King List

Nabonassar
Nabunadinzri
“Pulu” (Tiglathpileser III)
“Ululas” (Shalmanser IV)
Mardukbaliddin (Mardokempados)
“Arkanos” (Sargon II)
Sennecherib (last 8 yrs.)

Babylonian King List. (Pritchard, pg. 272) The Canon records a lunar eclipse in their first year. Sargon II recorded that in his first year he destroyed the Northern Kingdom of Israel. Therefore, by applying the eponym years to Ptolemy's Canon, we can determine when these kings ruled.

The Common Era

Modern scholar chose to distance themselves from the faith-based "Before Christ" and "Year of Our Lord" (AD) connotations. They opted to rename our current system the "Common" Era, since it had adopted into common use worldwide. Hence, we now find in scholarly works, the use of BCE, "Before the Common Era", instead of BC; and CE, "Common Era", instead of AD.

The year "0"

Early Christian historians disliked the idea of a "year 0". The BC/AD dates reflect this bias. With the dawning of our "Computer Age" there has been a shift to what is known as "Astronomical Time". When using Astronomical Time, the transition between BC/AD includes the count down-to and up-from a zero point.

Usually, the Christian and Common Era dates indicate identical years. It stands to reason that if the scholars wished to establish a system detached from religious bias and bases on scientific data, then the Common Era should represent Astronomical time and not simply be a reflection of the Christian system. For instance, in the charts of solar and lunar eclipses provided by NASA, the solar eclipses currently used for the eponym of Bur Sagale occurred in 762 BCE. Throughout this work the notation for Before the Common

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Era will equal Astronomical Time. Both the Christian and Astronomical counting systems will be given expressed, example **-1/0**. For the years after the year zero, AD, CE and Astronomical time are all three equivalent.

Christian system	3 BC, 2 BC, 1 BC , 1 AD, 2 AD
BC/AD dates	-3, -2, -1 , +1, , 2 AD
Astronomical system	2 BCE, 1 BCE, 0 CE , 1 CE, 2 CE
CE dates	-2, -1, 0 , +1, +2

The Olympiads

The ancient Olympic games were held in the summer (dark green column) of every fourth year. There are two options as to when the first Olympic Games was held. The records of Dionysius of Halicarnassus (60 BCE-7CE) seem to indicate that the Greeks began counting the years of the Olympiads from the summer of 776 BCE.²⁸ However, both Diodorus Siculus (?- c. 40 BCE) and Polybius (203-120 BCE) seem to have favored the year 775 BCE. Dating by the Olympiads continued in use until the Christians forced the games to be discontinued in 393 CE.²⁹

Seleucid Era

In the summer of 312 BCE, Seleucus Nicanor, one of Alexander's generals, won a decisive military victory over Ptolemy of Egypt. Year 1 of the Seleucid Era began that

²⁸ This is the method used by historians today.

²⁹ Bickerman, p. 75-76.

autumn on the new year of the Macedonian lunar/solar calendar³⁰. Unlike other new monarchs, his son did not begin a new count with his ascension to the throne, but continued to count from this victory of his father. Thus the Seleucid Era (**SE**), the first continuous historical era began.³¹

The Biblical Records

We can now apply our knowledge of these systems to establish the date for a given historical event. For an example, we might take the destruction of the Temple of Solomon in Jerusalem. This is an event of great importance, both historically and chronologically. In the Biblical and Babylonian texts it is documented that King Nebuchadnezzar II destroyed the First Temple.

Jehoiachin was eighteen years old when he began to reign; and he reigned in Jerusalem three months;....and the king of Babylon took him (Jehoiachin) in the **eighth year** of his (i.e. Nebuchadnezzar's) reign.And he carried away Jehoiachin to Babylon; (II Kings 24: 8a, 12b, 15a)

Now in the fifth month, on the seventh day of the month, which was the **nineteenth year** of King Nebuchadnezzar, king of Babylon, came Nebuzaradan..... unto Jerusalem. And he burnt the house of the Lord... (II Kings 25: 8-9)

³⁰ The Greco-Syrian calendar was very similar to the Jewish calendar. The first month, Dios, corresponded with the Hebrew month of Tishrei, occurring in September or October.

³¹ Bickerman, pg. 71.

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This is the people whom Nebuchadnezzar carried away captive: in the **seventh year** three thousand Jews and three and twenty; in the **eighteenth year** of Nebuchadnezzar, from Jerusalem, eight hundred thirty and two persons; (Jer. 52:28-29)

We seem to have a textual problem. In II Kings 24: 12b Jehoiachin is taken prisoner in the eighth year of Nebuchadnezzar, while in Jeremiah 52:28 it was in the Great King's seventh year. Again in II Kings 25: 8-9 Jerusalem was destroyed in Nebuchadnezzar's nineteenth year while in Jeremiah 52:29 it was in his eighteenth year. How can a chronologist handle the apparent contradictions in these records? For our answer we must reexamine the data in light of the different customs of beginning the count of a reign.

According to the Canon of Ptolemy, there was a lunar eclipse in 180 NE, which was Yr 37 of Nebuchadnezzar. This eclipse has been identified as occurring on July 4, -568/7. Therefore, Nebuchadnezzar began his rule in -605/4.

Nebuchadnezzar followed the custom of counting his regal years from the date of his official coronation in Nisanu. Even though he assumed power when his father, Nabopolassar, died during the previous year of -606, he counted from the spring of -605 in accordance with the Ascension System. The Israelite scribes have recorded the date of the destruction of the Temple based on both dating systems. The official Babylonian year is recorded in Jeremiah 52. The Jewish Ante-Dating system is recorded in II Kings 25.

Applied Chronology

When we put the pieces of chronological data together, we arrive at the following alignment for the Destruction of the First Temple in Jerusalem.

In Yr 18 of Nebuchadnezzar (Babylonian Ascension System),
Yr 11 of Zedekiah of Judah (Jewish Ante-Dating System),
the 1st year following the 48th Olympic Games in Greece,
167 A.U.C. - from the founding of the city of Rome,
161 NE - the Nabonassar Era,
3338 AM from the Creation - used in the Jewish calendar,
587 BC - used by Christian scholars, and 586 CE in Astronomical dates, and
-587/6 as noted in this work.
(see page A18)

The 19 year Luni-Solar Calendar

Early Near Eastern astronomers developed a calendar to harmonize the lunar months with the solar seasons. In both the records of Hammurabi (ca. -1790) and the Biblical Text, the New Year of the lunar calendar was associated with the spring planting season. The solar seasons were determined by noting the length of the sun's shadow cast by a gnomon, a vertical rod set perpendicular to the ground. When the shadow touched the marks for the longest and shortest days, the summer and winter solstices were celebration. The equinoxes marked the days when daylight and night hours were of equal length. By anchoring the lunar months to the spring equinox, a stabilized calendar was developed which prevented the moon from drifting aimlessly through the years.³² In

³² George Smith, *The Assyrian Eponym Canon* (London, 1875), pp. 18-19. The spring equinox was used by the Assyrians to determine the New Year is confirmed by

Table A the nineteen year cycles for each year are included in the first column labeled **19 L/S**.

In modern almanacs and astronomical tables, the “New Moon” refers to the “dark of the moon,” which is the actual astronomical luni-solar conjunction, called the *syzygy* (σύζυγος). In ancient Near Eastern calendars, the first day of each lunar month, following the *syzygy*, was determined by the sighting of the first sliver of moonlight, the *molad* (מולד) or “birth” of the moon. The New Year began on the first day of the lunar month of Nissan.

The Embolismic Year

Sumerian star-gazers began recording the interface of the earth, sun, and moon as early as 2400 BCE. Very early on, they discovered that there were 235 lunations in the nineteen year luni-solar cycle. A nineteen year cycle of the agricultural based solar years would give a total of 288 lunations. Thus there are seven additional lunar months in the cycle. After centuries of observations, a set pattern was established for these embolismic years of thirteen months.³³

examinations of the cuneiform texts. The Luni-Solar calendar system is still used by Jews and Zoroastrians today.

³³ E. G. Richards, pp. 148. and E. J. Bickerman, p. 64. Richards and Bickerman state that the Babylonians arrived at their calendar by computations of astronomical sighting. Probably a better explanation is that it was the produce of centuries of observing astronomic patterns. Early priesthoods kept these patterns of the periodic, natural occurrence of a 13th lunar a closely guarded secret. Publicly, they claimed to possess esoteric knowledge empowering them to *insert* an additional month, probably to maintain influence over kings and farmers alike. Among the Greeks and Romans, the insertion of a 13th month was done strictly at the discretion of the priests. It is no coincident that it was during this period the calendar was the main source of contention in the power struggle between the Pharisees and Sadducees.

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Usually, the additional month was placed at the end of the year. However, by Hammurabi's time (after roughly 600 years of observations) the calendar was further refined by placing a thirteenth month after Elul, the sixth month of the year. This Elul II was set in the seventeenth year of the luni-solar cycle. Since half of 235 is 117 with one remainder lunation, then the exact half-way point of a nineteen year cycle would be the seventh month (i.e. 117 lunations on either side of this odd one). The first day of the seventh month, 1 Tishrei, is the Jewish New Year. The seventeenth year of the cycle was possibly chosen for the mid-cycle point because it is earliest lunation of the year. (see *Table C*) Therefore, the additional month of a second Elul, preceding the first of Tishrei, was in the embolismic 17th year of the cycle. The intercalation of an Elul II continued in use until at least 380 BCE.³⁴

A Babylonian astronomical treatise (ca. -1000) noted that if the first new moon of a year (in red on page *C2*) was in a near conjunction with the 'mul-apin' (the "Plough Star"), which is call Pleiades, the following year would contain an additional thirteenth lunation (years highlighted in turquoise on all Tables). Thus the ancient astronomers devised a reliable calendar by anchoring the lunar phases to the Spring Equinox and the Pleiades star cluster of the constellation of Taurus (♉). In the year 1000 BCE the Spring Equinox occurred at 18° ♉.

In 431 BCE³⁵, Meton of Athens (pp. *A22*; *C2*) brought the ancient Near Eastern calendar to the Greek world. It is from his thesis that the embolismic years are numbered

³⁴ Richards, 147-148.

³⁵ Conventional texts will use 432 BC; but, by including the year "0" it becomes 431 BCE.

3rd, 6th, 8th, 11th, 14th, 17th, and 19th. In his time the Spring Equinox corresponded with the nineteenth year of the cycle. Since the precession of the equinox is so slow, it seems that Meton assumed that the New Moon of the nineteenth year always occurs at the Spring Equinox.

The Precession of the Equinox

When Ptolemy of Alexandria observed the eastern horizon at the spring equinox, he saw the constellation of Ares. But, remember, in about -1000 the Babylonian astronomical treatise noted that often the first new moon of the year was in a near conjunction with Pleiades. This means that the spring equinox was then in Taurus (♉). Today it is in the first degrees of Pisces (♊) and next will enter the sign of Aquarius.³⁶ This apparent slow, backward movement of the spring equinox through the constellations of the zodiac is known as the *Precession of the Equinox*. Our oldest surviving account of the precession was written by the great Greek astronomer, Hipparchus of Nicaea, in -130 (page B3).³⁷ He had noticed that the spring equinox had moved into the sign of Ares (♈).

In *Table C*, the spring equinoxes are highlighted in bright-green.³⁸ Note that the dates are progressively earlier until we arrive at 10 March 1582 CE. In this year Pope Gregory took drastic steps to stop the slipping of the date of Easter earlier and earlier in

³⁶ This phenomenon inspired the popular song the “Dawning of the Age of Aquarius.”

³⁷ Richards, pg. 29-30.

³⁸ P. Brentagnon and Jean-Louis Simon. *Planetary Programs and Tables –4000 to 2800, IBM-BASICA*. (Richmond: Willmann-Bell, 1986).

the year. He ordered that eleven days be removed from the calendar and the spring equinox of 1583 was reset to 21 March.³⁹ Due to this innovation, once again the Spring Equinox falls in the 19th year of the 19 year cycle. This is not accidental but reflects the influence of both Meton and Ptolemy.

In short, the molad of Nissan must occur in Aviv (i.e. in near conjunction with the Spring Equinox). The Precession of the Equinox, which is caused by a “wobbling” of the Earth on its axis, causes a very slight realignment of the fixed stars. This movement gives the appearance that the fixed stars are moving backwards and that the Spring Equinox is arriving earlier in the solar calendar each year.

This is a very slow movement. For the point of the Spring Equinox to move through the estimated 30° of single stellar constellation take roughly 2160 years. This equals about 1° every 72 years.

The Spring Equinox is now in the first degrees of Pisces (♊) and is just moving backwards into the stellar constellation of Aquarius (♒ i.e. “Dawning of the Age of Aquarius”). It was record that the equinox was in the first degrees of Aries (♈) by the Greek astronomer, Hipparchus of Nicaea (c. 190 BC – c. 120 BC). Thus it was at that time moving backwards into the last degrees of the stellar constellation Pisces (♊). Therefore, in 2310 BCE (i.e. about the time of Noah using a Torah based calculation), it was in the last degrees of Taurus (♉) and was at that time moving into the last degrees of the stellar constellation of Aries (♈).

³⁹ On page A50, 1582 was the 5th year of the 19 year cycle and should have been followed by the 6th year in which the 1st of Nissan would have fallen on 11-13 March. This alteration of the Julian calendar, which was established by Julius Caesar, became known as the Gregorian Calendar. By resetting the spring equinox to 21 March, the 1st of Nissan again fell on 23 March, and thus 1582 and 1583 were both in the 5th years of the 19 year L/S cycle. Since the introduction of the Gregorian calendar, the spring equinox usually falls on either 20 or 21 March; however, at times it occurs on 19 March.

A Babylonian astronomical treatise, dating from about 1000 BC, tells us that the New Year was set by the near conjunction of the moon and the ‘mul-*apin*’ (the plough star), which we call Pleiades.⁴⁰ This astronomical treatise must have been a copy of another work from about the year 2300 BCE, since the conjunctions of the New Moon of Nissan, Spring Equinox, and Pleiades (the major fixed star of the constellation Tarsus (♃)) occurred in that epoch.

Application of the Tables

Thiele noted that efforts have been put forth to identify Smith’s discovery with two other solar eclipses, 13 June 809 and 24 June 791 B.C., but that neither of dates are acceptable.⁴¹ The eclipse on 791 B.C. has garnered the greater support.⁴² Thiele does not explain why they were rejected. As an example of how the tables work, we will use these dates for the solar eclipse of Bur Sagale. The table below provides all important eclipses visible from Nineveh during the Assyrian Era.

1) On pages *A14* and *A15*, find these three years. The first column from the left gives the corresponding year of the Luni-Solar (L/S) cycle in which these eclipses occurred. Thus,

$$-808 = \text{a } 9^{\text{th}} \text{ year,} \quad -790 = \text{an } 8^{\text{th}} \text{ year,} \quad -762 = \text{a } 17^{\text{th}} \text{ year.}$$

2) To find the approximate date on which the *syzygy* of the 1st lunar month occurred, turn to Table C, page C2. First find the Common Era years, then move down

⁴⁰ Richards, pg. 148.

⁴¹ Thiele, p. 69.

⁴² Martin Anstey, *The Romance of Bible Chronology* (London: 1913), p. 220.

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the column until you arrive at the dates across from years of the L/S cycle, which are under the heading **Year of Cycle**. These are the approximate dates of the *syzygy* that preceded the first of Nissan.

- 808 in a 9th year = 16/17 April,
- 790 in an 8th year = 28-30 March
- 762 in a 17th year = 19/20 March

3) Now reference the astronomical data on the NASA's website for those years via the link on top bar. We can now calculate the date for the more important eclipses of the period.

Solar Eclipse Date	Luni-Solar 19 year Cycle Table A	Approximated date Syzygy before 1 Nissan Table B	NASA calculated Syzygy of Adar	Syzygy # from Adar to the Solar Eclipse	Lunar Month of Solar Eclipse
23 Jul -950	19th year	27-28 March	Mar 27 05:44	5th syzygy	Tammuz
13 Jul -884	9th year	15-16 April	Apr 16 10:44	4th syzygy	Sivan
23 May -863	11th year	24-26 March	Mar 25 04:00	3rd syzygy	Iyar
04 Jul -856	18th year	6-7 April	Apr 6 21:19	4th syzygy	Sivan
13 Jun -808	9th year	15-16 April	Apr 15 10:38	3rd syzygy	Iyar
24 Jun -790	8th year	27-29 March	Mar 28 09:52	4th syzygy	Sivan
15 Jun -762	17th year	18-19 March	Mar 19 10:28	4th syzygy	Sivan
26 Jul -736	5th year	31 March – 2 April	Mar 31 01:40	5th syzygy	Tammuz
17 Jun -678	6th year	19-21 March	Mar 20 08:16	4th syzygy	Sivan
27 Jun -660	5th year	30 March – 1 April	Mar 30 15:09	4th syzygy	Sivan
07 Jun -650	15th year	8-10 April	Apr 9 05:23	3rd syzygy	Iyar
30 Jul -606	2nd year	2-4 April	Apr 2 21:51	5th syzygy	Tammuz
18 May -602	6th year	18-20 March	Mar 20 15:01	3rd syzygy	Iyar

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The eclipse in -790 was an annular that was visible in Nineveh just before sunset.⁴³ Thiele, fine tuning the work of his predecessors, Rawlinson and Smith, placed the eponym of Bur Sagale in the 10th year of the Assyrian king Asshur-Dan III and identified it with the eclipse of -762. This was a very spectacular total eclipse.

In the four volumes of the *Catalogue of the Cuneiform*, 213 tablet fragments having inscriptions concerning eclipses.⁴⁴ This illustrates the importance of eclipses to the Assyrians. There are twenty-two reports of actual observations of eclipses which were sent to the king. The remaining inscriptions of eclipses were regarding astrological predictions regarding public affairs. Both solar and lunar eclipses were used to astrological predictions the future, which was a very pervasive facet of their culture. It seems very strange that the Assyrians would note only one in the eponym canon. Astrological predictions were culturally pervasive, and eclipses played an important role in astrology.

Solomon's Temple was destroyed on the 9th of Av, which is the fifth month. Table A informs us that the year -586 was the 3rd year the 19 year cycle (p. A18). Table C provides a quick reference for dates of the *syzygy*, which precedes the *molad* of the New Year for that year (1 Nissan). In the third column on page C2 we find that the 3rd year *syzygies* occurred on either 23rd or 24th of March. The exact dates for the -586 *syzygies* are easily found by following on the NASA website (link on top-bar homepage). There

⁴³ Mucke, J. and Meeus, J. *Canon of Solar Eclipses, -2003 to +2526* (Wien: Astronomisches Buro, 1983). Manfred Kudlek and Erich H. Mickler. *Solar and Lunar Eclipses of the Ancient Near East from 3000 B.C. To 0 with Maps.* (Herstellung: Butzon & Bercker Kevelaer, 1971).

⁴⁴ C. Bezold, *Catalogue of the Cuneiform Tablets in the Kouyunjik Collection of the British Museum.* (London: Harrison & Sons and Longmans & Co., 1889, 1896).

we find that the *syzygy* preceding 1 Nissan was on 23 March at 06:37, and the *syzygy* of preceding the fifth month was on 18 July at 18:58.

We are determining the date of a Jewish historical event; therefore the rules for determining the *molad* will be based on the Jewish system.

The day begins and ends at sunset, or more precisely, after dusk when the first three stars of medium size appear. This rule applies to the theoretical beginning and ending of Sabbaths, festivals, fast days, and the hours for the daily prayers. However, for calendar calculation, especially for the computation of the *Moladoth*⁴⁵ (the times of the New Moon) and the *Tekufoth* (beginnings of the seasons) the day begins and ends at 6 o'clock in the evening, Jerusalem time.

The hour 6 P.M. is called Hour 0 or 24, abbreviated 0h or 24h. The day is divided into 24 hours which are counted 1, 2, 3,.. 24 from 7 P.M. on. Midnight is designated by 6h, Noon by 18h, 2 P.M. by 20h, etc.⁴⁶

When the *Molad Tishri* occurs at noon (18h) or later Rosh Hashanah is postponed to the next day.⁴⁷

The *syzygy* preceding Av, the fifth month, was on 18 July at 18:58, which is after the noon mark (18h). Then according to the rule, the *molad* was postponed to the next day, 19 July. Therefore, the ninth of Av, when Solomon's Temple was destroyed, was on 27 July 586 BCE.

⁴⁵ Feminine plural of *Molad*.

⁴⁶ Arthur Spier, *The Comprehensive Hebrew Calendar: twentieth to twenty second century 5660-5860 * 1900-2100*, (Jerusalem: Feldheim Publishers, 1986), p. 13.

⁴⁷ *Ibid*, p. 15.

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Current chronological tables are based on the reconstruction of Assyrian cuneiform records by the scholars of the nineteenth century. These Assyrian records seemed to limit the duration of Solomon's Temple at 373 years, which conflicted with the chronological data preserved in the Hebrew Texts and threw into even greater disarray the alignment of the monarchies of the kingdoms Israel and Judah. A heated debate raged between supporter of the Biblical text and supporters of the Assyrian cuneiform texts until a convenient compromise was struck by Thiele. His model for the chronology of the First Temple period has dominated publications, both academic and popular, since its first endorsement by Albright in 1945.⁴⁸

In the Biblical account for the Exodus and Conquest, Caleb was 85 y/o (Joshua 14:5-11) when the land was divided. Therefore, he was 40 years old when he was sent to spy out the land. Since the Israelite tribes wandered 40 years in the "Wilderness," we know that the conquest took five years. Then the Ark of the Covenant was moved to Shilo, and the counting of the Sabbatical/Jubilee cycles (#S/J) began that fall. A18, if we follow the column labeled **1st Temple** back to page A10, we find that the it was founded in -996. Simple math supports this finding: $-586 + 410 \text{ years} = -996$.

⁴⁸ *Ibid*, 18.