A Pre-exilic Hebrew Solar-Lunar Calendar.

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Abstract

This is a Solar-Lunar development of a 364 year Solar calendar uploaded here in 2015[1]. Unlike the Babylonian and Jewish calendars, that are corrected by intercalating a thirteenth month, this calendar always has twelve month years. In this revised version, the Exodus Calendar year starts one day earlier than in the earlier solar version. The calendar still consists of an integral number of weeks but years can only be 350, 357, 378 or 385 days long. Extra weeks are added by extending one or more of the eight 28 day months to 35 days to keep in step with the full moon to give light in the festival months of Abib, Zif and Ethanim (months I, II and VII) in the Exodus Calendar.

Because this is still essentially a Solar Calendar, as all agricultural calendars should be, I call it a Solar-Lunar Calendar to distinguish it from the more usual Lunar-Solar Calendars in which some years have thirteenth months. This Solar-Lunar Calendar retains the septimal based year of the 364 day year solar calendar but, of course, the year can never consist of 364 days and still track the moon. However, 50 or 51 and 54 or 55 week years fall 3 or 4 days either side of 12 or 13 lunar months respectively. Months VII to XI inclusive consist of alternate months of 29 and 30 days which keep these winter months approximately in step with lunar months. As a result it can be shown that, from a single lunar observation for the sixth month and the observation of the Southward Equinox, the start of the first month of the new spring year can be decided without having to make any further observations during the late autumn to early spring period when the weather in Israel is usually poor. The same autumn observations enable a decision to be made as to when to add 4 weeks to months II to V in the following year so that Passover will always fall within a 35 day band.

Introduction: The Septimal Year

A calendar with an integral number of seven day weeks will always start each year on the same day of the week but there are several ways in which the months may be arranged. For example, 13 months of 28 days would make every month start on the same day of the week. Alternatively 12 months of alternating 30 and 31 days could ensure that every quarter year would start on the same day of the week. There are other possibilities that, when analysed, can give rise to some unique properties. In the previous work [1], the derived pattern has the first seven months of the year starting on the same day of the week. This meant that the Jewish festivals would all be tied to fixed days and so obviate the need for exceptions if, as in the post exilic Jewish calendar, festivals clash with a regular Sabbath or for various other reasons – exceptions that Jews had to concoct after adopting or adapting the calendars of their conquerors. The post exilic Jewish calendar makes it impossible to keep the Feast of Weeks festival (Shavuot or Pentecost) as it was described in Lev. 23:26-27,

"*And ye shall count unto you from the morrow after the sabbath, from the day that ye brought the sheaf of the wave offering; seven sabbaths shall be complete: Even unto the morrow after the seventh sabbath shall ye number fifty days; and ye shall offer a new meat offering unto the LORD.*"

The above shows that the first two months must have consisted of an integral number of weeks at the time this command was given, moreover it also suggests that the feast was not tied to a particular date. These are features compatible with the Exodus Calendar presented here: where Shavout (Pentecost) can fall on 32/II, 4/III or 11/III and is always the day after the seventh Sabbath following the Sabbath of 17/I.

The Solar-Lunar Calendars

The 364 day year Solar Calendar [1] provides the basis for this Solar-Lunar calendar without alteration to the basic pattern. This pattern consists of the first six months of the year (from spring) having 28 days to which

any or all of them may have a further week added. There follow five months of alternating 29 and 30 days and a final (twelfth) month of 28 days – again with the possibility of an added week. This pattern gives a year of a minimum length of 343 days, although in practice at least one other week must be added each year. The only difference between the two calendars is in the number and sequence of the weeks that may be added. In the Solar Calendar, diagrams of the Creation/Flood and the Exodus Calendars were shown with 364 days in the year with the suggestion that a correcting week could be added, on average, every 5.3 Years. In this Solar-Lunar Calendar there should never be an actual 364 day year because it will always be possible to add weeks to the basic 343 day pattern to follow the moon more precisely. The result is possible year lengths of 350, 357, 378 and 385 days and the long term average will tend towards the true tropical year length by observation of the southward equinox. These year lengths approximate to 12 and 13 lunar months (approximately 354 and 384 days) respectively.

The method by which the Flood and Exodus calendars were constructed was covered in the original paper [1] and need not be repeated here except to say that the Exodus calendar was first designed from consideration of the requirements of the Jewish Festivals and Chronology and the need to incorporate a 150 day span over a five month period starting on the same weekday as in the Flood Calendar. The derived pattern was then applied to the Flood Calendar and a certain amount of iteration made amongst possible month lengths.

In the original paper, the first seven months of the Exodus Calendar all started on a Thursday after sunset and this was labelled as Friday. This arose from a misunderstanding of which day the Passover meal was kept and was a result of using the ambiguous data given in the new testament for the last supper, the Crucifixion and the Jews' Passover days. Further study has shown that the New Testament data concerning the Passover (Pesach) can only be reconciled with itself and with the Old Testament definitions if there were two Passover meals eaten on different days by different parties in the crucifixion year. This suggests that there were in fact two calendars being used at that time. This is discussed elsewhere [2]. There are two consequences arising from this: first, confirmation that it was known in New Testament times that a different Jewish calendar from that of the conventional Jewish calendar existed; and second, the need to change the first day of the year in my previously published Exodus Calendar. This results in an extra day's shift between the start of the Exodus and Creation Calendars, making the difference 9 weeks and 3 days. It also gives rise to a more suitable pattern for the Jewish festivals by which Sabbaths and Holy Days are always separated by at least one normal day. There are two exceptions to this: in the seventh month when a regular Sabbath follows the first of the month. This may explain the occasion when David fled into exile after he had missed two consecutive meals at Saul's table (1 Sam. 20:24-27). The other exception is that the Day of Atonement (Yom Kippur) falls on a regular Sabbath and it is referred to as a Sabbath of rest in Lev. 23: 27, 32.

"Also on the tenth day of this seventh month there shall be a day of atonement: ... It shall be unto you a sabbath of rest, and ye shall afflict your souls: in the ninth day of the month at even, from even unto even, shall ye celebrate your sabbath."

The term "from even unto even" is very similar to that of Passover which was to commence "between the evenings" on 14 Abib, (referred to in the NT as the day of preparation), whereas the Passover meal was actually eaten after sunset – that is 15 Abib [2]. Therefore, similarly, the Sabbath referred to above was on 10 Ethanim, the Day of Atonement after sunset at the end of the ninth day.

The pattern of days of the derived Exodus calendar is shown in figure 1. The 150 days are made up of two months of 28 days, one of 29, one of 30 and one of 35 days and, by reference to the flood narrative, can be superimposed on the Exodus calendar (for the pattern shown) starting on Tuesday day 26 of month IV. This configuration has the interesting property that the 1st day of the Creation/Flood calendar year

transposes to the day of Pentecost in the Exodus Calendar. In the developed Calendar, this is true for all configurations of added weeks.

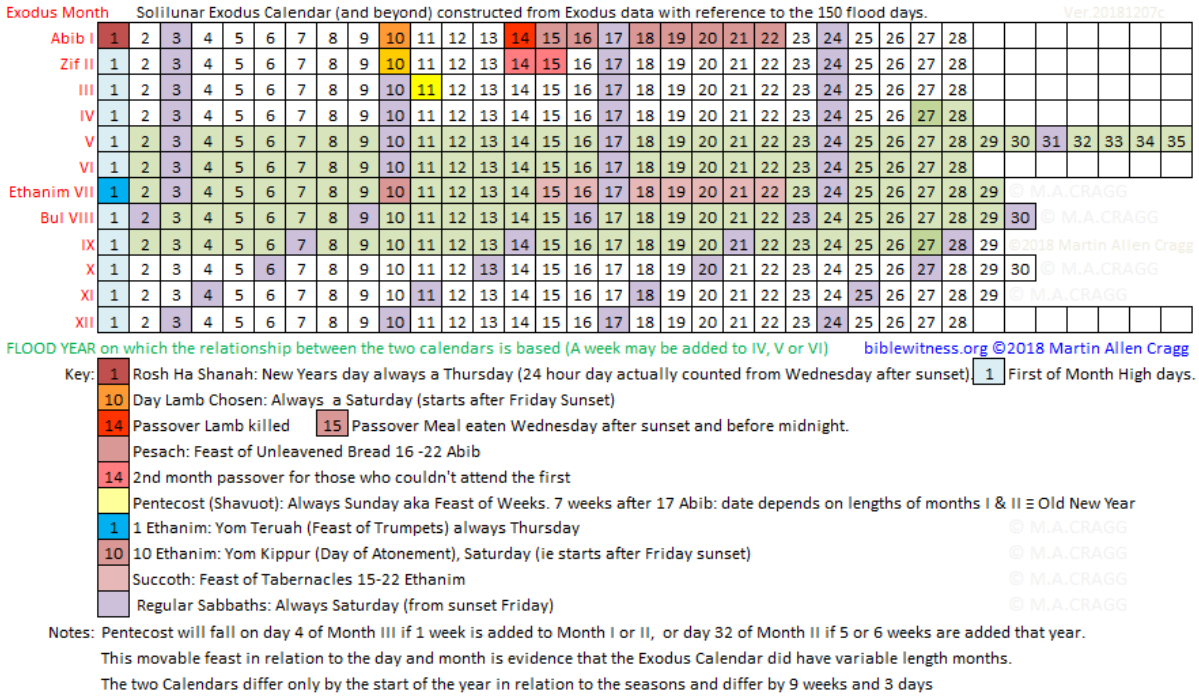

Figure 1: The Solar-Lunar Exodus Calendar for the same Year

The epoch of the Exodus calendar was, of course, at the time of the Exodus which occurred after midnight on 15 Abib (Nu. 3:33), although it was instituted on the first day of Abib: the first month of the new calendar year (Ex. 12:1, 13:4). In a previous work [3] the author has given evidence from Egyptian records that this was around the time of a spring full moon.
A full moon would also occur around the Feast of Tabernacles in the seventh month when the Israelites were dwelling in booths. The above patterns were derived for my computed BC flood year for AM 1656. Not all years give a valid transformation between the calendars and it essential to check that the method of adjusting the calendars to the Lunar and Solar cycles maintain a valid transform to the computed dates for whatever chronology is adopted by an investigator.

Hitherto most published biblical chronologies [4, 5] have been based on the lunar-solar calendar adopted by the Jews some time during or after the Babylonian exile, using month names derived from the Babylonian calendar [6] in which the first month is called Nisan and the seventh month is called Tishri. The fact that the Babylonian calendar and this work both have Lunar derived months has considerable chronological implications whereby Abib and Nisan, Ethanim and Tishri etc. can be out of step by several days or even a whole month, especially as their lunar synchronisation methods are different. This will be examined in the next section.

Dating the First Day of the Exodus Calendar Year
Figure 2 shows a comparison for the seventh month of the Exodus Calendar (Ethanim) with that of Tishri for the years 626 BC to 560 BC. The horizontal axis is centred on the Southward Equinox.

The more stable aspect of the Exodus Solar-Lunar calendar in comparison with the Babylonian Lunar-Solar Calendar is immediately apparent. The former months all start within a 35 day band compared with about a 53 day spread in the Babylonian calendar of that era. There are a few other interesting aspects too.

The prophet Daniel was taken captive to Babylon in 605 BC but he and his companions did not appear before king Nebuchadnezzar until 3 years had passed, then *"…in all matters of wisdom and understanding, that the king enquired of them, he found them ten times better than all the magicians and astrologers that were in all his realm."*(Dan.1:20). The sudden improvement in the regularity of the Babylonian calendar starting around 600 BC is suggestive of an attempted reform of the calendar – a reform that would be opposed by the magicians and astrologers which perhaps explains the erratic nature of the Babylonian months in subsequent years (the Babylonian calendar intercalations were not standardised until 383 BC at the earliest [6]). It seems very unfair that the world credits Babylonia with the invention of the science of astronomy whereas this superior calendar was given by God to Israel!

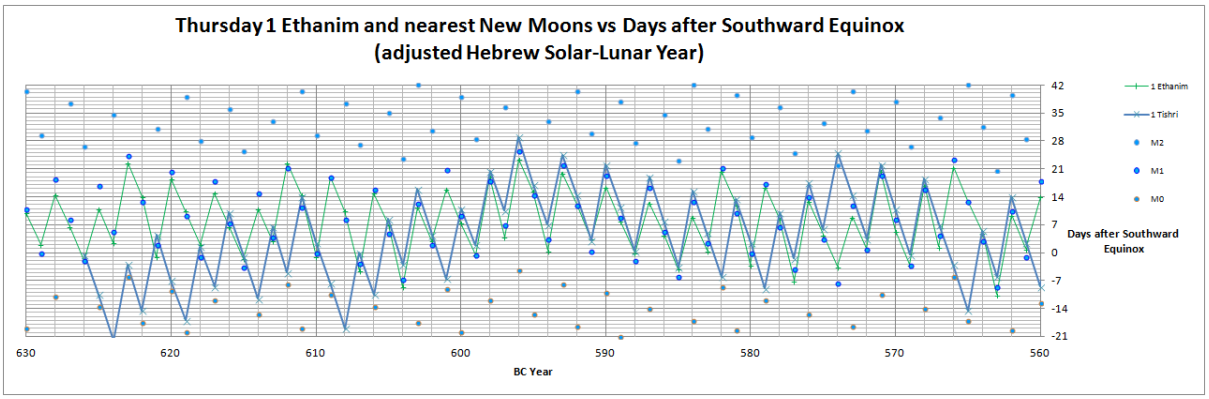

Figure 2. Showing a plot tied to the moon in autumn

The eighteen years from 600BC to 583BC, in which the Babylonian calendars and Exodus Calendars used the same moon, has been used as a basis for anchoring this Exodus Calendar to the Lunar and Solar cycles.

The Lunar Element in the Exodus Calendar

Although the Exodus Calendar is essentially a Solar Calendar there are three months in the year when a full moon would be helpful: between 14 and 22 Abib (Month I), 14-15 Zif (Month II) and between 15 and 23 Ethanim (VII) when the Israelites dwelt in camps or booths during the designated feasts.

In one week the moon phase advances by almost a quarter phase and there are approximately two weeks between a new moon and a full moon. The months following month II do not need to track the moon until month VII. This suggests a mechanism whereby the Calendar can be adjusted to include an extra Lunar month without having to add a 13th month. A week added to each of months II to V approximate to the addition of an extra lunar month and month VI is available for the addition of an extra week to ensure that a full Moon is available for the Feast of Tabernacles. Months 7 to 11 inclusive approximately track a given phase of the moon so the same phase (~ -3/+4 days) would occur during the following Passover week to commemorate the Exodus full moon. Also a one week positive adjustment can be made by adding a week to the end of month 12.

Lunar Observations

The Babylonian Calendar month began the day when the thin crescent of the new moon was first visible in the sky at sunset [6]. This would always be between 1 or 2 and occasionally 3 days after the astronomical new moon. While this no doubt satisfied the religious observances of the Babylonians (who were moon worshipers) it was not a very practical system – especially for an empire of large extent whereby it would take days, weeks or months to transmit the official dates to the outer parts of the empire. The Jews were not (or should not have been) hampered by such a restriction, in fact they were expressly forbidden to worship

the heavenly bodies which were given for times and seasons (Psa.104:19). In the time of David we learn that the new moon or start of the month could be predicted at least one day in advance (1Sam.20:18).

It is not known what method was used before the exile but there were far more practical methods available for anchoring their calendar to the moon. The mean lunar cycle (new moon to new moon) as observed from a particular location is approximately 29.53 days but this can vary by 13 to 14 hours between successive new moons. A similar variation exists between successive full moons but the quarter moons are less stable (nearly 18 hour variations).

The astronomical new moon is, of course, unobservable. The full moon is easily observable all night. If, in any month it were decided that there was not enough evening light towards the end of the 22nd day of the month, then that could be corrected for the following month by extending the current month by a week. The quarter moons are observable over a period of about six hours of darkness. There are either 21 or 22 days between the first quarter moon and the astronomical new moon and between the third quarter moon and the Full moon, with a bias slightly towards 22 days.

The arithmetical (or simulated observational) Exodus Solar-Lunar Calendar can be tied to any of these moon phases and all give similar results – for example the synchronism shown in figure 2 can be produced from astronomical calculations of local time for New, First Quarter, Full and last Quarter, although in other cases the start of the month may switch by a week or a month either way. At the present state of development of this calendar the 15th day of the feast months in any year falls between 6 days before and 2 days after the full moon for months I and VII and between 5 days before and 3 days after for month II.

Does the Calendar work?

One of the tests for a Biblical calendar is whether or not a secular date can be matched to a Biblical date. One such date is that of the surrender of king Jehoiachin to Nebuchadnezzar on the Babylonian date of Adar 2. This is widely acknowledged to have taken place on 16 March 597 BC in the Julian calendar. In the Exodus Calendar this translates to BC 597/XII/10 which satisfyingly agrees with Jehoiachin's reign length of three months and 10 days (2Ch. 36:9) after his accession following the winter death of his father Jehoiakim (see Figure 3).

One other interesting and unexpected synchronism that this Solar-Lunar Exodus Calendar revealed is the time lapse between Saturday BC 573 /II/10 and the day on which Israel officially became independent after the Britain's UN mandate expired at the end of Friday 14 May 1948. This made Saturday 15 May 1948 their first day as an independent nation since Old Testament times. This translates to Saturday AD 1948/II/10 in the proposed Exodus Calendar. That is exactly 2520 Exodus Calendar years since Saturday BC 573/II/10, which latter can be shown to be a Jubilee year when Ezekiel had a vision of a future Temple on the 10th day of an unspecified month at the beginning of the year (Eze. 40:1). Students of prophecy will know the significance of 2520 years: being the period that the gentile nations would have exclusive rule in the world.

Conclusion

When the Jews went into captivity their calendar must have been superseded by that of the Babylonians and, on their return, by those of the Persians, Greeks, Seleucids and Romans, all of whom would naturally insist on having a common dating system throughout their empires. The Jews then had to make adjustments to their festivals in order to avoid them falling on awkward days; as recorded in their various non-canonical writings and as they do to this day. This was a problem that could not have arisen with their wonderful original calendar of which the above is an attempted reconstruction. A twelve month year also is much more compatible with the priestly courses and with the levies required during the building of Solomon's Temple.

The evidence of the Last Supper shows that there must have been two Passover meals celebrated at that time on consecutive days [2] and that Jesus of Nazareth was crucified on the very same day that the

Jews killed their Passover lamb. Whether or not this use of the old calendar that year by Christ was a unique occurrence in order to fulfil the Law in the sacrifice of The Lamb of God cannot, for now, be determined. The use of a different calendar up to and including the time of Ezekiel and Jeremiah does have implications for chronology as discussed above and as shown in Figure 3 below.

597 BC	Day	Mnth	Julian Date	Remarks
Babylonian	29	/IX	Sun 7 Jan 597 BC[J]	Start of Gregorian Year
Kislev 22	1	/X	Mon 8 Jan 597 BC[J]	Month /X is fixed at 30 days
Tebeth 23	1	/XI	Wed 7 Feb 597 BC[J]	Month /XI is fixed at 29 days
Shebat 27	1	/XII	Thu 7 Mar 597 BC[J]	Month XII contains 5 weeks this year
Adar 2	10	/XII	Sat 16 Mar 597 BC[J]	Nebuchadnezzar deposes Jehoiachin
Adar 13	21	/XII	Wed 27 Mar 597 BC[J]	Northward Equinox
Adar 28	1	/I	Thu 11 Apr 597 BC[J]	1 Abib : Rosh HaShanah
Nisan 8	10	/I	Sat 20 Apr 597 BC[J]	10 Abib: Pascal Lamb Chosen
Nisan 13	15	/I	Thu 25 Apr 597 BC[J]	15 Abib: Passover Day
Nisan 27	1	/II	Thu 9 May 597 BC[J]	
Iyyar 6	10	/II	Sat 18 May 597 BC[J]	10 Zif: #2 Pascal Lamb Chosen
Iyyar 11	15	/II	Thu 23 May 597 BC[J]	15 Zif: Passover Day #2
Iyar 25	1	/III	Thu 6 Jun 597 BC[J]	Month /III contains 5 weeks this year
Sivan 6	11	/III	Sun 16 Jun 597 BC[J]	Shavuot (Feast of Weeks /Pentecost)
Sivan 19	24	/III	Sat 29 Jun 597 BC[J]	North Solstice
Tammuz 1	1	/IV	Thu 11 Jul 597 BC[J]	
Tammuz 29	1	/V	Thu 8 Aug 597 BC[J]	
Ab 27	1	/VI	Thu 5 Sep 597 BC[J]	
Elul 21	25	/VI	Sun 29 Sep 597 BC[J]	Southward Equinox
Elul 25	1	/VII	Thu 3 Oct 597 BC[J]	Feast of Trumpets. VII (Ethanim) has 29 days
Tishri 4	10	/VII	Sat 12 Oct 597 BC[J]	10/VII: Yom Kippur (Day of Atonement)
Tishri 9	15	VII	Thu 17 Oct 597 BC[J]	15/VII: Sukkot (Feast of Tabernacles)
Tishri 24	1	/VIII	Fri 1 Nov 597 BC[J]	Month /VIII is fixed at 30 days
Heshvan 25	1	/IX	Sun 1 Dec 597 BC[J]	Month /IX is fixed at 29 days
Kislev 22	27	/IX	Fri 27 Dec 597 BC[J]	South Solstice
Kislev 25	1	/X	Mon 30 Dec 597 BC[J]	Month /X is fixed at 30 days

Figure 3. The Babylonian vs. Exodus Solar-Lunar calendar for Year 597 BC

M.A.C. February, 2019

[1] A Reconstruction of Creation, Flood and Exodus Calendars from the 364-day, 294 year Cycle.
Available from: www.academia.edu and http://www.biblewitness.org
[2] http://www.biblewitness.org/passover.htm
[3] http://www.biblewitness.org/pharaoh.htm
[4] Thiele, Edwin R: "The Mysterious Numbers of the Hebrew Kings", 3rd Edition, 1983 The Zondervan Corpn.
[5] Young, Rodger R. "When did Jerusalem Fall?" JETS 47/1 (March 2004) 21-38.
[6] Parker R.A. Dubberstein W.H. "Babylonian Chronology 626 B.C. – A.D. 72. Wipf & Stock 2007 Reprint