Leap year theories compared.

The role of the menorah in the temple service.

Taken from Ken Johnson's book - Ancient Dead Sea Scrolls Calendar. Do purchase and read it, for those of you big fans of this calendar study! Shalom, **Rojo Mathews**

Menorah as a Timepiece

The tabernacle of Moses always faced east. This would allow a priest in the tabernacle to record the day that the spring equinox occurred by observing the sunrise that morning.

Josephus says this about the Menorah:

"Over against this table, near the southern wall, was set a candlestick of cast gold, hollow within, and being of the weight of one hundred pound: which the Hebrews call cinchares: which, if it be turned into the Greek language, it denotes a talent. It was made with its knops, and lilies, and pomegranates, and bowls: which ornaments amounted to seventy in all.

By which means the shaft elevated itself on high from a single base, and spread itself into as many branches as there are planets: including the sun among them. It terminated in seven heads, in one row, all standing parallel to one another; and these branches carried seven lamps, one by one, in imitation of the number of the planets: these lamps looked to the east and to the south, the candlestick being situate obliquely." Josephus' *Antiquities 3.6.7*

According to Josephus the lamps on the Menorah "imitated the number" of the planets. That might mean that they were named after the planets. Originally the days of the week were numbered one through seven, or one through six and "the Sabbath." Later, the days of the week were named after the planets. Saturday, Sunday, and Monday are obvious in English as Saturn, the sun and the moon. Tuesday, Wednesday, Thursday, and Friday are easier seen in the French language than the English language. Tuesday is mardi (Mars). Wednesday is mercredi (Mercury). Thursday is jeudi (Jupiter). Friday is vendredi (Venus).

Pagans later named their gods after the planets. So, by saying that the lamps on the Menorah were named after the planets, he could very easily be saying they represented the days of the week. The lamps could be "slanted" or turned to face either east or south. I believe Josephus has given us the Zadok priests' method of recording the day of the week that the spring equinox occurred, and thereby showing when to add the leap week into the calendar.

It would start with the lamps all pointing the same way accept the marker lamp pointing the other way. The Essenes used Wednesday to start their calendar because Genesis 1:14-19 records that the sun, moon, and stars were created on the fourth day of the week. Wednesday would be the middle or fourth lamp in the row. The next spring equinox would occur 365 days later, one day more than the 364-day calendar that they used. This would place the spring equinox on Thursday instead of Wednesday. So, the priest would turn the fourth lamp back in line with the others and turn the fifth lamp to mark that the equinox occurred

on Thursday that year.

Continuing this pattern, the second year's equinox would fall on a Friday and the third year's equinox would fall on a Saturday.

In the fourth year something interesting would happen. The marker would naturally be moved from Saturday to Sunday, back to the first lamp on the Menorah. This would signal that the year was a leap year adding a "leap week." However, since this would be the fourth year in the cycle, it would also have an extra day (the 366th day on the Gregorian calendar). By adding this extra day, the marker would move from Saturday to Monday, instead of Saturday to Sunday.

The fifth year the marker would move to Tuesday, then in the sixth year it would move to Wednesday, and then in the seventh year it would move to Thursday. In the eighth year it should move to Friday but every four years we need to add that extra day (the 366th day on the Gregorian Calendar), so it would actually move from Thursday to Saturday.

The ninth year would be a normal year, it would only move from Saturday to Sunday (only one day). The marker would move off of Saturday, the seventh lamp, and return to the left side of the Menorah landing on Sunday. That means we would add a seven-day leap week. After eleven cycles the pattern repeats.

Sun	Mon	Tue	Wed	Thu	Fri	Sat

			X	1yr	2yr	3yr
→	4yr	5yr	6yr	7yr	→	8yr
9yr	10yr	11yr	→	12yr	13yr	14yr
15yr	→	16yr	17yr	18yr	19yr	→
20yr	21yr	22yr	23yr	→	24yr	25yr
26yr	27yr	→	28yr	29yr	30yr	31yr
→	32yr	33yr	34yr	35yr	→	36yr
37yr	38yr	39yr	→	40yr	41yr	42yr
43yr	→	44yr	45yr	46yr	47yr	→
48yr	49yr	50yr	51yr	→	52yr	53yr
54yr	55yr	→	**X**			

This would keep the calendar correct for approximately 20,806 years, until another "extra day" would add up. But, when it does, the priests could simply add an extra skip day on the Menorah and start all over. In other words, it is a self-correcting calendar. It would never get off.

This method keeps both the seven-day sequence uninterrupted and keeps the start of the new year within *three* days of the equinox. If you count the number of years between leap years using this method, it is either five or six years long. I believe this is more evidence that we are using the correct method.

After the Equinox Debate

The method taught in this chapter only allows the spring equinox to occur a maximum of three days away from the first of the new year, three days before to three days after.

There are those who believe that the sign of the spring equinox must always be before the Wednesday which is the new year. With their method, the counting and marking of the Menorah would be the same as this one, but they would place the leap week when the marker moves from Tuesday to Wednesday instead of moving from Saturday to Sunday. Their method would allow the spring equinox to vary a total of seven days away from the first day of the new year. This is the major reason I believe the "after the equinox" method is incorrect. The seasons would get too far out of alignment. It seems more natural to have the leap week when the Menorah lamp counter goes back a week.

Leap Years

What is not stated clearly is how to calculate leap years. We need this to finish the calendar calculations. First, we will look at all possible theories and eliminate the ones that do not fit the evidence and see what is left.

Theory 1 – No Leap Year
The first theory is that there was no leap year, leap month, leap week, or leap day at all. The Muslim calendar is like this. It follows the moon phases and never corrects itself. If the Dead Sea Scroll Calendar did this, we would eventually have summer in winter and Passover would be in the fall. Scripture states the year always begins in the spring month of Nisan, also called Abib.

> "You are to begin your calendar with this month; it will be the first month of the year for you." *Exodus 12:2 CJB*

Enoch states the year always begins with the spring equinox when the daylight hours and hours of darkness are equal and that the base calendar is 364 days long.

> "On that day the night decreases to nine parts day and nine parts night, and the night is equal to the day and the year is exactly 364 days long." *Ancient Book of Enoch 72:32*

Looking at these two sources and considering the fact that the Dead Sea Scroll calendar has the solstices and equinoxes built into it proves there has to be some kind of correction to keep the seasons correctly.

Theory 2 – A Leap Month
This theory would have us add a whole month to the calendar every so many years. This is how the modern Jewish calendar does it. It works for the modern Jewish calendar because it is a lunar/solar calendar. This method does not work with the solar year given in the Dead Sea Scrolls. It would be twenty-two years or more before we would add a leap month to this calendar the way the Essenes did their calculations. That would make the seasons off by fifteen to thirty days before a correction. We have two witnesses against the idea of using the lunar leap month.

Before the discovery of the Book of Enoch in the Dead Sea Scrolls, the only full version we had was from the Ethiopic. The Ethiopic version mentions both the sun and the moon in the section for calendar calculations. This has led some to assume there is some lunar calculation required for the calendar. The version found in the Dead Sea Scrolls has "sun and stars" in place of the Ethiopic "sun and moon." This would indicate that we are to use *only* the sun and stars to properly calculate the calendar. The moon is only to be used to check the calculations, to ensure their accuracy.

> "The sun and the stars bring in all the years exactly, so that they do not advance or delay their position by a single day unto eternity" *Ancient Book of Enoch 74:12*

The Book of Jubilees predicted that the Jews would abandon the God-given solar year and adopt lunar calculations. This would corrupt the calendar.

> "For there will be those who will assuredly make observations of the moon – now it disturbeth the seasons and cometh in from year to year ten days too soon. For this reason the years will come upon them when they will disturb the order, and make an abominable day the day of testimony, and an unclean day a feast day, and they will confound all the days, the holy with the unclean, and the unclean day with the holy; for they will go wrong as to the months and sabbaths and feasts and jubilees. For this reason I command and testify to thee that thou mayest testify to them; for after thy death thy children will disturb them, so that they will not make the year 364 days only, and for this reason they will go wrong as to the new moons and seasons and sabbaths and festivals…" *Ancient Book of Jubilees 6:36-38*

With all of this evidence I think we can safely conclude there should be no leap month.

Theory 3 – A Leap Day
The third theory is to add a day or two at the end of the year to make the first of the year come out evenly with the spring equinox. This sounds like the most accurate way of doing it, but it would break the seven-day cycle. We can see in the calendar scrolls (4Q230-231a) the moon phases were added to the base calendar. The moon phases show there was no leap day each year to compensate for the drift.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

The priestly calendar scrolls (4Q230-231a) have a repeating six-year cycle. In year one of that cycle the first of Nisan is a Wednesday. It is also a full moon. The new moon appears on Friday, Nisan 17 and the second full moon, called a blue moon, appears on Thursday Nisan 30. The moon phases are recorded every month for six years. A close look at these calendar scrolls demonstrate no leap days in the first six years. If we added a leap day anywhere in the six-year period, the moon phases would be off.

It has been noted that 4Q230-31 do not take into account that the moon adds a day every two years and ten months, which calls into question if it can be trusted for accuracy. Dead Sea Scroll 4Q317 shows the calendar calculations with the same moon phases but it has scribal notes correcting the moon phases of 4Q319-320. All together these scrolls show that the Essenes were just using the moon as a second witness to mark time.

The addition of moon phases to the base calendar prove they did not use a leap day every year. These moon phases also help to pinpoint the year the Essenes were using for the calculations. The full moon would only show up on the same day in the same week every nineteen years. Coupling that with the spring equinox occurring on the Tuesday of that same week makes it much rarer: only once in over five hundred years.

Theory 4 – A Leap Week
The fourth theory is to intercalate a leap week every so many years. This is the only theory left so it must be the correct one. This would keep the seven-day cycle uninterrupted and keep the seasons in check. But how do we find out exactly when to add the leap week to the end of the year? There have been several theories proposed to answer this question.

Leap Week Theory 1 – Shemittahs and Jubilees
In this theory we would add a leap week at the end of every Shemittah (seven-year period) and add an extra leap week every Jubilee year (every fiftieth year). At first, this sounds logical because Shemittahs and Jubilees are a major part of the calendar system. The problem with this design is that there would be a maximum of thirteen days away from the equinox before the Jubilee year, and it would still have 6.11 days after the first Jubilee year. There would have to be extra leap weeks added somewhere, so the theory is incomplete and makes the year off too many days.

Leap Week Theory 2 – Shemittahs and Sun Cycles
Another way of using Shemittah years for leap years is to replace the extra leap week on the Jubilee with one on every twenty-eight-year sun cycle. A ritual is performed every twenty-eight years thanking God for the creation of the sun and the calendar (see the Birkat Hachama in the chapter on the Modern Jewish Calendar). Adding a leap week at the end of each Shemittah and each twenty-

eight-year-sun-cycle is more accurate than the Shemittah/Jubilee theory, but it still has 5.46 days left over at the end of seven hundred years.

The calendar fragments show years one through six and then year one repeats. This may not be the case every year, but since it is the case in some years the leap weeks cannot be *every* Shemittah year.

There are other variants of the Shemittah theory, but I believe all of them allow the start of the year to drift too far away from the equinox. In my opinion, theories three to five are the only viable ones.

Leap Week Theory 3 – Wednesday after the Equinox
This theory places New Year's Day, Nisan 1, on the first Wednesday that occurs after the spring equinox. The idea that the spring equinox cannot be the first day of the new year is based on these passages from Enoch.

> "[6]In this way he rises in the first month [Nisan] in the great constellation, which is the fourth of those six constellations in the east... [8]When the sun rises in the heaven, he comes out of that fourth constellation thirty mornings in succession, and sets accurately in the constellation in the west of the heaven... [32]On that day the night decreases to nine parts day and nine parts night, and the night is equal to the day and the year is exactly 364 days long." *Ancient Book of Enoch 72:6, 8, 32*

So, it is true that the new year, the first of Nisan, occurs after the sun has entered the fourth portal, or constellation, which is after the equinox. But it is also true that the sun enters the other portals after the solstices and equinoxes.
The solstices and equinoxes are set to occur at a predetermined time on the calendar and are off a day or two from the actual time they would be observed. The function of the leap week is to keep the start of the year as close to the spring equinox without disrupting the seven-day week cycle.

This leap-week theory would keep New Year's Day closer to the equinox than the other methods while keeping the seven-year cycle uninterrupted. If the spring equinox fell on a Wednesday, the first of the year would be seven days later, on the next Wednesday. This would allow the first of the year to drift up to a maximum of seven days away from the spring equinox.

S	M	T	W	T	F	S
			VE	1	2	3
4	5	6	7			

Leap Week Theory 4 – Wednesday on or after the Equinox
This theory is the same as theory 3 except that it is thought that if the vernal equinox falls on a Wednesday, it would also be the first day of the new year. This would allow the first day of the new year to occur up to a maximum of six days away from the equinox. This seems more accurate but there is an even more accurate method.

S	M	T	W	T	F	S
			1(VE)	2	3	4
5	6	7				

Leap Week Theory 5 – Wednesday closest to the Equinox
In my opinion, the best theory seems to be to place New Year's Day on the Wednesday closest to the spring equinox. This self-correcting method would keep the seven-year cycle intact and allow a drift of only up to a maximum of three days before or up to a maximum of three days after the spring equinox. This is by far the most accurate method.

S	M	T	W	T	F	S
-3	-2	-1	VE	1	2	3

In the next chapter the Jewish historian Josephus will give us a clue that this method is the correct one.

Enoch's Five, Six, and Eight Year Periods
Enoch 72:32 says that the calendar year is exactly 364 days. Enoch 74 discusses the difference in the calendar months of his system and the lunar months. Enoch says that the moon has 354 days in one lunar year. This makes 1,062 days in three lunar years, 1,770 days in five lunar years, and 2,832 days in eight lunar years. The number of his calendar days total 364 days in one solar year, 1,092 days in three solar years, 1,820 days in five solar years, and 2,912 days in eight solar years.

This has made some think years three, five, and eight are special and that they must be used in the calculation of the leap years in some way.

There are almost ten days' difference in one year. The basic principle is that in Enoch's septenary system, there are thirty-six lunar cycles every three years, sixty-one lunar cycles every five years, and ninety-nine lunar cycles every eight years. On the solar calendar you would have thirty six months in three years, but sixty months in five years, and ninety six months in eight years. So in three years they appear to be equal, but there is one extra month by the time you get to year six and three extra months by the time you get to year eight. This is without taking into account any leap system so as not to confuse readers. In other words, you would think you would see the extra month in year six but it appears in year five instead and you might think to see three extra months by year nine but they show up in year eight instead.

Enoch is simply showing how off the calendar would be if it used the moon for *any* calculation. That's all. It has nothing to do with leap years.

Evidence for the Correct Method
If we recap the facts from this chapter, we can see that there must be a leap year sometime, and it has to be a leap week to fit all the criteria. Out of the three possible leap week theories using the Wednesday closest to the spring equinox is the most logical.

1. The spring equinox is the pointer for the start of the year.
2. The year always starts on a Wednesday.
3. There are no leap days that occur every single year.
4. The solstices and equinoxes are calculated, not observed.
5. The Wednesday closest to the equinox is a self-correcting method.
6. The priestly courses do not show any leap weeks. Therefore, the leap weeks are not counted as part of the year, in the same way that the tekufahs are not counted as part of the days inside of the months.

Conclusion
In my opinion, the correct leap week method is keeping the start of the calendar as close to the spring equinox as possible. This is best done by placing the first of the new year on the Wednesday closest to the spring equinox. This will keep the seven-day cycle intact.