

Chapter VII

Day of Atonement and October 22, 1844

The question has been raised whether October 22 was the correct Gregorian calendar equivalent for the Day of Atonement on 10 Tishri (tenth day of the seventh month in the ancient Jewish calendar) in 1844.

Calculations to ascertain the modern equivalent for an ancient date like this depend upon (1) the projection of that date forward into modern times through mathematical computations, or (2) the survival of the ancient calendrical practice through its continual use by a perpetuated community of persons. The Karaite sect of Jews has sometimes been cited as an example of such a community that (it is assumed) has handed down the ancient Jewish system of calendation as a living tradition.

This assumption about the Karaites is open to question. Some chronographers, E. Bickerman for example, have held that there were periods in their history when the Karaites used a more programmatic calendar, as opposed to one based more directly upon observational factors. This applies in particular to the problem of how the intercalary month was added in periodically to keep the Jewish lunar calendar even with the actual solar year.

When the Millerites set out to establish the correct modern equivalent in the Gregorian calendar for the date of the Day of Atonement on 10 Tishri in 1844, one source of authority which they consulted was the Karaite calendar as it was thought to have preserved the most original calendrical practice among the Jews. This assumption may not have been completely accurate.

Even if the Karaites did retain a more original usage of the ancient Jewish calendar, their practice may still have been adapted or interrupted. It is also possible that the Millerites may not have understood their Karaite sources with perfect clarity. However, regardless of the problems involved

in such an approach, the Millerites should still be commended for having made the effort to obtain the most accurate determination of that date that they could arrive at from the sources then available to them.

I do not know how original nor how accurately preserved the Karaite calendrical practices are since I have not studied them in any detail myself. Neither do I know how well the Millerites understood the Karaites. However, I no longer consider the Karaite practice in this regard particularly relevant to the problem.

With the passage of more than a century since the Millerites made their October 22 calculation, more accurate, direct, and ancient contemporary sources have come into our hands. These now enable us to deal with such a determination with more precision. I refer to the results that have come from the work of a number of scholars who have been engaged in research on ancient mathematics and astronomy.

Mathematical computations have produced a complete table of dates for all the new moons of antiquity. These have been correlated with the lunar calendar used in ancient Babylonia through the use of a representative number of datable references to intercalated months in the datelines on Babylonian business documents. Not only do these references indicate the particular years in which the extra month was intercalated, but enough of them are also available with which to establish the mathematical practice by which they were intercalated.

This line of investigation indicates that probably by the sixth century B.C. (and certainly by the fourth century B.C.) the intercalated months were added on a systematic mathematical basis and not on just an ad hoc observational basis.

The end product of this work has been the compilation of tables with the Julian equivalents for the dates of all the new moons in the Babylonian calendar from 626 B.C. to A.D. 75. See the work entitled, *Babylonian Chronology*.¹

We can therefore bypass the intermediate state of the Karaite calendar in our study of this problem and go to materials that have been derived directly from contemporary texts of the ancient world.

Before this source is consulted for its input into the problem, a basic qualifying question should be asked here. Is it legitimate to utilize a Babylonian source to determine dates in the calendar used by the Jews who lived in Palestine under Persian rule?

1 R. A. Parker and W. H. Dubberstein (Providence, 1956).

It is true that the Persians did employ a different set of month names than those found in the cuneiform texts from Babylonia. These month names appear, for example, in the texts from the time of Darius I that were excavated at Persepolis.

In Babylonia under Persian control, however, the scribes continued to use the normal Babylonian month names, and these month names spread west from there to Palestine where they appear in several postexilic biblical books (Neh 1:1; 2:1; 6:15; Esth 2:16; 3:7; 8:9; Zech 1:7; 7:1) and on to Egypt where they appear in the Persian-Babylonian half of the double datelines of the Elephantine papyri from the fifth century B.C. (the other half gives the date in native Egyptian terms).

While it is technically true that there was a distinction between the native Persian and Babylonian calendars, for practical purposes what we are talking about here is the Babylonian calendar that was in use in Babylonia and its western dependencies during the Persian period. It was under this calendar that the biblical personages like Ezra and Nehemiah and their immediate predecessors lived and worked.

If we were working on the problem of dating Christ's death or some of the other events that took place later in the 70 weeks' prophecy, then our use of this source would have to be qualified to a serious degree. But in this instance—coming as it does at the beginning of the 70 weeks—we are not dealing with Jews who lived in later Palestine. We are dealing with the date when a Persian king gave a decree to the Jewish exile Ezra who lived in Babylonia prior to his journey to Palestine. Thus it is quite legitimate to use the Babylonian calendar for that purpose. The fact that Ezra adapted that calendar to his purposes by dating his New Year on 1 Tishri does not negate the usefulness of the underlying Babylonian scheme as a vehicle with which we can investigate this problem.

Before entering into our calculations we should make a further observation in regard to the effect of the difference between the Julian and Gregorian calendars. As a standard convention, historians employ Julian dates for the B.C. period uniformly. The Julian year of 365.25 days is, however, 11 minutes and 4 seconds longer than the true tropical year. By the sixteenth century A.D. the accumulated excess of numbered days over the true solar years elapsed had reached about 10 days.

Pope Gregory XIII decreed that this excess should be compensated for by adding 10 numbered days to the month of October 1582. Thus Friday, October 15, followed Thursday, October 4, in that year. The principal reason for this adjustment was to bring the vernal equinox, and Easter

with it, back to March 21 when it had drifted forward—in terms of the Julian calendar—to March 11.²

The adjustment required by the Gregorian calendar necessitated a renumbering of the days involved; but it did not affect the order of the days of the week (= rotations of the earth), or the regular astronomical occurrence of new and full moons, or the total number of calendar years elapsed. In the case of the calculations offered below, this difference may be ignored. The reason for this is that we are dealing basically with lunar months and dates for new and full moons, especially those that overlap the autumnal equinox. The calendar revision described above was intended to fix the date of the spring equinox. In accomplishing that purpose it also fixed the dates for the autumnal equinox that, in ancient times, fell in the month of Tishri.

What we really wish to know is, given the total number of 2300 solar years elapsed, how did the new moons of the same months of the years at the beginning and the end of this whole cycle relate to each other?

Since there were three main positions for the moon in terms of the numbered dates of the lunar year in relationship to the solar year (see chart below), it is the position of the new moon and thus the lunar month in relationship to the fall equinox that we are most interested in, not the Gregorian day number assigned to the day of the new moon at that time. The tables employed below, that are based on the Julian calendar, suffice to serve that purpose adequately.

What we want to know, therefore, is when (in terms of the Babylonian system of intercalation) did the month of Tishri start in 458 and 457 B.C.? These are the dates which demarcated the fall-to-fall year during which Artaxerxes I issued his decree and Ezra returned to Jerusalem with his fellow exiles. These dates can be determined by simply looking them up in Parker and Dubberstein's tables. The tables indicate that 1 Tishri in 458 B.C. fell on October 2 and in 457 B.C. on September 21 (p. 32).

These two dates can be related to their corresponding numbers which bounded that fall-to-fall year (1843-1844) in which the 2300 prophetic day-years ended. This can be done mathematically. At this point we are helped by the fact that 235 lunar months have almost exactly the same number of days as 19 solar years.³ Thus we do not yet need to be concerned with the specific years within this cycle during which intercalations were designated.

2 For a popular discussion of this subject, see G. Moyer, "The Gregorian Calendar," in *Scientific American* 246 (May, 1982): 144-53.

3 Parker and Dubberstein, *Babylonian Chronology*, 1.

The Babylonian astronomers were well aware of this 19 year cycle. It provided one of the bases upon which the finer details of those cycles were established and worked out.

For our present purpose we can simply divide the 19 years of this intercalary cycle that was based upon the solar year into the 2300 years of the prophecy. Every 19 years the dates in the lunar calendar repeat themselves. For this reason any multiple of 19 years later would give the same date for 1 Tishri—whether it be in A.D. 1844 or any other year. Nineteen goes into 2300 a total of 121 times with one left over. In other words, $19 \times 121 = 2299$ with one year left over.

If 19 had divided evenly into 2300, then 1 Tishri would have fallen on the same Babylonian day in 1844 that it did in 458 B.C., but it didn't divide evenly. There was one year left over, and now we have to deal with that left over year. This is done by noting the finer details in the intercalary cycle. In order to do this I have copied below the new moon dates for the first seven months of 459 to 456 B.C. to provide a basis for further discussion of this point:

B.C. Yr.	Nisan	Iyyar	Sivan	Tammuz	Ab	Elul	Tishri	(Position)
459	4-19	5-18	6-17	7-16	8-15	9-13	10-12	A
458	4-8	5-8	6-6	7-6	8-4	9-3	10-2	B
457	3-27	4-26	5-25	6-24	7-24	8-22	9-21	C
456	4-15	5-14	6-13	7-13	8-11	9-10	10-10	A, etc.

As can be seen from a comparison of the dates in these years, the Julian date for the same lunar calendar date basically moved forward 10 days for each of the three years. Then, with the intercalation of a second Adar (a second month (XII) on March 16, 456 B.C., the whole cycle was thrown back a month later in the year, from which point the sequence started over again. For example, the date for the new moon in Nisan 459 B.C. is 4-19. It occurs approximately 10 days earlier the next year (4-8), and still another 10 days earlier the following year of 457 (3-27). But in 456 B.C. the insertion of an intercalary month moves the date for the new moon to 4-15, nearly what it was in 459.

The reason for this advance of the lunar months through the solar year until they were retarded again stems from the fact that 12 lunar months of

29.5 days results in a year of 354 days which is essentially 10 days short of the solar year. The ancients allowed this 10 day deficit to accumulate for three years (resulting in a total of 30 days). They then compensated for this difference by inserting a thirteenth month of 29.5 days (= 30) at the end of that third year. Whether they realize it or not, Christians are familiar with this system through the way the dates for Easter change from year to year.

Unfortunately the deficit compensated for every third year or so was not precisely a third of a lunar month. This mathematical fact produced some irregularity in the pattern of the years in which the additional month was added. This problem need not concern us greatly here for we have the 19 year cycles with which to work over the long haul like the 2300 day-years.

Now we need to decide to which of the three years of the intercalary cycle 1844 belonged. Since there was an excess of one year when the 19-year cycle was divided into the 2300 years, the year at the end of the 2300 years was one year farther down the intercalary cycle than the year at the beginning of the 2300 years. It will be necessary, therefore, to look at the year in which the 2300 years began in terms of which year of the cycle it fell in. The year at the end of the 2300 years, 1844, can be identified as the next year in the cycle.

From the table quoted above we may refer to 459 as the *late year*, or position *A*, because 1 Tishri fell on October 12 (10-12) then. The *intermediate year*, or position *B*, is 458 because 1 Tishri fell on October 2 (10-2). The *early year*, or position *C*, is 457 because 1 Tishri fell on September 21 (9-21) of that year.

The year we are interested in fell 2300 years later than the fall-to-fall year of 458/457. The fall-to-fall year of 458/457 was measured by 1 Tishri that fell in the *B* and *C* positions, the intermediate and early positions of October 2 and September 21. The 1 Tishri of the fall-to-fall year 2299 years later fell in these same *B* and *C* positions. But from our division of 19 into 2300 we are interested in the pattern of the next fall-to-fall year because of the one year left over from that division.

This means that we must move one year farther along in the cycle to determine those dates. When we do so, we find that they come out at the *C* and *A* positions, because after the third or *C* year, the cycle reverts back to start over again due to the intercalation at the end of the third or *C* year.

To summarize: This means that in the fall of 1843 1 Tishri fell in the *C* position or around September 21 (9-21). In the spring of 1844—at the end

of that Babylonian lunar year—the Babylonians normally would have intercalated a second Adar according to their regular and established mathematical procedure. This means that, in the fall of 1844, 1 Tishri would have been retarded by the intercalary month back to the late or *A* position. The date given for its corresponding number 2300 years earlier is October 10 (10-10). Ten days more to the Day of Atonement on Tishri 10 would thus take us to October 20.

The two-day slippage over the 2300 years has developed from minor mathematical differences and is not statistically significant. This is evident from the fact that the Millerites only had to make a choice between one new moon or the other in 1844: the one for an early Tishri, or the one for a late Tishri. They chose the late one, and that was the correct one when it is figured from the Babylonian lunar year of 458/457 B.C.

If the Karaites did not come up with this date, then they simply differed from the pattern that was in operation during the year when Ezra returned to Jerusalem. There were plenty of opportunities for such a difference to have developed over the years. But we no longer need be concerned with such potential differences because now, with advances in research on ancient astronomy and calendation, we can trace this matter all the way back to its source—the year when Ezra left Babylon. Tracing this trail back that far has indicated that the Millerites did select the correct date for 10 Tishri by dating it to October 22 in A.D. 1844. This point has now been established as definitively as it can be through the study of ancient mathematics and astronomy.