

A Unique Feature of the Jewish Calendar - *Deḥiyot*

Ari Belenkiy

Department of Physics, Bar-Ilan University

ABSTRACT.

From the 2nd century AD the coincidence of Passover and Easter was recognized as a problem for the Christian church by the church authorities, and in the 4th century, after Christianity became the Roman state religion, Roman authorities took steps to prevent Passover and Easter coinciding. This effort was complicated by the growing separation between the churches in Rome and Constantinople.

Though from the 2nd century the majority of Jews lived in the diaspora, at least up to the 10th century the calendar was governed by a rabbinical court in Eretz Israel (the Land of Israel). Here we discuss the changes in the Jewish calendar in the 5-8th centuries AD, the middle (c. 636 AD) of which period witnessed an abrupt transition from Byzantine rule over Eretz Israel to Arab rule. In this period no serious changes were made in the basic mathematics of the Jewish calendar; the only changes had a political context.

Here we discuss a single but singular feature of the Jewish calendar, the "Deḥiyot" [postponements] of Rosh Hashana. Our major claim is that Deḥiyah D [postponement from Wednesday to Thursday] and Deḥiyah U [postponement from Friday to Saturday] entered the calendar c. 532 AD as an ingenious Jewish response to Emperor Justinian's ban against the Passover feast (Nisan 14) falling on a Saturday, instituted to mend a famous calendar rift between the Roman and Alexandrian churches.

Next we claim that Deḥiyah A [postponement from Sunday to Monday] became part of the calendar no earlier than when the 2nd day of the festivals Rosh Hashana [New Year] and Sukkot [Tabernacles] acquired the status of sacred day and we raise the lower historical boundary of Deḥiyah A's introduction in the calendar up to the time of the first Gaonim [heads of talmudic academies in the Arab caliphate] (c. 658 AD).

We also suggest timing of three other deḥiyot.

"In the sixth Christian century lived Procopius, a Christian magistrate of Constantinople, in the days when Justinian was Emperor and Belisarius general. As many know, he wrote the history of his own times, a work every way of uncommon value. By the best authorities, he has always been considered a most trustworthy and unexaggerating historian, except in some one or two particulars, not at all affecting the matter presently to be mentioned."

(Herman Melville, *Moby Dick*)

Introduction

The modern Jewish calendar has a 19 year intercalation cycle with intercalary (consisting of 13 months) years 3, 6, 8, 11, 14, 17, 19 and is built on the notion of the Molad - the point in time symbolizing an abstract calendar "luni-solar" conjunction. *Moladot* (plural of molad) are equidistant in time, separated by the value of the calendar month which is accepted to be equal to the *mean month* of the Babylonians and Greeks, quoted in Ptolemy's *Almagest*¹ as $29^d 12^h 44^m 1^p$.

The base point of the modern calendar is the imaginary Molad Tishrei of the year 3761 BC. Its name - Molad *Baharad* - came from a mnemonic for the time of that Molad: $2^d 5^h 204^p$.² Adding to this number the length of the regular (of 12 months) lunar year of $354^d 8^h 876^p$, one arrives at Molad *Adam*, the moment which Jewish tradition announced as the birth of the first man: Tishrei 1 of the year 3760 BC, $6^d 14^h$ into the week (Friday, 8:00).³

To find the time of the coming Rosh Hashana (further: RH), one has to recall the molad of the previous RH and add the length of 12 calendar months, $354^d 8^h 876^p$, if the coming year is regular, or the length of 13 calendar months, $383^d 21^h 589^p$, if the year is intercalary. The result should be divided by 7 and the remainder will show the day of the coming RH. All the months are of constant (30 or 29 days) length and alternate; the two variable months of the modern calendar are \hat{H} eshvan and Kislev, which immediately follow the month of Tishrei. When \hat{H} eshvan and Kislev were first employed in the role of variable months is unknown. It might be that this was the contribution of Hillel II in 359 AD, together with the introduction of a 19 year cycle. However, we will see that this conjecture is probably untrue and that in the 4-5th centuries the month Elul played the role of a single variable month.

That's all, though there are also four rules of postponing RH by 1-2 days, called De \hat{H} iyot, explaining which is the major objective of this paper. These De \hat{H} iyot are a very singular feature of the Jewish calendar, not existing in any other calendar.

I. Deḥiyot ADU

According to a rule of the present calendar, Deḥiyah ADU, RH cannot fall on the 1st (A-Aleph), 4th (D-Dalet), or 6th (U-Vav) days of the week.⁴

Historically Deḥiyah A was often mentioned separately from Deḥiyot DU. The latter were first suggested c. 280 AD in connection with the idea that Yom Kippur [the Day of Atonement], celebrated on the 10th of Tishrei (9 days after RH), cannot fall immediately before or after Shabbat. The reason was twofold: Mar Ulla claimed that the vegetables would perish from two days' negligence while Rabbi Aha ben Hanina argued that the dead cannot wait two days to be buried.⁵ Being taken as a law, this would immediately lead to Deḥiyah (DU). It is unclear, however, whether these reasons were found to be imperative at that time: Palestinian Talmud quotes⁶ another sage, Rabbi Honia, who objected to those rules and to those "who remove Yom Kippur from its rightful place." At this point nothing is said about Deḥiyah A.

However, there were no Deḥiyot up to the year 383 AD. This is partially confirmed by an inscription on a recently found tombstone from Catania in Sicily, which plainly shows that the Jewish community in Sicily was unaware of Deḥiyah D in the year 383.⁷ As we will see later, Deḥiyah A was unknown as late as 506 AD.

1. Two calendar systems

The wider public became aware of the structure of the Jewish calendar only in the beginning of the 10th century AD, after calendar debates between Saadia Gaon, head of the Sura⁸ talmudic academy at Baghdad, and Aharon ben Meir, head of the talmudic academy at Tiberius, at the Sea of Galilee. These debates led to great turmoil, finally won by Saadia Gaon,⁹ but the calendar *per se* since that time has been almost certainly unchanged. At the end of that century, in the year 992 AD, Hai Gaon, head of the Pumbedita academy at Baghdad, in one of his epistles claimed that the calendar Jews used in his time was the same as was introduced by the Eretz Israel Jewish leader Hillel bar Yehuda (Hillel II)¹⁰ in 359 AD.

Even if it were so and the modern Molad system goes back to the year 359 AD, it does not require Deḥiyot. With a formal regular calendar year of $354^d 8^h 876^p$ the system can work perfectly with 354 or 355 days in regular years; with a formal intercalary calendar year of $383^d 21^h 589^p$ the system can work perfectly with 383 or 384 days in intercalary years. The present-day Jewish calendar solves this problem by the introduction of two variable months.

In the paper "Jewish Calendar in the Roman Period"¹¹ I argue, however, that from the end of the 3rd till the mid-8th centuries Jews used another system, called "epact," described by Otto Neugebauer in one of his last papers, "Ethiopic Easter Computus." This system was also used by the contemporary Alexandrian Church.¹² The rule in that system was to shift the holidays each year 11 days down in the Julian calendar and move them up by 30 days in the Jewish intercalary years. In the last, 19th, year of the cycle the shift down had to be 12 days; it later acquired the name "saltus lunae," the "jump of the moon." The only difference between the Church and the Jewish calendars was that in the former the second month Elul was intercalated while it was the second Adar in the latter.

The system leads to regular Jewish years of 354 (365 -11) days in the regular Julian year or of 355 (366-11) days in the leap Julian year, and to 384 or 385 days, correspondingly, for intercalary years. The only thing needed was to change the number of days in one month of 29 days to 30 days once in four years. The "saltus lunae," applied in a fixed year of the cycle, could cause the regular and intercalary years be of 353 and 383 days, correspondingly. Each of the Deḥiyot ADU immediately destroys this convenient *3x2-type-of-year* classification by stretching, say, the regular year to 356 days or squeezing the intercalary year down to 382 days. Only external circumstances could impose Deḥiyot ADU on a simple structure of the "epact" system. It is our claim that the introduction of Deḥiyot ADU finally (c. 776 AD) caused a change of the calendar system from the "epact" to the modern one.

The intermediate period (5-8th cent. AD) could be responsible for the survival in the Talmud of the statement¹³ attributed to Mar Shmuel, "the year can be of 352 and 356 days," which probably reflected the situation of the first half of the 3rd century when 19-year cycle was not yet enforced and either the 8-year cycle was in use or the beginning of the new months were fixed by direct observation. Because there is no reason for the year of 356 days in the

"epact" system except legitimizing the *deḥiyot*, this is proof that *deḥiyot* entered the calendar at the time of the final editing of the Talmud. Though generally the final editing is attributed to Rav Ashi (c. 425) or Ravina (d. 499) we may assume, as was shown in some other cases, that Shmuel's statement was returned to the Talmud after Ravina's editing.¹⁴

As we shall see, a discussion about specific *deḥiyot* is related to the question of where in the calendar an extra day was added (or subtracted): 1) between RH and Passover (Nisan 15) or 2) between Passover and RH. In the first case the number of days between RH and Passover was variable but between Passover and the following RH it was fixed. The logic should be inverted in the second case. Depending on when the extra day is added, *Deḥiyah ADU* (postponement of RH) implies different weekdays when the Passover cannot be held.

Today the number of days between RH and the Passover is variable, but the number of days between the Passover and the coming RH is fixed and equal to 163 days (2 days more than the number of weeks). Therefore today the Passover cannot fall on the 6th, 2nd, or 4th days of the week. These days do not say anything particularly important in a historical context. To discover something more significant, let us look back into history.

2. The conflict

The conflict between Passover and Easter started almost at the very beginning of Christianity. The *Harper Bible Dictionary*¹⁵ (entry: Easter) says:

"Easter was originally observed on the day following the end of the Passover feast (14 Nisan)¹⁶, regardless of the day of the week on which it fell. In the mid-second century, however, some Gentile Christians began to celebrate it on the Sunday after 14 Nisan,.... The resulting controversy...reached a head in 197, when Victor of Rome excommunicated those Christians who insisted on celebrating Easter on 14 Nisan. The dispute continued until the early fourth century, when [they] were required by Emperor Constantine to conform to the empire-wide practice of observing Easter on the Sunday following 14 Nisan, rather than on that date itself."

The problem was a subject of irritation not only for Christians, but also for Jews. Talmudic sages tried to avoid any co-incidence of Jewish holidays with Christian or pagan holidays.¹⁷ Parallel to that, *Didascalia*, a 3rd century Christian work, instructed Christian to fast for

Jews during Passover: *"You will fast for our brothers who have not obeyed; even when they will hate us you are obliged to call them brothers."*¹⁸

Both sides wanted a clear separation and seem to have achieved it in AD 325, at the Council of Nicea. A new rule was established at the Council of Nicea (325): Easter would be celebrated on the first Sunday after the first full moon after/on the Vernal equinox.¹⁹

3. Dehiyot DU

However, separation was not achieved completely. At least for a century more the Church condemned its followers who celebrated Easter on the time of Passover, as was done by Councils of Antioch (341 AD) and Sardica (343 AD). Written in 387 AD by the famous Antiochine preacher (and later saint) John Chrysostom, the third of his "six homilies against Jews" was also devoted to the problem of "judaizing".²⁰

The loophole in the Nicean decision was a situation when the Passover feast fell on Saturday: in this case the Passover holiday *per se* (Nisan 15th) and Easter coincided. As a result, on the same day Jews went to worship in synagogues and Christians - in churches.²¹ Mixing was inevitable. This could be a reason behind the practice of the Roman Church to

calendar fell on Saturday. This practice was, however, not followed by the then equally powerful Alexandrian Church: the latter celebrated Easter the next day, the coming Sunday.²²

Here comes a simple hypothesis: when there were 190 days (which is greater by 1 than a complete number of weeks) in regular years and 220 days (which is greater by 3 than a complete number of weeks) in Jewish intercalary years between RH and the coming Passover feast (Nisan 14), RH had to be banned from falling on Fridays in regular years and on Wednesdays in intercalary years to prevent the Passover feast from falling on a Saturday.

This idea, however, is based on the assumption that between RH and the coming Passover there were no variable months (except the intercalated second month Adar of 30 days) and in contradiction with the conjecture of variable length Heshvan and Kislev since 360 AD. So

we should assume that during the time in question (4th-7th centuries) the variable month was still the month Elul.²³

Still, it is highly improbable that the Church alone could influence changes in the Jewish calendar. They had to secure imperial help. The first guess would be to look at the Codex of Theodocius (c. 425) or at the Codex of Justinian (c. 529). Examining the latter's *Liber 3*, which deals with problems related to Easter, we did not find any conclusive evidence of such interference.²⁴ The evidence comes from secular sources.

Procopius, a contemporary of Justinian, writes in the 28th chapter of his *Secret History*²⁵:

"[The emperor Justinian] also did his best to abolish the laws revered by the Hebrews. Whenever the returning months happened to bring the Passover Feast before that kept by the Christians, he would not permit the Jews to celebrate this at the proper time, not to offer anything to God at this feast, nor to perform any of their customary ceremonies. Many of them were brought into court by government officials and charged with an offence against the laws of the State, in that they had tasted lamb at this period. They were then sentenced to pay heavy fines."

The only way to understand this phrase allows the discussion above. Clearly, Justinian could not forbid Passover feast falling *always before* Easter. Though in one or two cases during 19 year (or any other) cycle it is unclear which the "first" full moon and which the "second" full moon after the vernal equinox is, in almost all cases it is clear which the first full moon is. So "always before" would imply that Jews should move Passover to the second full moon. This would lead to the destruction of the very foundation of the Jewish religion, which was not Justinian's goal. So the word "before" has to be reinterpreted: it should mean "immediately before," or a ban on the Passover feast falling on a Saturday. The only change which was required from Jewish sages to comply with imperial decree could be a postponement of the Passover feast by one day - e.g., by adding an additional, 30th day to Adar - to force Nisan 14 falling on Sunday instead of Saturday.²⁶ This scenario is confirmed by the following evidence. Edward Gibbon, in his voluminous compilation, writes, mixing Procopius and Theophanes:²⁷

"The Jews, who had been gradually stripped from all their immunities, were oppressed by a vexation law, which compelled them to observe the festival of Easter the same day on which it was celebrated"

The people of Constantinople delayed the beginning of their Lent a whole week after it was ordained by authority; and they had the pleasure of fasting seven days, while meat was exposed for sale by the command of the emperor."

Gibbon is ambiguous. In the first line we are told (though in a slightly confused way) that Byzantine Jews had to move the Passover feast to Sunday and both the Roman and the Alexandrian churches celebrated Easter simultaneously the same Sunday (as Alexandrians used to do). However, the word "delayed" in the second phrase indicates that Easter was postponed by a week (as Romans were accustomed). If, however, to take into account the rationale behind that decision, the only reasonable way for Justinian to act was to move Easter a week further from Passover.

Jewish sages surely had to comply with Justinian's decree. Then an inevitable confusion had to arise in the "epact" calendar system: if the postponement occurred at the end of a Jewish year of 355 days then a 356th day had to be accommodated, yet one variable month (Elul) was not enough to resolve this problem. Moreover, after such a postponement the next year of 354 days had to be shrunk to 353 days, i.e., one month of 30 days had to be cut to 29 days, but the Jewish calendar did not possess such a tool. The confusion was ended in 8-9th centuries by switching the entire calendar system from "epact" to the modern system and the introduction of two variable months. It was already a time when both Babylonian and Eretz Israel Jewry lived in the Muslim caliphate. The original (Byzantine) requirement for Passover feast not to fall on Shabbat had become irrelevant long time ago.

The question could be asked: why are *dehiyot* named after the RH dating and not Passover? The answer might be that these particular names for *dehiyot* came much later than the story discussed here. For a long time the sages of Eretz Israel and Babylonia disagreed about whether the world was created in the spring (Nisan) or in the fall (Tishrei). Babylonians eventually won, together with Tishrei and RH.

4. Dehiyah A

The Mishna 6:3 in Talmudic tractate *Menachot*²⁸ says:

And they say: On Shabbat? On Shabbat! On Shabbat? On Shabbat! To cut? To cut! To cut? To cut!

What does the Mishna discuss? The Omer, a sheaf of wheat symbolizing the start of the 49 day count from the 2nd day of Passover to Shavuot [Pentecost]. Why were all the questions emphasized and repeated twice? Because it is forbidden to reap on Shabbat! Then why does the Mishna insist? Because Passover (Nisan 15) fell on the 6th day of the week! In their polemics against Boethians in the time of the Second Temple (prior to 70 AD) - when to start counting 50 days to Shavuot - Rabbanim were ready to profane Shabbat. As we see, at the time of the Mishna (over by 220 AD) they repeated their claim without having any problem with RH falling on the 1st day of the week.²⁹

Deḥiyah A appeared in the calendar later than the other two Deḥiyot, though the reason for it was mentioned in the Talmud³⁰ in the name of R. Simon of the mid-3rd century, as a suggestion for preventing Hoshana Rabba [literally: Big Salvation, the seventh day of Sukkot] from falling on Shabbat: we cannot perform the traditional beating of *aravot* (willow branches) on Shabbat. As we shall see below, this statement failed to become a law immediately - probably because that particular reason (a "custom of the prophets") did not seem important: after all, the Mishna 4:2 in tractate *Sukkah* approves their beating on Shabbat.

The lower time boundary for the introduction of Deḥiyah A can be deduced from a famous letter by Sherira Gaon, head of the Pumbedita academy in Baghdad and father of Hai Gaon, with a list of sages from talmudic times up to the 10th century.³¹ Speaking about the death of a certain sage, it implies that Purim [a holiday held 29 days before the Passover feast] of the year 506 fell on the 4th day of the week, so RH of that Julian year had to fall on the 1st day of the week.³² Because up to the 10th century Babylonian sages always followed the calendar of Eretz Israel, we should conclude that before 506 AD Deḥiyah A was not yet a part of the calendar.

On the other hand, "Sheiltot," a recently discovered manuscript³³ by Ahai Gaon (dated usually as mid-8th century), explains why, in his time, Purim and first days of RH and Sukkot cannot fall on Shabbat. Zvi Hirsh Ioffe, in his posthumously published history of the calendar *Qorot Ḥeshbon Haibbur*,³⁴ amended the text of "Sheiltot," including into the ban also Hoshana Rabba, to prove that Deḥiyah A was firmly established by the time of Ahai Gaon, and suggested 640 AD as the year when Deḥiyah A might have entered the calendar

by sheer interpolation between 506 and 750: finding the center between two dates. We suggest a more conclusive argument.

5. Halakhic status of the second day of Jewish festivals

It is clear that the most unfortunate circumstance for Jewish sages was when RH and, following it two weeks later the 1st day of Sukkot, fell on Shabbat. Blowing the *shofar* (ram's horn) on RH and waving the *lulav* (palm branch) on the 1st day of Sukkot - commandments of much greater importance than beating *aravot* - were forbidden in Diaspora when these days fell on Shabbat³⁵ In fact, the Palestinian Talmud³⁶ says that Rabbi Simon, quoted above, also suggested avoiding RH falling on Shabbat!

On the other hand, it was impossible to introduce Deh'iyah "Shabbat" together with Deh'iyah U: this might delay RH by two days and could cause its celebration a day (or two!) after the first vision of the new moon of the Tishrei - a big embarrassment for the community. Besides, this would lead to the frequent occurrence of the 1st day of RH on Sunday, which would lead to three holy days in row; for the ordinary Jew it would be difficult to sustain himself through these days. So how was this problem finally circumvented?

Celebrating RH for two days was a custom in Babylonia (Parthia, Persia) from the time after the expulsion from Eretz Israel following 132-35 Bar-Kochba's revolt. The reason for two days was obvious: messengers from Eretz Israel could not possibly arrive on time to announce the day of the New Moon. Not so with the festive days of Passover, Shavuot [Pentecost] and Sukkot, which start on the 15th, 6th, and 15th days of the Nisan, Sivan, and Tishrei respectively, and to report to Diaspora about the holidays in Nisan and Tishrei messengers were allowed even to transgress Shabbat while Shavuot, at a fixed 50 day distance from Passover, could not cause any problem.³⁷

Now we have to emphasize a very important point of Jewish religion. All the commandments are divided into divine (from the Torah) or rabbinical, and the status of the former group is higher. Though the *lulav* could be waved on all seven days of Sukkot, its waving on the first day has Torah status while on the rest of the festival it is only rabbinical. The same was with blowing *shofar* on the second day of RH - it was only a rabbinical injunction.³⁸

Our claim is that the problem of not fulfilling certain Torah commandments pertained to RH and Sukkot on Shabbat was circumvented only when the second day of these festivals also acquired the halakhic status of the first day regarding the Torah commandments.³⁹ Elevation of the status of the second day of every festival allowed fulfilling the Torah commandments of RH and Sukkot each year, even when their 1st days fell on Shabbat, thus saving rabbinical logic on one hand and allowing a stress on the less significant Hoshana Rabba and its *willow branches* on the other.⁴⁰

Therefore acceptance of Deḥiyah A in the calendar can be dated no earlier than the attachment of Torah status to the second days of RH and Sukkot for the Diaspora. This was never true for Eretz Israel. However, the decline of the Jewish population in Eretz Israel and depriving its leader of the status Patriarch,⁴¹ together with the rise of Diaspora Jewry and the understanding that the Diaspora (with its two days for each holiday) was an unavoidable reality for many years to come, made the Bet Din [rabbinical court] in Eretz Israel (which was in charge of the calendar up to the 9th century) accept unwillingly? Deḥiyah A.

So the lower bound should be raised to the time of the Gaonate's [collective name for the institution of Gaonim] formal establishment (in Baghdad) as the major halakhic authority of world Jewry and the Exiliarch as the major Jewish authority. The encyclopedia⁴² says that this happened in the year 658, when a dual authority was officially recognized: along with the authority of the exilarch [the political head of Babylonian Jews], a new office of Gaon was created for the head of the school of Sura.

The year 658, is however, only a lower bound for Deḥiyah A entering the calendar. We want to suggest an idea which would raise the date to the end of the 8th century. In 770's a group dissented from Baghdad Jewry and later acquired the name of Caraites [readers]. They questioned many rabbinical injunctions and even some of the traditional elements of the Jewish worship like *shofar*, *tephilin* [phylacteries], *lulav* and so on. So not blowing *shofar* on RH and not waving the *lulav* on the first days of RH and Sukkot falling on Shabbat could be considered a surrender to Caraites who also fiercely attacked the fixed rabbinical calendar. That's why Gaonim hastened to elevate the halakhic status of the 2nd day of the holiday to the Torah level, formally resolving the problem of negligence of the Torah commandments.

As I argue in my paper "Jewish Calendar in the Roman Period," the switch to the modern *Molad* system probably happened around the year 776, as the medieval text "Baraita d'Shmuel" hints. This dating fits our idea that the Molad system was the only possibility for accommodating *deḥiyot* while keeping only three types of regular year. On the other hand, this idea suggests either repudiating Ioffe's interpolations in *Sheiltot* by Ahai Gaon and dating the *Sheiltot* some 30 years later, or assuming that the interval between Purim and RH was not yet rigidly fixed at the mid-8th century, because Elul was still a variable month.

II. Three Other Deḥiyot

Deḥiyah Yaḥ (literally: 18), called also *molad zaqen* (literally: old molad), says that if Molad Tishrei fell after 18^h then RH had to start only the next day. This rule is believed to originate from an obscure passage in the Talmudic tractate *Rosh Hashana*⁴³ :

"The father of Rabbi Simlai asked Shmuel, "Do you know the difference between whether the molad is Rabbi Zeira said: This what father of Rabbi Simlai meant: if the molad

The late 3rd century sage, Rabbi Zeira, who moved from Babylonia (Persia) to Eretz Israel, elaborated that if the *molad* (conjunction?!) falls after noon, one cannot possibly see the young moon the same evening, i.e. after about 6-8 hours depending on the season, but if before the noon - the young moon can be visible the same evening. Though it is unclear what type of conjunction was meant - mean or true - the statement cannot bear reasonable scrutiny.

If Rabbi Zeira meant "true conjunction" then his statement is false because the record in moon's eye-visibility is about 15 hours after conjunction.⁴⁴ If he meant "mean conjunction" then the situation is even worse: mean and true conjunctions can follow one another as close as 14 hours.⁴⁵ Therefore the moon might be perfectly invisible the same evening, even if the mean conjunction occurred before midnight! The reason quoted could cloud another one.⁴⁶

This hidden reason was to adjust Jewish time-reckoning (days start at 18:00) and Muslim time reckoning (days start at 12:00). This means that Deḥiyah Yaḥ was introduced after the Arab conquest of the Asia, and the exact time grossly depends on when the modern Molad system was introduced. Sacha Stern convincingly argues that *molad zaqen* might not have been a part of the calendar until after 836 AD while the Saadyah Gaon - Ben Meir controversy shows that c. 922 AD this rule was already firmly established.⁴⁷ It is an interesting open question to find how one of the late 9th cent. AD Jewish exilarchs was coerced by Muslim rulers into introducing such a calendar unification.

The two last Deḥiyot - GaTRaD (literally: 3, 9, 204) and BaTuThaKPaT (literally: 2, 15, 589)- are mere adjustments of Deḥiyot ADU and Yaḥ to the *3x2-types-of-* year system.

The first - GaTRaD - is applied when Molad Tishrei falls, in a regular year, on the 3rd day after 9^h 204^p. The reason for postponing the beginning of the year to the next day is that after adding 354^d 8^h 876^p the following year will fall on the 7th day after 18^h, which will cause postponement to the 1st day according to Deḥiyah Yaḥ and then to the 2nd day according to Deḥiyah A. Therefore this year will consist of 356 days, which is undesirable.

The second - BaTuThaKPaT - is applied when Molad Tishrei falls on the 2nd day after 15^h 589^p in a regular year following the intercalary year. The reason for postponing the beginning of the year to the next (3rd) day is that if the previous intercalary year of 383^d 21^h 589^p had to fall on the 3th day after 18^h, according to Deḥiyah Yaḥ and Deḥiyah D it had to be postponed to the 5th day. Then this year could not possibly start on the 2nd day, because the intercalary year had to consist of 382 days, which is undesirable.

Both these two last Deḥiyot in the present form clearly appeared after ADU and Yaḥ were introduced, though they also could have existed in another form after the introduction of the molad system with Deḥiyot ADU and before the introduction of Deḥiyah Yaḥ. Both are responsible for the fact that the calendar acquired a convenient classification of years by length: there are two kinds of year: "regular" or "intercalary," and three types of the "regular" kind: "simple" of 354, "complete" of 355, and "incomplete" of 353 days. This simple classification eventually led, in the 9th century, to the adoption of the so-called "4-gates" table, named after the four remaining permissible days of the week for RH - a basic table for the contemporary Jewish calendar.⁴⁸

Epilogue

As we know, later historical developments in the Near East switched Jewish attention from Christianity toward Islam. Under the protection of Muslim rulers Jews could fearlessly disregard the problem of postponements DU altogether. Why didn't they dispense with Deĥiyah ADU? The probable answer is that the sages of the late 5th and early 6th centuries had already legitimized all Deĥiyot by quoting convenient places in Talmud and thus attaching halakhic (legal) reasons to each. Still, their triumph was to find a way to restore the relative simplicity of the calendar by finding the modern calendar system. The price was insignificant - two additional deĥiyot.

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| 7 | 6 | 24 | 3 | 8 | 4 |
| 8 | 17 | 13 | 22 | 27 | 23 |
| 9 | 28 | 2 | 11 | 16 | 12 |
| 10 | 9 | 21 | 30 | 5 | 1 |
| 11 | 20 | 10 | 19 | 24 | 20 |
| 12 | 1 | 29 | 8 | 13 | 9 |
| 13 | 12 | 18 | 27 | 2 | 28 |
| 14 | 23 | 7 | 16 | 21 | 17 |
| 15 | 4 | 26 | 5 | 10 | 6 |
| 16 | 15 | 15 | 24 | 29 | 25 |
| 17 | 26 | 4 | 13 | 18 | 14 |
| 18 | 7 | 23 | 2 | 7 | 3 |
| 19 | 18 | 12 | 21 | 26 | 22 |

“Table XIX”

Table 1 (taken from O. Neugebauer's "Ethiopic Easter Computus," [*Oriens Christianus*, 63, 4, 1979], p. 94). A regular 19 year cycle according to "epact" theory. In the 1st column, the number of the year; in the 2nd, epact; in the 3-6th, dates of RH, Yom Kippur, Sukkot and Passover feast, correspondingly, according to the Alexandrian civil calendar.

| D | i | ep | t | j | e | m | \bar{m} | yk | $\bar{y}k$ | tb | $\bar{t}b$ | bf | $\bar{b}f$ | p | \bar{p} | pw | r | \bar{r} |
|----|---|----|---|---|----|-----|-----------|-----|------------|----|------------|----|------------|----|-----------|----|----|-----------|
| 44 | 1 | 6 | 1 | 4 | 25 | 5 | 1 | 14 | 10 | 19 | 15 | 24 | 22 | 15 | 14 | 4 | 19 | 18 |
| 45 | 2 | 5 | 2 | 5 | 6 | 24* | 1 | 3 | 10 | 8 | 15 | 16 | 25 | 4 | 14 | 1 | 11 | 21 |
| 46 | 3 | 5 | 3 | 6 | 17 | 13 | 1 | 22 | 10 | 27 | 15 | 29 | 19 | 23 | 14 | 7 | 24 | 15 |
| 47 | 4 | 5 | 4 | 7 | 28 | 2 | 1 | 11 | 10 | 16 | 15 | 21 | 22 | 12 | 14 | 4 | 16 | 18 |
| 48 | 5 | 6 | 6 | 2 | 9 | 21* | 1 | 30* | 10 | 5 | 15 | 12 | 24 | 1 | 14 | 2 | 7 | 20 |
| 49 | 6 | 5 | 7 | 3 | 20 | 10 | 1 | 19 | 10 | 24 | 15 | 2* | 25 | 20 | 14 | 1 | 27 | 21 |
| 50 | 7 | 5 | 1 | 4 | 1 | 29* | 1 | 8 | 10 | 13 | 15 | 17 | 21 | 9 | 14 | 5 | 12 | 17 |
| 44 | 1 | | 1 | | 25 | | | | | | | | | | | | 19 | 18 |
| 45 | 2 | | 2 | | 6 | | | | | | | | | | | | 11 | 21 |
| 46 | 3 | | 3 | | 17 | | | | | | | | | | | | 24 | 15 |
| 47 | 4 | | 4 | | 28 | | | | | | | | | | | | 16 | 18 |
| 48 | 5 | | 6 | | 9 | | | | | | | | | | | | 7 | 20 |
| 49 | 6 | | 7 | | 20 | | | | | | | | | | | | 20 | 15 |
| 50 | 7 | | 1 | | 1 | | | | | | | | | | | | 12 | 17 |

Table 2 (taken from O. Neugebauer's "Ethiopic Easter Computus," [*Oriens Christianus*, 63, 4, 1979], p. 101). An Ethiopic table (above) discovered in the Armenian Patriarchate at Jerusalem compared with an Easter messages by Athanasius (below). In the 1st column from the left, the number of the years numbered according to Era of Diocletian; in the 3rd column from the right, week days of Passover feast.

References

¹ *Ptolemy's Almagest*, ed. G. J. Toomer (Princeton Univ. Press 1998), ch. IV:2. Further 1p = 1 part = 1chelek = $3\frac{1}{3}$ s.

² Or the 5th hour and 204 parts of the 2nd day of the week, which starts at 18:00 of the previous day. The Julian date is Oct. 6, Sun., c. 23:11 (presumably Jerusalem Mean Time).

³ Though formally considered the 7th month of the Jewish year, Tishrei is the beginning of Jewish New Year. The first month is considered to be the spring month Nisan. This confusion spread from the mixture of two traditions: that of Eretz Israel and of Babylonia.

⁴ See, e.g., Moses **Maimonides**, *Sanctification of the New Month in Code of Maimonides*, book 5, treat. 1. Transl. by S. Gandz. Introduction by Oberman. Commentary by O. Neugebauer. Yale Judaica Series. v. 11. (New Haven: Yale University Press 1952), ch. 7:1, or any other book describing the present-day calendar.

⁵ See *Babylonian Talmud (Bavli)*, ed. I. Epstein (London: Soncino Press 1938); see also *Dafyomi Advancement Forum* (<http://www.dafyomi.co.il/today.htm>) *Rosh Hashana* 20a. Both disputants lived in the late 3rd century. The Palestinian Talmud (*Avoda Zara* 1:1 and *Megilla* 1:2) also mentions this rule without giving any reason for it.

⁶ Palestinian Talmud, *Avoda Zara* 1:1. Cf. Stern (below, p. 166).

⁷ See Abraham **Wasserstein**, "Calendric Implications of a Fourth-Century Jewish Inscription from Sicily" (*Scripta Classica Israelica*, vol. XI 1991/2, pp. 162-5). Though Wasserstein goes so far as to claim that a fixed calendar did not exist in 383 AD, it is surely wrong. We can show that the calendar described by Otto **Neugebauer** in "Ethiopic Easter Computus" (*Oriens Christianus*, 63, 4, 1979) is in agreement with the date on the tombstone. Stern [below, pp. 132-6], however, questions the consistency of the inscription.

⁸ A town on the Euphrates in Persia, probably not far from ancient Babylon, where originally the academy was founded.

⁹ See Henry **Malter**, *Saadia Gaon: His Life and Works* (The Jewish Publ. Soc. of America: Philadelphia 1921), ch. 4, or Sacha **Stern**, *Calendar and Community* (Oxford Univ. Press: Oxford 2001), p. 264. The disagreement was concerned with Dehiyah YaĤ, to be discussed further.

¹⁰ Hillel II, to distinguish from Hillel I who was one of the first rabbinical teachers, c. 0 AD. Hillel II's exact status is unclear, though the title *Nasi* (Patriarch), usually attached to him, suggests a supreme authority, which was granted to Jewish leaders since c. 200 AD. This epistle is the only source to mention Hillel II's name.

¹¹ To appear in DIO. See also its Hebrew version "Sod Haibbur: Shalosh Shitot B'luach Haivri B'meat Harishonot L'spirah" in the *Proceedings of the 11th Conference on the History of Judea and Samaria*. Ariel 2002, pp. 275-86.

¹² The Church used it from Council at Nicea (325) up to the Gregorian reform of 1572, when additional changes were introduced. Consult Table 1 for details.

¹³ Bavli, *Arachin 9b*.

¹⁴ One of them is Ravina's statement, on the same page of Bavli (*Arachin 9b*), about the length of the calendar month. See, e.g., Ernest **Wiesenberg**, *Code of Maimonides. Appendix*. (Yale Judaica Series. v. 11. New Haven. Yale University Press. 1961), pp. 569-70, with a discussion on the possible timing of that statement.

¹⁵ P.J. **Achtemeier**, James L. **Mays**. Publisher: HarperCollins: Boxed Set edition (May 1991)

¹⁶ The Passover feast (when Jews eat the Passover sacrifice) falls on Nisan 14 according to the Christian tradition, with day starting and finishing at the midnight. Because the Jewish day starts at sunset (18:00) technically, according to the Jewish calendar, the Passover feast falls in the beginning of Nisan 15.

¹⁷ See, e.g., first Mishnas in tractate *Avoda Zara* which prohibit Jews to partake in the celebrations by heathens. At that time Christians were viewed as such.

¹⁸ See Edward **Flannery**, *The Anguish of the Jews: Twenty-Three Centuries of Antisemitism*, (Paulist Press, N.Y. 1985), pp. 41-2. See also Stern (*ibid*, p. 68 and refs. there). This fast was observed on the morning before the Passover feast. It is an interesting open question to find whether that custom caused the Jewish "Fast of firstborns," held on the same morning. According to modern Jewish tradition the fast can be abolished by studying a portion of the Talmud.

¹⁹ See entire discussion in the *Easter Controversy* at <http://newadvent.org/cathen/05228a.htm>.

²⁰ See Flannery (*ibid*, ch. 3, text before fts. 37-40); see also Stern (*ibid*, p. 69).

²¹ Though we do not have factual confirmation from Jewish sources that Nisan 15 fell on Sunday, it is clear that it could happen on average every seventh year, even if the beginning of the months was fixed empirically by observation of the new moon. The same frequency is also true for the "epact" system which Jews likely followed from the end of the 3rd century AD. A concrete example comes from the Ethiopic calendar table (see Table 2), where the Passover feast of the year 330 AD (Diocletian 46) fell on the 7th day of the week.

²² The Roman Church's formal contention could be that there was not enough time between "crucifixion" day and "resurrection" day.

²³ A remark by a Babylonian sage of the late 3rd cent. that "since the time of Ezra Elul was never full (30 days)" (Bavli: *Rosh Hashana* 19b, 32a) indicates the time when the transition to a variable Elul occurred. Bavli explicitly mentioned at least 4 cases, from late 3rd century on, of Elul being made full.

²⁴ This law could have been promulgated after the Justinian Codex was finished and could be part of the additions known as *Novellas*. Flannery (ibid, p. 100) quotes the fundamental work by James **Parkes**, *Conflict of Church and Synagogue*, (Meridian: NY 1961) which brings a related Novella on Jewish worship in Appendix 1.

²⁵ *Historia Aracana or the Anecdota* (Loeb Classical Library, Penguin Classics edition, transl. by G.A. Williamson, 1966), p. 182.

²⁶ Without any justification Stern blames Juster (and even Procopius!) for "misunderstanding of Justinian's decree," and suggests a different but confused explanation (ibid, p. 86): "*Jews were allowed to celebrate Passover in the same month as Easter, but not in the preceding month...which is the month, to say, preceding the vernal equinox...*" Stern was obviously confused by the phrase "*the Catholics themselves did not agree with the astronomical calculations of their sovereign.*" However, this remark does not necessarily speak about the vernal equinox. Justinian could have simply disagreed with the "epact" system used by the Church on when the full moon of Passover feast fell and suggested moving it by a day later. Stern's conclusion (ibid, p. 87) is even more remarkable: "*...as late as the 6th century, Jews were still widely observing Passover before the equinox, as we have seen was the case in the 4th century.*" Enamoured with the "equinox rule," Stern seemingly did not notice that the 6th century is separated from the 4th by 200 years and by the reform of Hillel II. Of course, an unfortunate choice of the intercalary years in the 19 year cycle could cause Passover to fall before the vernal equinox even in the fixed calendar.

²⁷ See Edward **Gibbon**, *Decline and Fall of the Roman Empire* (Bigelow, Brown & Co, New York, 1977), ch. 47, p. 677, and his ref. to *Chronographia* by **Theophanes Confessor** (Homologetes).

²⁸ Bavli, *Menachot* 65a.

²⁹ 163 after division by 7 gives remainder 2. The month Elul was not yet variable, see ftn. 23 above.

³⁰ Bavli, *Sukka* 43b.

³¹ See, e.g., Stern (ibid, p. 182).

³² 193 after division by 7 gives remainder 4. The problem of an additional day in Elul or Adar is irrelevant here because - according to the "theory of others" - an extra day had to be added in the leap Julian years and the year 506 was not one. According to Gauss' formula, the full moon of Passover in that year had to fall on March 25 so an extra Adar was not intercalated. (Besides, giving that the intercalation sequence might be different from the present-day, an extra month Adar I had to be added before the Purim month of Adar II and not after). Stern (ibid, pp. 182-3) came to the same conclusion.

³³ Printed by S.K. **Mirsky** (Jerusalem, 1964). See details in Stern (ibid, p. 187).

³⁴ Z.H. Ioffe, *Qorot Heshbon Haibbur* (Jerusalem, 1931), pp. 51-4. See also Stern (ibid, pp. 186-7).

³⁵ The reason was uncertainty about the "true" day of the holiday. See Bavli: *Rosh Hashana* 29b and *Sukkah* 41b.

³⁶ Palestinian Talmud, *Sukka* 4:1.

³⁷ See *Rosh Hashana*, Mishna 1: 4-6.

³⁸ See Bavli: *Rosh Hashana* 29b and *Sukkah* 42b-43a.

³⁹ On status of the 2nd day see Bavli: *Betzah* 4b, *Erubin* 39b etc.

⁴⁰ One cannot find a clear statement in the Talmud to support this claim, so it must have happened in Gaonic times. Hai Gaon, in one of his responsa, confirmed this by quoting the Talmudic "keep your father's customs."

⁴¹ This happened in the year 425 following the death of the Jewish patriarch Gamliel VI. See Flannery (ibid, ch. 3, ft. 47).

⁴² *Catholic Encyclopedia*, entry *History of the Jews* (Encyclopedia Press, 1913).

⁴³ Bavli, *Rosh Hashana* 20b.

⁴⁴ See Brad **Schaefer**, *Quarterly Journal of the Royal Astronomical Society* (1988, 29, p. 511).

⁴⁵ This is because *mean* and *true* moons at syzygies can be as far from each other as 7 and the daily elongation of the moon from the sun is 12. See Robert **Newton**, *Crime of Claudius Ptolemy* (Baltimore and London 1978), ch. V.

⁴⁶ Maimonides (ibid, 7:8), however, claimed that the reason for all *dehiyot* is purely astronomical and Wiesenberg (ibid, pp. 587-92) tried to defend this point of view.

⁴⁷ See Stern (ibid, p. 196) with analysis of the exilarch's letter of 836. As was said above, Ben Meir attempted to change *Dehiyah Yaĥ* by adding another 642 parts to 12:00 but a discussion about reasons behind this attempt is beyond the scope of this paper. Stern (ibid, p.264 on) gives a detailed reference.

⁴⁸ See, e.g., Malter (ibid, ch. 4) and Stern (ibid, p. 266).

