

LETTERS TO THE EDITOR

Molad Zaqen

In “Molad Zaqen and Islamic Scientific Innovation,” *Hakirah*, Vol. 18, Rabbi Ari Storch seeks to relate the establishment of the *deḥiyyot Molad Zaqen* to Islamic observations of the visibility of the moon around the globe made at the end of the first millennium.

Rabbi Storch begins, “The contemporary Hebrew calendar is a lunar one that sets the first day of the year based on the *molad*, the time of a lunar conjunction.”

It is essential to understand what these terms mean.

Molad

Three relationships collectively define the Molad:

- A) Rabban Gamliel’s statement of Synodic Interval:
 אין חדושה של לבנה פחותה מעשרים ותשעה יום ומחצה ושני שלישי שעה ושבעים ושלושה חלקים .
- B) The tradition of the *Molad* of *Tobu*, *BaHaRad*, 2-5-204, a mathematical constant that melds the analog of the lunar cycle to the moon and enables calculation of the calendar from knowledge of the Hebrew Year.
- C) *GUHADZaT* (גוהאדזט), a mnemonic that relates to, and links the months in the Hebrew year in a way to sync the moon with the Sun, i.e., 3-6-8-11-14-17-19.

This series, or at least a subset of it, should be familiar to every *gabai*. It is used to announce the *Molad* at each *Shabbat Mevorkhim*. Traditionally it has been thought that the use of this series began with Hillel II in 358 CE.

From the Gemara, *Hulin* 95b we learn of Shmuel’s ability to calculate the Molad: כתב שדר ליה עיבורא: דשיתין שני אמר [R’ Yoḥanan] the calendar for the next 60 years. השתא חושבנא בעלמא ידעת [R’ Yoḥanan’s curt reply], He only knows mere calculations.

Precisely true, the *Molad* is only a calculation.

Lunar Conjunction

The Lunar Conjunction, as we now understand it, after much relatively recent science, is an exact physical reality. NASA has provided 6 millennia of lunar phase data for use by historians. This means we know the time of each Conjunction back through the *Molad* of *Tobu*, Monday, September 7, 3761 BCE (Gregorian).

Rabbi Storch gives a definition. “A lunar conjunction is defined as when the moon is aligned with the earth and sun in such a way that all its light is reflected toward the sun, rendering it invisible to those on earth.”

A reasonable definition—but was it *Hazal*’s understanding? At the

time of *Hazal* there was a geocentric view of the Solar System. Today with our heliocentric view we understand that much of the perceived motions of the Sun and Moon are the result of the revolution of the Earth. This results in symmetry between the last time we see the Old Moon (just before a sunrise) and the first time we see the New Moon (just after a sunset). This means that the minimum period the moon is invisible is 36 hours, and not the 24 hours cited in the Gemora. Normally the moon is invisible for 60 hours and occasionally 84 hours, confirming Rabban Gamliel's expertise on the moon: פַּעֲמִים שְׁבַע בְּאֵרוֹכָה וּפַעֲמִים שְׁבַע בְּקִצְרָה.

Many Rabbis thought that the time of the *Molad* was at the time of the Conjunction. They knew by observation that the moon could not be seen at the *Molad* nor could it be seen at the Conjunction.

Rabban Gamliel's Synodic Interval is within half a second of the astronomers' value, but combined with *BaHaRad* and *GUHADZaT* it is still, on average, 5 hours and 17 minutes after the value of the Conjunction for values related to the *Molad* of Tishrei, within the Common Era.

From the mathematical parameters it was *BaHaRad* that positioned the *Molad*. Had *Molad* of *Tobu* (2-5-204) been 1-23-975 then the *Molad* would have been on average equal to the Conjunction. Incidentally, had the *Molad* of *Tobu* been 4-5-204, two days later, then we would, on average, see the New Moon on the

Molad of Tishrei.

The *Molad* is not the Conjunction—but if the *Molad* is not the Conjunction then what is it?

Etymologically the word *Molad* means birth. Contemporary astronomers consider the birth of the moon to be the Conjunction that they can calculate and detect but not see with the naked eye. Ancient peoples kept lunar calendars based upon the first appearance of the moon after a substantial period of darkness. To this day this is the prime modus operandi of the Muslims to establish the start of their new months. So why didn't *Hazal* set the parameters of *Molad* to track the New Moon? I discuss this in my book, *Sod Ha'ibur*.

The Real Raison D'être of the *Dehiyyah Molad Zaqen*

According to my study of the years subject to the *Dehiyyah Molad Zaqen*, the moon will not be seen until two days after the day of the *Molad*—thus not visible anywhere on earth. This is what Dr. Irv Bromberg of the University of Toronto on his calendar-related website states, "Traditionally, this postponement [*Dehiyyah Molad Zaqen*] was considered necessary to ensure the visibility of the New Moon on the first day of Rosh Hashanah. In reality, it doesn't ensure that." This could be true only on those minority of days that the *Dehiyyah Molad Zaqen* is followed by the *Dehiyyah Lo ADU Rosh*.

In my book I show that approximately 74% of the time the New Moon cannot be seen on the day of the Molad of Tishrei nor the day after. Another surprising fact is also revealed. Of the 74%, only 70% are what I call two-day discrepancies, 4% are three-day discrepancies. Three-day discrepancies are characterized with the conditions described in Yerushalmi, *RH* 2:4:

רבי חייה רבה הילך לאורו של ישן
ארבעת מיל רבי אבון משדי עלוי
צררין ואמר לה לא תבהית בני מריך
ברמשא אנן בעיין תיתחמי מיכא ואת
מיתחמי מיכא מיד איתבלע מן קומוי.

R' Hiyya the Great walked by the light of the Old Moon for four miles. Rabbi Abun threw pebbles at [the Old Moon] and said to it: "Do not upset the children of your Master, tonight we have to see you from this side [i.e., the New Moon], but you are seen from here [the Old Moon is still visible]."

A compelling confirmation of the relationships I have just revealed is attested by four dates, two embedded in history and two inferred by history, all of which are proven in my book to be dates with a three-day discrepancy.

358 CE, as mentioned, is traditionally the date of adoption of the Hebrew Calendar in use today. The date is in the source. Yet lunar science will confirm the Old Moon was very visible the morning before Rosh Hashanah (the *Molad* of Tishrei).

835 CE, the letter of the Exilarch, is discussed by Sacha Stern.

In my book I show this letter too was the result of the very visible Old Moon before Rosh Hashanah.

198 CE, using lunar science, the date is consistent with known fact of the R' Hiyya incident. Indeed it is consistent with and confirms the veracity of the story itself.

120 CE, using lunar science, the date is consistent with the life of Rabban Gamliel and his conflict with R' Yehoshua.

In all of the dates the *Molad* would have been deferred by the *Dehiyyah Molad Zaqen* and prevented the visible Old Moon, the appearance of which belied the establishment of Rosh Hashanah based on actual witnessed testimony.

Richard Fiedler
Author, *Sod Ha'ibur*

Ari Storch responds:

As Mr. Fiedler theorizes, the contemporary *molad* is an average and not an actual conjunction, but this is irrelevant to my article. My article was not based on the contemporary usage of the word *molad*; rather, it was based on Talmudic texts. The contemporary usage of the word *molad* is entirely different from the way the Talmudic passages treat it. I explicitly mentioned my intention to focus on the Talmudic definition when citing a dispute between the *Rishonim* and the Rambam on p. 182. Citing to contemporaneous definitions of *molad*, cannot be used with the pre-calendar discussions in the Talmud.

This new theory's presentation of *molad* is certainly creative, but is flawed. This new theory extrapolates the definition of *molad* from the contemporary system and works backwards. But the current *molad* did not exist in the time period this new theory attempts to analyze. Writing for Bar Ilan University, Yaaqov Loewinger proves that the *molad* in current use was most in synch with the astronomical reality in the 4th century—the traditional date for the introduction of the calendar. <<http://www.biu.ac.il/JH/Parasha/veethca/lev.html>>. Just as the *molad* has subsequently drifted from being perfectly aligned, it drifts when projecting the calendar back through history to the centuries prior to its introduction. It is therefore no surprise that the theoretical *molad* did not synchronize with any astronomical event during Rabban Gamliel's lifetime; this was centuries before the contemporary *molad* was created. Instead of redefining *molad* to some unknown and nondescript lunar position, the more reasonable approach is that our tradition is based on the historic reality of the 4th century when the calendar was introduced. At that time the *molad* aligned with actual conjunctions. The new theory cites Dr. Bromberg of the University of Toronto in its support, but Dr. Bromberg actually mentions that the *molad* corresponded to the average conjunction during the 4th. <<http://individual.utoronto.ca/kalendis/hebrew/molad.htm>>. Thus, it is clear one cannot project

the calendar to a time before its inception as this new theory does.

This disconnect between the time periods before and after the introduction of the calendar emanates from the Talmudic texts themselves, something that this new theory seems to recognize but ignores. In establishing the Talmudic definition of *molad*, Mr. Fiedler writes, "This means that the minimum period the moon is invisible is for 36 hours, and not the 24 hours cited in the Gemara." Somehow Mr. Fiedler attempts to give a Talmudic definition while simultaneously refuting it. He then resorts to using a system he attributes to Rabban Gamliel. The problem with this is that no Talmudic text attributes *molad* to Rabban Gamliel and it is incorrect to do so. The Talmud does not use the word *molad* within Rabban Gamliel's methodology of determining the months; rather, it intentionally uses the word *hiddushah*. This is because Rabban Gamliel was working within a system where the *beit din* would determine the months based on the sighting of the moon and not the conjunctions. It is plausible that Rabban Gamliel estimated the *moladot* to determine the first sightings, but that is not the Talmud's concern. Additionally, this new theory essentially must state that Rabban Gamliel's definitions were abandoned by the Talmud and then somehow resurrected at a later point in time. Such an assertion requires significant proof. The simpler approach is more intuitive and is the one the Talmud itself presents

with its terminology; the two incompatible systems worked under different parameters. The Talmud itself demonstrates that there are two systems with two definitions.

A concern not addressed by this new theory, and its fatal flaw, is the overwhelming evidence that *molad zaqen* was not introduced until the 9th century. This new theory is predicated on *molad zaqen's* presence prior to the 9th century; yet, as mentioned in the article, there is an abundance of evidence that it did not exist until that time. The new theory presents the dates of the *molad* of Tishrei for four years to support his idea: 120, 198, 358, and 835. Not only was *molad zaqen* not practiced during this time, but two of the dates were prior to the calendar itself! The years 120 and 198 predate the calendar and *molad zaqen*, or the underlying reason behind it, cannot have been present. The new theory contends that *molad zaqen* is to ensure that the sighting of the moon occurs on Rosh

Hashanah, but during this time period, Rosh Hashanah was declared by the sighting of the moon itself. The date of Rosh Hashanah would not be pushed off due to its nonoccurrence on the date the moon was sighted because witnesses would present themselves to the *beit din* and testify that they had sighted the moon prior to the declaration of Rosh Hashanah. The year 835 is also an interesting date to use as proof because, as mentioned in my article, we have a written testimonial from the Exilarch that *molad zaqen* was not implemented in that year. The only year left is 358, the first of the calendar, and I am unsure as to any symbolism this has. Thus, this new theory is incompatible with Talmudic passages because it is predicated on a calendrical component that was nonexistent at the time, *molad zaqen*. Based on the scientific, Talmudic, and historical evidence, I fail to see Mr. Fiedler's position on this subject.

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