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Talmudic Metrology VII
Sabbath Limits and Jewish Time Reckoning
(continued)[1]

The question of the limits of the Sabbath is an important one in Jewish society, since it concerns the concept of the Sabbath, a major element and symbol in the Jewish religion. This problem is debated in B. Shabbat and in Y. Berakhot.

A thorough analysis of the Talmudic passages attempts to more fully understand the extant Talmudic opinions. We show that the divergence between Abaye and Rava already seems to foresee the discussion between R. Tam and his opponents. We examine thoroughly the opinions of the different authorities, and we examine and propose a clear exegesis of Ram's theory (R. Eliezer of Metz) of the Sabbath's limits. We try to understand R. Tam's theory by understanding the theories of his closest pupils and of the authorities of his time.

We examine the understanding of R. Tam through history, and show how its original understanding evolved. Little by little, it reached such a point that the differences between it and the previously opposing position, today called the position of the *geonim*, were reduced to very few. We reject a modern theory that denies any difference between the two positions as well as the argumentation that this was already the understanding of former authorities.

We note that most of the rabbis had an incorrect knowledge of the variation throughout the solar year of the length of twilight. The first table, scientifically based, of Sabbath limits and Jewish time, was issued in Hanover in 1756, but Sabbath tables were still calculated on an incorrect basis at the end of the 19th century.

A. CONNECTION BETWEEN HOUR COUNTING IN THE SURROUNDING SOCIETY AND JEWISH TIME

1. Temporary Hours

We have seen that the use of temporal hours for the fixing of the moment of the Christian prayers was a well-accepted fact from the end of the Roman Empire until the Middle Ages. This was certainly a practice dating from the time of the Mishnah,

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at the beginning of Christianity, which was never contested. This way of counting the time of Jewish prayer was followed naturally, without any contestation, by the Christians, from the time when there was scarcely a difference between the Christianizing Jews and the traditional Jews until modern times.

Not only was there no contestation against this way of counting time, which was universally accepted, but these temporary hours remained in use as long as the influence of the Church on the way of life of city dwellers was sufficiently strong.

The general practice of surrounding society certainly had an important influence on the rabbis. Therefore most, if not all, of the rabbis followed the local method of counting the temporary hours. The only known rabbi who did not do so was R. Israel Isserlein, since, in the area in which he lived, equinoctial hours had already been adopted and he could hardly imagine himself using temporal hours. As already noted, until the twelfth century, all the rabbis used short temporal hours; the same hours as the surrounding society. Only after the Tosafists and mainly R. Tam, who defined a Jewish day as lasting from daybreak until the end of astronomical twilight, was the concept of long temporary hours created. It should be noted that R. Tam's new ideas about a long sunset, or later about two sunsets and consequently the long temporary hours, had more success in Spain than in Germany. While great Spanish authorities like Nahmanides, Rashba, and Ritva acclaimed this new theory, the German rabbinic authorities, such as R. Eliezer ben Joel ha-Levi of Bonn (Ravia), R. Meir ben Baruch of Rothenburg (Maharam) and R. Jacob ha-Levi Moellin (Maharil) remained attached to their old practices and accepted the Sabbath incredibly early, ended Sabbath early with the appearance of three little stars (because of the *tosefet*), when there is still some light in the western part of the sky, and continued using the short temporary hours, calculated between sunrise and sunset, those used by the surrounding society as read on the sundial.

2. Hanukah

The plain explanation of the Talmudic passage in B. Shabbat is that the Hanukah candles must be lit during the span of time beginning at משתשקע, the beginning of BHS, 0.75 miles before the night, a few minutes after sunset, at the time of the equinox, until the time defined as עד שתכלה רגל מן השוק. This last moment seems to be precisely the Roman moment termed "conticinium," the silence following the beginning of the night determined by the appearance of the night stars.[2] At this moment, all activity stops because of the lack of daylight and there is no more circulation on the street. This moment follows the appearance of the stars. The

2 "conticinium est quando omnes silent; contiscere enim silent est."

span of time during which Hanukah candles must be lit would then begin together with BHS, and would last about half an hour, until the end of all activity on the street, after the appearance of the night stars. The determination of the lighting period of the Hanukah candles is of course independent of the time that these candles must be kept lit. The explanation given by R. Eliezer of Metz fits this conclusion very well. He understands that the candles must be lit from משתשקע, 0.75 miles before the appearance of three average-sized stars. R. Tam, on the contrary, explains that the Hanukah candles must be lit after the sun has reached the upper vault and crossed it, four miles after sunset, when the night is complete. But what will then represent עד שתכלה רגל מן השוק? Civil life has already stopped at the end of daylight, corresponding to the end of our civil twilight and the appearance of the first night stars!

3. The Fast of 1 Sivan in Worms

This fast was instituted in Worms[3] in remembrance of the calamities caused by the First Crusade in 1096 CE. The regulations of Worms mention that one should fast until Vespers, apparently whether the fast day is a Friday or another day. Following the regulations literally, people were fasting until 3 p.m. corresponding indeed to Vespers. There was no explanation for this strange practice and it raised opposition because fasting on the day of the Neomenia (Rosh Hodesh) is normally forbidden.[4]

The explanation seems to be that when this regulation was enacted, Vespers was probably still at 6 p.m.[5] in Worms, and they probably fasted until sunset.

Later, when the canonical hours in Worms shifted, the original custom was forgotten and they applied the regulation literally, fasting until Vespers. Because of an imprecise formulation of the regulation using a non-Jewish technical term, whose meaning evolved over time, the community of Worms was not able to find an explanation for this strange practice of fasting until 3 p.m.

4. The Beginning of Sabbath at 22h[6] in Bah (1561-1640) on *Tor Orah Hayim* 261 and in *Shemesh Tzedaka* (Venice, 1743)

The exact meaning of this passage requires knowledge of the Italian clock, which

3 See D. Sperber: *Minhagei Yisrael*, Vol. I, Mossad ha-Rav Kook (Jerusalem, 1989), chapter 25.

4 See Orah Hayim 580.

5 Temporary hour.

6 All the authorities who begin Sabbath at 22h, either rest on the opinion of R. Eliezer of Metz or that of R. Hayim Or Zarua. The latter accepted Sabbath two hours before sunset, thus at 21h 30. However, the rabbis who counted *pelag* from the appearance of the stars did

was in use in some parts of Poland during this period. Twenty-two hours means two hours before the end of civil twilight and the first night stars.[7] R. Samson Morpurgo (1681-1740) was asked about two Italian communities that followed the German rite. The first was praying *Minha* with *tefillin*[8] and then, after removing them, they accepted Sabbath at 22h, two hours before night;[9] the second did the same, but on Friday afternoon they did not wear *tefillin*.[10]

R. Morpurgo[11] confirmed the correctness of these customs. He relied on the rule of R. Hayim Or Zarua mentioned in *Darkei Moshe*. From responsum 8 it appears that:

- 24h is the beginning of the night.
- 22h is ~ 1h 30m before sunset = the beginning of sunset of R. Tam. Sunset is thus at about 23h 30m.
- The night of R. Tam is later than 24h 30m (probably about 24h 40m).

R. Morpurgo thus follows the classical understanding of R. Tam: the beginning of sunset is our geometrical sunset, the beginning of the night is at 24h and the end of sunset, corresponding to the beginning of the night of R. Tam, is later than 24h 30m.

the same with the two hours of R. Hayim Or Zarua. See *Darkei Moshe* on Tor Orah Hayim 261.

7 See "Talmudic Metrology VI: A: 4. Modern Hour Reckoning," *B.D.D* 24: 12-13. In the Italian hour system, the 24 equinoctial hours begin a half hour after sunset. Thus, according to this system, the clocks must be set right at sunset. Indeed, the span of time between two consecutive sunsets varies from day to day. This operation could only be carried out by the use of tables. Thus, because of the inaccuracy of the clocks, they had to set the clocks at true noon with sundials: it was then 18 h. And at sunset they must again set the clocks right according to calculated tables and put the clocks on or back by the number of minutes indicated by their tables in order to have sunset coinciding again with 23h 30m. It should be noted that, in some areas, the beginning of the Italian hour was not a half hour after sunset but at sunset. By contrast with all the rabbis, who used the Italian hour beginning a half hour after sunset, I found that in the book *Mo'ed David* (Amsterdam, 1740) by R. David Meldola (1714-1818, thus 104 years!), it writes (p. 124) that in Italy, where they begin to count the hours at sunset, the entrance of the Sabbath is always at 23h. This is thus one equinoctial hour before sunset instead of 1.5 hours before sunset prescribed by Bah and *Shemesh Tzedaka*.

8 It was current practice to wear *tefillin* at *Minha*: see Yossef Ometz § 491.

9 *Shemesh Tzedaka*, responsum 7.

10 *Shemesh Tzedaka*, responsum 8.

11 See responsa *Shemesh Tzedaka* 7 and 8.

12 Rosh must be considered with caution in this group, since Rosh seems to share the opinion of R. Tam.

B. LATER AUTHORITIES WITH REGARD TO R. TAM

1. Six of the Greatest Authorities of the 16th Century with Regard to R. Tam

a. *R. Moses ibn Al-Ashkar (1466-1542), responsum 96*

The query was about a child born on Friday evening after sunset, but before the appearance of three stars. Should we circumcise the child on Sunday according to Rif, Maimonides and Rosh,[12] because he was born during BHS? Or, should we circumcise on the following Friday because he was born before BHS according to R. Tam, Nahmanides, Semag, Ran and (R. Jeroham?),[13] who consider that BHS begins after the end of sunset, 3.25 miles after sunset?

R. Al-Ashkar answers that the circumcision should happen on the next Sunday, according to the first possibility, because the opinion of R. Tam is based on a false scientific basis and is therefore completely rejected. He writes further that there is only one sunset lasting in Palestine 2/3°, i.e. 2/3 x 4m = 2.66 m or 2m 40 s.[14]

The text of the responsum contains a problematic sentence:

ואמנם בתחילת השקיעה יש הפרש גדול ביניהם דר"ת ז"ל אית ליה דשתי שקיעות נינהו.

On the basis of this sentence, some want to prove that, according to their understanding of R. Tam, the "end of sunset" is the astronomical sunset, a precise moment, while the "beginning of sunset" is before sunset when the sun appears still to be glowing. The moment of this "beginning of sunset" would then be the object of the difference between R. Tam and *geonim*. Nevertheless, an analysis of this responsum proves that this is nonsense.[15]

R. Al-Ashkar describes the cosmographical model of R. Tam: at sunset the sun enters the thickness of the firmament and, after it has crossed the whole thickness of the firmament, all the stars appear. Symmetrically, at the end of the night, at daybreak, the sun enters the thickness of the firmament and, after crossing the

13 This last reference, as noted by R. Al-Ashkar, is irrelevant. R. Jeroham decides indeed that one should begin Sabbath at sunset, like Maimonides.

14 At the latitude of Jerusalem with fi = 31.8° and delta = 0°, the apparent setting of the sun's under limb occurs when the depression of the sun is 35' – 16' = 19' at 18h 01m 29s, and the setting of the sun's upper limb occurs when the solar depression is 35' + 16' – 51' at 18h 04m 00s. Sunset lasts 2m 31s, slightly less than the 2m 40s given by R. Moses Al-Ashkar. He gives indeed 2/3 of an equinoctial degree; one equinoctial degree corresponds to 4 m and 2/3 of 4 m is 2 m 40s.

15 Because of this sentence, the followers of R. Tam's new theory ascertain that R. Tam and *geonim* have the same three stars at the end of *bein ha-shemashot*. Their difference is only at the level of the beginning of sunset which, for R. Tam, is 3.25 miles before the end of sunset, contrary to the opinion of the *geonim* that it is at sunset.

whole thickness of the firmament, the sun rises over the earth. He writes further that, according to Rashi, the beginning of the night closely follows sunset, contrary to R. Tam. He mentions R. Jeroham who, after the exposition of the theory of R. Tam, which he seems theoretically to accept,[16] concludes that we must nevertheless behave according to the (more stringent) opinion of Rif and Maimonides, and accept Sabbath and refrain from any work, from the "beginning of sunset." All these elements prove that he considers that R. Tam begins Sabbath much later than the *geonim*.[17] We can also observe that R. Moses confirms tacitly the difference between R. Tam and the *geonim*, as it was expressed in the query. Otherwise, he should have added that despite the fact that the theory of R. Tam is incorrect, there is no practical difference between them in the litigious case.[18] Therefore, it appears that the above-mentioned argumentation is nonsense, and we must conclude that there is a lapsus calami in the above quotation that should be corrected by replacing the word השקיע by בין השמשות:

ואמנם בתחילת בין השמשות יש הפרש גדול ביניהם דר"ת ז"ל אית ליה דשתי שקיעות נינהו...

R. Moses Al-Ashkar finally makes the remark that the query should have made it clear if the birth was near sunset or not. Indeed, if it was near sunset, it is BHS only according to Rabbah but not according to R. Joseph; for the latter, it was still day.

One should finally note the preliminary statement of R. Moses Al-Ashkar: both R. Tam and his opponents agree, in theory, that BHS begins 0.75 miles before the appearance of three middle stars. Therefore, in northern countries,[19] where three middle stars appear later than 0.75 miles after sunset, it seems that the opinion of R. Moses Al-Ashkar could give preeminence to the rule of 0.75 miles before the stars[20] rather than to the rule that BHS begins at sunset.[21] This seems also to be the opinion of R. Eliezer of Metz, according to the interpretation championed in this paper. This would nevertheless contradict the rulings of Rif, Maimonides and R.

16 R. Moses Al-Ashkar does not seem to accept this remark.

17 According to the mitigated theory of *Minhat Cohen*, it is generally accepted that BHS begins 0.75 miles before three middle stars, after sunset when Maimonides and Gra begin BHS of Rabbi Judah. But R. Moses Al-Ashkar does not know this mitigated theory and, for him, *tzeit ha-kokhavim* of R. Tam is four miles after sunset.

18 Because the query was probably sent from Egypt, where there is no practical difference between the beginning of BHS of 0.75 miles before the three middle stars and sunset. Thus, if R. Tam and *geonim* considered the same stars for the end of the day, there would not be any significant difference between them in the litigious case.

19 Or even in Palestine, for those authorities who consider that a mile is less than 24 m.

20 This is the opinion of R. Ingras, see *infra*.

21 In fact, there are different positions among the opponents of R. Tam:

* Maimonides writes that BHS is the span of time between sunset and the appearance of

Jeroham, who do not mention the 0.75 miles but begin BHS at sunset. R. Al-Ashkar further writes that the whole Mediterranean area follows Maimonides' ruling.

b. *R. David ben Solomon ibn Abi Zimra (1479-1573)*

The query again is about a child born Friday evening after sunset and before night.[22] Should he be circumcised on Sunday, as it appears from the *rishonim* or on Friday according to the *aharonim*, who consider that the child was still born on Friday because BHS begins later at the end of sunset?

R. David ibn Zimra's position is diametrically opposed to that of R. Moses ibn Al-Ashkar. He follows the opinion of R. Vidal of Tolossa in *Magid Mishneh* that Maimonides does not contradict R. Tam, therefore the sunset mentioned by Maimonides is the "second sunset." The responsum is very casuistic, but we learn that the beginning of sunset is a precise and known moment for anyone, contrary to the end of sunset which is difficult to fix. He notes also that after the beginning of sunset, the wings of the birds are still lightened by the sun. Again, the "beginning of sunset" is our apparent sunset. Unfortunately, at a crucial point, at the end of the responsum, we have another embarrassing passage with an evident mistake that must be considered a misprint or a *lapsus calami*, i.e. a slip of the pen of the copier who had his eyes on the *bein ha-shemashot* at the end of the sentence.[23] Finally, Radvaz does not tell us how practically he fixed the moment of the appearance of three middle stars, four miles after sunset.

three middle stars without referring to the length of 0.75 miles. But, according to R. Levi ben Haviv in *Hilkhot Kiddush ha-hodesh* II: 9, this ruling is for the non-specialized people. The rule for Bet Din is that BHS is between the 2nd and 3rd middle star.

* Gra writes that BHS is 0.75 miles after sunset.
* *Geonim*, according to Or Meir, begin BHS slightly after sunset, when the light diminishes.
* R. Ingras of Frankfurt (*dayan* under R. Poppers, 18th century) mentioned this argument, that R. Moses Al-Ashkar, follower of the *geonim*, considered that BHS begins 0.75 miles before the appearance of three middle stars.

22 There is a great similitude between this query and the query 96 asked to R. Moses al-Ashkar, and it is not at all impossible that it dealt with the same case.

23 The litigious passage is the following:
דמשעה שמסתלקת החמה מעל הארץ הוי תחילת בין השמשות וכששוקעת במערב ועדיין לא נראו ג' כוכבים הוי בין השמשות.
The first בין השמשות must be replaced by השקיע:
דמשעה שמסתלקת החמה מעל הארץ הוי תחילת השקיע וכששוקעת במערב ועדיין לא נראו ג' כוכבים הוי בין השמשות.

c. *R. Joseph Caro (1488-1575)*

R. Joseph Caro wrote in *Beit Yosef*[24] that the Rosh and his son the Tor were hesitating about which position to adopt in the contradiction between R. Tam and the *geonim*, and therefore they avoided making a pronouncement on the subject. This statement proves already that for R. Joseph Caro, the positions of R. Tam and the *geonim* are contradictory, and that their times of beginning and ending the Sabbath are different. The position of R. Joseph Caro on the subject is also ambiguous. In Shulhan Arukh Orah Hayim, he follows the theory of R. Tam and quotes Nahmanides.[25] In Shulhan Arukh Yoreh Deah,[26] he quotes R. Isaac ben Abba Mari of Marseille and writes that the circumcision of a child, born on Friday evening from משתשקע החמה until the appearance of three stars, is delayed until Sunday because of doubt regarding the status of the moment of his birth. Some authors[27] believe that he speaks of sunset and therefore think that he changed his mind with regard to his rulings in Orah Hayim about Sabbath and Festivals. In fact, the original text of *Ittur* is corrupt, and it is not possible to decide with certitude whether the *Ittur* expressed in this quotation is an opinion opposed to R. Tam or in agreement with him.[28] The solution

24 Orah Hayim 261.

25 See Shulhan Arukh Orah Hayim 261: 2. In fact, the quotation follows the spirit of Nahmanides but it is not a rigorous quotation, verbatim. See also other references where he follows undoubtedly the theory of R. Tam: Orah Hayim 562, 608, 623 §1, 623 §2 and 672 §1. In Orah Hayim 261, R. Joseph Caro writes that the span of time of 3.25 miles after the beginning of sunset, "when the sun is no more seen on the earth" is still day and can be used as "*tosefet*" of Sabbath before BHS. Some people wish to understand that it is the "end of sunset" that corresponds to the astronomical sunset. They rest on the commentary *Olat Sabbath* on Orah Hayim 261 (Amsterdam 1681). However, if we consider Shulhan Arukh Orah Hayim 672: 1, R. Joseph Caro writes that the Hanukah candles must be lighted after the end of sunset, but in special circumstances one may light them from *pelag ha-minha* on. In *Beit Yosef*, he ascribes this ruling to R. Aharon ha-Kohen from Lunel in *Orhot Hayim*: "the lighting of the Hanukah candles is valid from the *pelag ha-minha ha-aharon*, the last *pelag ha-minha*, 1.25 hours before the stars, which is 3m before sunset." Here it is not possible any more to play with the understanding of the text: the "beginning of sunset" is necessarily astronomical sunset and the second sunset is 3.25 miles later.

26 Shulhan Arukh Yoreh Deah 266: 9.

27 Shah (*Siftei Cohen*) *ad locum* and R. Shneur Zalman of Liady in his *siddur*.

28 The Bah, Ancient Responsa 154 about a child born after sunset, more than 20 minutes before the appearance of the stars, mentions this quotation of Shulhan Arukh, but he does not accept it. He writes that most of the rabbis ruled according to R. Tam, including R. Caro himself on the laws of Sabbath. He considers thus that משתשקע is 0.75 miles before the appearance of the stars. The Bah ruled that the child was still born during the day, according to the opinion of R. Tam. Bah writes the same in Yoreh Deah 246.

of the problem can probably be found in Yoreh Deah 262, where R. Joseph Caro mentions two rulings attributed to R. Isaac of Dampierre, from which we can infer that the three stars marking the beginning of Sabbath are already visible when the sky is still partially lightened and luminous, near sunset.[29] This seems to prove that R. Joseph Caro now follows the theory of the *geonim* and begins Sabbath around sunset, contrary to his ruling in Orah Hayim, according to which he begins Sabbath, at least theoretically, 3.25 miles after sunset.[30] We have then two possible answers to explain this contradiction. The first is to conclude that R. Caro indeed changed his mind, but forgot to correct his text in Orah Hayim.[31] Another solution is perhaps the following: the Shulhan Arukh is a halakhic synopsis or digest of all the rulings mentioned in his *Beit Yosef* on the Tor. The book is a *vade mecum* intended for the rabbis for revising the law, but not for ruling without referring to the *Beit Yosef*. It seems that it was divided originally into 30 sections, to be read consecutively, one section daily, so that the whole book could be covered in 30 days.[32] It is constructed on the basis of quotations of former authorities. An internal contradiction, corresponding to two contradictory quotations of two different authorities would then be possible.[33] In any case, the position of R. Joseph Caro is ambiguous and

29 In Yoreh Deah 262: 5 he mentions a ruling of R. Isaac recorded in *Mordekhai*, and in Yoreh Deah 262: 6 he mentions a ruling of R. Isaac recorded in *Hagahot Maimoniot*. For more details of these two rulings, which apparently belonged to the same responsum, see the important paper of Dr. Shai Valter: 168-39 (התשס"ד) .יודעי בינה ב ,שנולד ,מילת תינוק שי ואלטר בצאת הכוכבים R. J.G. Weiss asks himself if this was not an abnormal phenomenon. Well we know the abnormality of aurora borealis, but at sunset I do not know of anything similar.

30 As mentioned above, one cannot propose to say that his position in Orah Hayim is the same as in Yoreh Deah, and his משתשקע corresponds to apparent sunset. Firstly, it doesn't fit the enunciation of Orah Hayim 261 and secondly, as we remarked in connection with the doubts of Rosh and Tor, he has implicitly admitted in *Beit Yosef* on Tor Orah Hayim 261, that the beginning and end of Sabbath of R. Tam and *geonim* are different.

31 This was the opinion of R. Shneur Zalman. But things are not so evident. Indeed, we meet already a contradiction in Orah Hayim between 261 and 293. In 293 he ends Sabbath at the appearance of three stars, without any regard to the time elapsed since sunset. Furthermore, the difficulty is that he brought already the quotation of *Sefer ha-Ittur* in *Beit Yosef*.

32 According to the information given in the title page of the sixth edition (Venice, 1574).

33 Nevertheless, R. Joseph Caro ascertains, in his introduction to *Beit Yosef*, that he is consistent in his rulings. It is clear, however, that this is not always possible in such a monumental work; furthermore, such a situation is not unique. We can mention another similar case where Shulhan Arukh seems to quote two divergent quotations: in the issue of travelers between places having different *minhagim*. In Orah Hayim 496 (*yom tov sheni shel galuyot*), *Beit Yosef* quotes a text from *Orhot Hayim* (R. Aaron ha-Cohen from Lunel [Firenze, 1750]), which considers three cases: whether the traveler settles in the new place, comes back after a delay, or comes back immediately. In Shulhan Arukh Orah Hayim 496 the ruling is a

misleading. He was perhaps influenced by the hesitant position of Tor, which he noted.[34] The position of the Mehaber, R. Joseph Caro in Orah Hayim 623 is also problematic. According to his ruling in Orah Hayim 261, it is day 3.25 miles after the beginning of sunset, when the sun is no longer seen on the earth. However, in Orah Hayim 623 he writes that the prayer of *Ne'ila* begins when the sun is on top of the trees and it ends near to sunset. This would not give more than about half an hour for *Ne'ila*. This is certainly the reason why he insists on the necessity to hurry, shorten the prayer, and even abridge the recitation of the prayer in order to end in time, before sunset. But if it were still day until 3.25 miles after sunset, why is there such hurry? Why doesn't he allow praying *Ne'ila* until the "end of sunset" like Ritva? Apparently, he already changed his mind in Orah Hayim 623.

However, this is not certain: it is possible and even likely[35] that this last ruling is not contradictory to his former ruling about the late beginning and end of Sabbath. The office of *Ne'ila* and the priest's benediction must end before sunset. Indeed, although it is still day until "the end of sunset," the gates of the sanctuary close at sunset. Indeed, R. Tam ascertains that the rule דם נפסל בשקיעת החמה refers to the "beginning of sunset,"[36] thus the geometrical sunset.

Finally, R. Joseph Caro rules that a mile represents a time span of 18 minutes.[37]

shortened and simplified version of the text of *Orhot Hayim* in which the intermediate case is omitted.

- In Yoreh Deah 214: 2, about the binding character of the *minhagim* of a town upon its inhabitants, the ruling is concordant.
- In Shulhan Arukh Orah Hayim 468, about the travelers between towns with different *minhagim* related to working on the morning of *Nisan* 14, R. Joseph Caro follows a divergent ruling and quotes *Maimonides Hilkhot Yom Tov* VIII: 20. The understanding of this last ruling raised long and divergent discussions between *aharonim*.

In any case, it appears that here too R. Joseph Caro used quotations of former rulers, and this does not always guarantee homogeneity.

34 Tor rules in Orah Hayim 261: BHS is 0.75 miles and it begins at *mishetishka*. Non-expert people should light the Sabbath candles before sunset, when the sun is on the palms;

- in Orah Hayim 293: Sabbath ends at the appearance of three small and gathered together stars;
- in Orah Hayim 608: BHS is 1500 cubits before the night.

35 Otherwise we should have the same difficulty with the commentaries of Rosh and Meiri.

36 B. Menakhot 20b. Tosafot ד"ה נפסל בשקיעת החמה:

37 See Shulhan Arukh Orah Hayim 459 and Yoreh Deah 69. Most commentators consider that this ruling is based on *Terumat ha-Deshen* I, 167, which considers 40 miles in an extended day of 12 long hours, lasting from daybreak until the end of astronomical twilight; 18 minutes mean then 18 long minutes. Each of them represent 40/32 = 1.25 or 40/30 = 1.33 equinoctial minutes. Even if it appears that R. Israel Isserlein considered a day lasting from sunrise until sunset and used misleading terminology, R. Joseph Caro and later authorities were

d. *R. Mordekhai Jaffe (1535-1612)*

R. Mordekhai Jaffe, in his *Levush* on Orah Hayim, rules according to the classical understanding of R. Tam. Sunset corresponds to the "first sunset," *tzeit ha-kohavim* is 72 m after sunset. The temporary hours are calculated between sunrise and sunset; the mile is 18 minutes.

This position is exceptional as, generally, those who rule on Sabbath, according to R. Tam, adopt long temporary hours calculated on an extended day beginning at daybreak and ending at the end of twilight.

e. *R. Judah Loew ben Bezalel of Prague (Maharal) (1525-1609)*

In his Novellae on the Talmud, he refers to Tosafot on B. Shabbat 35a: תרי תלתי.[38] More specifically, he refers to the objection raised between the 2/3 or 3/4 miles of B. Shabbat and the 4 miles of B. Pesahim and to the solution proposed by R. Tam that the *bein ha-shemashot* of 3/4 mile must be placed at the end of the process of setting (the crossing of the firmament). The process of setting lasts 4 miles after sunset and the BHS of 0.75 miles is at the end of the 4 miles. Thus, the end of the 4 miles of B. Pesahim is the same as the end of the 0.75 miles of B. Shabbat.

Maharal writes that it is very strange that the process of setting of the sun lasts more than 3 miles. He asks why we should not better say that the 0.75 miles of Sabbath is not at the end of the four miles of Pesahim but at their beginning. The three middle stars would appear at the beginning of the four miles of the crossing. On the contrary, at the end of the crossing of the firmament, four miles after sunset, all the stars would become visible. This would then be symmetrical with the situation at daybreak, four miles before sunset, when all the stars are still visible. Sunrise begins when the upper limb of the sun becomes visible and it ends when the under limb of the sun becomes visible. The beginning of sunset is when the under limb disappears and the end of sunset is when the upper limb disappears.[39] In this way, there would be a complete symmetry between the process of sunrise in the morning and the process of sunset in the evening. Maharal, like R. Moses Al-Ashkar, rejects

unaware of this. The only authors who clearly equate 1 mile to 18 equinoctial minutes are R. Moses Isserles in Orah Hayim 261: 1 and R. Mordekhai Jaffe in *Levush* Orah Hayim 459 and in Yoreh Deah 69. They must consider that the 40 miles are walked in 12 equinoctial hours. R. Mordekhai Jaffe uses short seasonal hours like Maharil, contrary to R. Tam's followers who use long seasonal hours.

38 חידושי מהר"ל מפראג והוא ספר גור אריה על מסכתות שבת, עירובין, פסחים. לבוב תרכ"ג

39 This definition of the halakhic sunset is the same as that of R. Moses Al-Ashkar in the name of R. Abraham Maimuni.

completely the theory of R. Tam; he ascertains that the crossing of the firmament begins at sunset and ends 4 miles later. The BHS is at the beginning of the crossing but he doesn't specify if it begins immediately after sunset or slightly later.

In any case, Maharal understands the opinion of R. Tam according to the classical understanding exactly as R. Mordekhai Jaffe.

f. *R. Moses ben Samuel Cases of Mantua (1550-1617)*

In his Novellae,[40] published only thirty years ago, he expresses an opinion very similar to R. Mordekhai Jaffe and understands R. Tam according to the classical view. He presents it according to the old explanation of the Sages of Israel and according to Ptolemaic astronomy.

2. Four Authorities of the 17th Century with Regard to R. Tam

a. *R. Joel Sirkes (1561-1640)*

R. Joel Sirkes follows the opinion of R. Tam according to its classical understanding. Indeed, he writes that a mile is 24 m[41] and that five miles are 1.5 hours.[42] The explanation of these statements is that five miles are equal to 2 equinoctial hours and to 1.5 temporal hours. Bah follows the scheme of a complete day of 5 + 30 + 5 = 40 miles; the use of the scheme of Ulla that was thrown out in the Talmud is a conundrum.

This means that Bah considers an extended day lasting from daybreak until the end of dusk, from five miles before sunrise until five miles after sunset, corresponding to 40 miles.

In other words, Bah seems to consider a halakhic day beginning when all the stars are still visible, five miles before sunrise and ending at the appearance of all the stars, five miles after sunset. Therefore, a mile represents 18 m in temporal time and 24 m in equinoctial time. R. Joel Sirkes clearly confirms his point of view in his commentary on Tor Orah Hayim 623, where he writes that, according to the opinion of Rabbi Johanan, the prayer of *Ne'ila* must end at the time when Rav

40 *Hidushe Rabbenu Mosheh Cases*: Shabbat, Rosh ha-Shanah, Sukah. Eliahu Dov Pines, Makhom Yerushalayim, 5735. The orthography "Cases" was adopted following the *Encyclopaedia Judaica*, and the Italian orthography adopted by the family and the lineage.

41 He writes in Bah on Tor Orah Hayim 261 and in his ancient responsa 154 that a baby born within a third of an hour before the appearance of three middle stars is circumcised on Sabbath. Thus 0.75 miles = 20m. This must be a measure of security. In his responsa he uses 18 m, his mile is thus 24 m.

42 See Bah on Orah Hayim 261 and his ancient responsa 126.

would begin it, i.e. סמוך לשקיעת החמה. According to R. Sirkes, this moment is half an hour before sunset. He adds that this moment is quite a while before the appearance of the stars since there are already 5 miles between sunset and צאת הכוכבים.

He refers thus to the opinion of R. Tam and considers that the stars of R. Tam appear 5 miles after sunset.

Parallel to this theoretical position, R. Joel Sirkes advocates an early acceptance of the Sabbath around 22 h, Italian hour, i.e. two hours before the appearance of the first night stars.[43] This time is surely given at the equinox. In other words, he would begin Sabbath two equinoctial hours before the appearance of three middle stars, which happens about 30 m after sunset. We speak of course of the first appearance of three night stars, theoretically marking the beginning of the night. However, additional requirements are necessary for ending the Sabbath, namely concentrated stars, or little stars, in order to have the required supplement (*tosefet*). He could easily have justified this position of early acceptance of Sabbath, using the statement of *Darkei Moshe* on Tor Orah Hayim 261 that one can accept Sabbath from two hours before the night.[44] He could even have justified two hours before sunset using a similar argument by Maharil in the name of R. Hayim Or Zarua.[45] Nevertheless, Bah does not use these arguments but bases his argumentation on R. Eliezer of Metz who, he says, begins BHS 0.75 miles before sunset.

He explains that sunset is five miles before the appearance of all the stars. If a mile represents 24 m, then five miles are 2 equinoctial hours or 1.5 temporal hours.[46] BHS represents 18 equinoctial minutes or 13.5 temporal minutes. R. Sirkes takes a *tosefet* into account and rounds off the result, after adding a *tosefet*, and says that one should accept the Sabbath 2 temporal hours before the appearance of all the stars. Now he identifies in an incomprehensible manner the time of appearance of all the stars of Ram, which corresponds also to the time of the appearance of the

43 Bah on Tor Orah Hayim 261. We speak of course about the first night stars, i.e. mean stars and not about small and concentrated stars. In other words, Bah didn't end Sabbath at 24 h but later.

44 According to R. Isaac Tyrnau, an Austrian rabbi of the second half of the 14th century and beginning of 15th century (same time as Maharil).

45 See responsum 185 of R. Hayim Or Zarua, authorizing the acceptance of the Sabbath from the end of the tenth hour, i.e. two temporal hours before sunset. This opinion was mentioned by Maharil in his new responsa 45.

46 In one complete day, from daybreak until the appearance of the stars, one walks 40 miles. Between sunrise and sunset one walks 30 miles. Therefore 2 equinoctial hours = (30/40) x 2 = 1.5 temporal hours.

three stars of R. Tam, with 24 h Italian hour, i.e. the time of the appearance of the first three night stars, about half an hour after sunset. In this way, he brings the beginning of BHS of R. Eliezer of Metz artificially forward by 1.5 temporal hours. In this manner, he succeeds in justifying the ancient early acceptance of the Sabbath. In a similar way to R. Abraham Cohen Pimentel's later opinion, R. Joel Sirkes considers, without giving any explanation, that the three stars of R. Tam must be considered practically, by contrast with the theory, as the three first night middle stars. R. Sirkes begins Sabbath about 1.5 temporal hours before sunset while R. Pimentel does not begin Sabbath, in theory,[47] before sunset. R. Joel Sirkes also rejects the ruling of Shulhan Arukh, Yoreh Deah 266: 9[48] and considers, according to R. Tam, that a child born more than 20 minutes[49] before the appearance of three middle stars must still be considered to have been born on the former day.[50] Nevertheless, for both authors, R. Sirkes and R. Pimentel, the practical difference between R. Tam and the *geonim* became very tenuous: the only difference is that for the *geonim* BHS begins at sunset, while for R. Tam it begins 0.75 miles before the first three night stars.[51] We have here the first evidence[52] of a follower of R. Tam who practically considers a very early time for the appearance of the stars.

b. *R. Abraham Cohen Pimentel*[53] *(17th century)*

The importance of this author results from the influence he had on generations to

47 However, he writes that all Israel accept Sabbath before sunset.

48 Which he considers is in contradiction with the ruling of Shulhan Arukh and *Beit Yosef* on Orah Hayim 261 and 331: 5.

49 R. Joel Sirkes considers a mile of 24m.

50 See his responsum 154 about a boy born on the second day of Rosh ha-Shanah. He rules that a boy born more than a third of an hour (20 minutes) before the appearance of the stars belongs to the former day. Apparently there is a *lapsus calami* in Bah on Tor Orah Hayim 331: 5 where he speaks of one hour before the appearance of the stars.

51 Therefore, for authors who consider a mile of 24m, there is practically no difference in Israel between *geonim* and R. Tam.

52 Tor with *Bayit Hadash* was issued in 1631.

53 R. Abraham Cohen Pimentel was a pupil of the Yeshiva of the Portuguese community of Amsterdam. He is the author of a halakhic book published in Amsterdam in 1668 with the approbation of his teachers R. Isaac de Fonseca and R. Moses de Aguilar. This book had an important success and was very influential. R. Abraham Gombiner (1637-1683) was much influenced by the section מבוא השמש, connected to Jewish time and Sabbath limits. Similarly, R. Hezekiah da Silva greatly praised the book. The section about the laws of mixtures ספר התערובות was acclaimed by R. Joseph Teomim (c. 1727-1792) in his commentary *Peri Megadim* to Yoreh Deah (*Hilkhot Ta'arovet*). The author of the book מבוא השמש was not aware of the book *Sefer Elim* by R. Joseph Solomon Delmedigo (Amsterdam 1629), or, at

come. His book *Minhat Cohen* was issued in Amsterdam in 1668. The author considers two contradictory positions, that of R. Tam and that of the *geonim*.[54] In principle, the author is faithful to the theory of R. Tam, but he also wishes to satisfy, *lehumra*, the requirements of the *geonim*.

- He describes the theory of the Sages of Israel and the movement of the sun like R. Hananel.[55]
- He still thinks that the length of twilight is proportional to the length of the day.
- He follows the classical theory of R. Tam, the "beginning of sunset" being at apparent sunset and the "end of sunset" being four miles later or 72 m; therefore 1 mile = 18 m.
- His main innovation is to consider that in Amsterdam, at the time of equinox, it is already night at 18h 48m (local true time) even for R. Tam. This time is transposed at the summer solstice according to a proportional law as being 21h 21m. He tried to explain this particularity of R. Tam's night beginning before the end of four miles by the special topography of Holland, "Nederland," i.e. the lower country.
- He is at the origin of a secure mixture of a mitigated form of R. Tam's theory with the theory of the *geonim*. Sabbath is accepted at sunset and it finished, at least in Holland,[56] at an earlier time than the theoretical exit time.[57] This new position is very similar to today's general practice considered according the *geonim*. In fact, this mitigated position creates great confusion between these different and once clear-cut positions.

least, he doesn't mention it. This book was acclaimed and became a recognized reference book on the subject of Sabbath limits and time reckoning; its conclusions were accepted and even generalized to other countries, although it was based on the unscientifically grounded idea that Holland was an exception.

54 He knows the theory of the *geonim* through responsum 96 of R. Moses Al-Ashkar, who for the first time makes use of a responsum of R. Sherira Gaon and his son R. Hai Gaon. He will popularize the position of the *geonim*, practically unknown before, as such. R. Moses Sofer, in responsum Orah Hayim 80, seems still to ignore the position of the *geonim*.

55 On B. Pesahim 94a.

56 According to the book of R. Abraham Cohen Pimentel, this adaptation was only for Holland, "Nederland" = the lower countries.

57 Twilight was considered as 1/10 of the day: four miles for dawn, 32 miles for the day and four miles for dusk. Now twilight is at equinox 48m or 0.8 h and the complete day is 13.6 h.; twilight is 1/17 of the complete day.

58 He attributes these long temporary hours to the *Terumat ha-Deshen*. Short temporary hours are attributed to the *Levush* of R. Mordekhai Jaffe.

- Similarly, in Jewish time theory, he considers long temporary[58] hours calculated on the basis of an extended day, calculated, not according to his new rules, but according to the Talmudic scheme of 4 miles + the span of time between sunrise and sunset + 4 miles. This day is then symmetric with regard to the zenithal position of the sun.[59] This scheme is ascribed to *Terumat ha-Deshen* and is advised, by the cautious, in Torah matters like the limit of saying *Shema*. But the author considers that the short temporary hours calculated from sunrise until sunset are more logical, and this system should then be used in rabbinic matters, for example, the calculation of *pelag ha-minha*, the limit of eating leaven on the eve of Passover, and of praying the morning prayer, and the early acceptance of Sabbath.
- It seems that he is the one who popularized[60] the opinion of the *geonim*. This position of early acceptance of Sabbath was not ascribed to them previously.
- He gives for sunset at the solstice 20h 15m true time. This is a very rough data corresponding to the geometrical sunset.[61] In Amsterdam, at latitude of 52.4°, the geometrical sunset is at 20h 17m and the halakhic sunset[62] is at 20h 25m.
- Therefore, we can also conclude that at the equinox, his sunset is at 18h. Therefore his *tzeit ha-kokhavim*, which is at 18h 48m, corresponds to a depression of 7.29° or 7°; 17'.
- His calculation of *pelag ha-minha* and of the other moments of the religious day, according to *Terumat ha-Deshen*, as the limit for *Shema* or for prayer and *hametz*, is made on the basis of long temporary hours of the extended day described above, i.e. the solar day increased by 4 miles before sunrise and 4 miles after sunset.[63] The calculation is also very rough: at the equinox

59 He docsn't mention it explicitly, but it results, indirectly, from a numerical example developed in *Ma'amar Sheni*, chapter 9 : הנה אם כן כבר תרצתי. It appears that on the day of the equinox he works with an extended day of 1h 12m + 12h + 1h 12m = 14h 24m. His day is then symmetrical with regard to true noon, and does not take into account the observed time of apparition of the three first middle stars 48 m after sunset. He works with the theoretical day = 4 miles + span of time between sunrise and sunset + 4 miles. The 4 miles are considered equal to 1h 12m independently of the seasons.

60 In the footsteps of R. Moses Al-Ashkar in his responsum 96.

61 When the center of the sun is at the horizon.

62 When the upper limb of the sun disappears at the horizon, taking the refraction into account.

63 These moments correspond generally to rabbinic matters and, according to his former advice, they should be calculated on the basis of short temporary hours.

he writes that *pelag ha-minha* is at 17h 30m;[64] at the summer solstice he writes that *pelag ha-minha* is at 19h 30m.[65]

From *Minhat Cohen* on, it becomes practically impossible to know if a community behaves or claims to behave according to the *geonim*[66] or according to R. Tam.[67]

64 At the equinox in Amsterdam, we could imagine the following calculation:

sunset:	18h
stars:	18h 48m (corresponding to a solar depression of 7.29°)
extended day:	13h 36m
1 temporal hour:	1h 08m
1.25 temporal hour:	1h 25m
pelag ha-minha:	17h 23m

The calculation of *Minhat Cohen* is the following: length of the extended day: 1h 12m + 12h + 1h 12m = 14h 24m.

1 temporal hour:	1h 12m
1.25 temporal hour:	1h 30m
pelag ha-minha:	19h 12m - 1h 30m = 17h 42m. He writes 17h 30m.

65 At the solstice, according to the data of *Minhat Cohen*, we could imagine the following calculation:

sunset:	20h 15m
stars:	21h 21m (66m after sunset, according to his data)
extended day:	18h 42m
1 temporal hour:	1h 33m 30s
1.25 temporal hour:	1h 57m
pelag ha-minha:	19h 24m

The calculation of *Minhat Cohen* is in fact the following: length of the extended day: 1h 12m + 16h 30m + 1h 12m = 18h 54m.

1 temporal hour:	1h 34m 30s
1.25 temporal hour:	1h 58m 08s
pelag ha-minha:	20h 15m + 1h 12m - 1h 58m = 19h 29m. He writes 19h 30m.

In fact, even the time of the apparition of the stars given by *Minhat Cohen* is incorrect. The exact calculation is the following:

sunset:	20h 17m
stars:	21h 29m (solar depression of 7.29°)
extended day:	18h 58m
1 temporal hour:	1h 35m
1.25 temporal hour:	1h 59m
pelag ha-minha:	19h 30m

By an exceptional coincidence, the rough calculation of *Minhat Cohen* corresponds to the exact time of *pelag ha-minha*. In fact, on the day of the summer solstice, the length of twilight is exactly 1h 12m, and both calculations are identical.

66 But delays the end of Sabbath in order to take the opinion of R. Tam into consideration.

67 But begins Sabbath earlier in order to take the position of the *geonim* into consideration.

In conclusion, the real contribution of *Minhat Cohen* is to be the first[68] to give us quantitative data of what he considered night at the equinox in Amsterdam. His data for the summer solstice is calculated on the assumption that the length of twilight is proportional to the length of the day. On this basis, he calculated a twilight of 66m and he writes that he checked that at this moment, i.e. 21h 21m, the sky had the same darkness as at 18h 48m at the equinox.[69]

Furthermore, the consequence of his book will be to increase the confusion around the subject by smoothing over the apparent differences between the opposing positions. His synthesis will also help fight those using the theory of R. Tam to delay the beginning of Sabbath.

c. *R. Abraham Gombiner*[70] *(1637-1683)*

R. Abraham Gombiner also follows the theoretical opinion of R. Tam according to

68 Except Maimonides, who wrote that the appearance of three night stars is 20 minutes after sunset.

69 His data at the summer solstice is calculated on the basis of proportional time and not on the basis of a constant solar depression.

70 Because of the importance of this rabbi as a ruler, and the fact that the way the communities calculate the schedule of the Jewish day is generally ascribed to him, we will summarize his opinions.
Orah Hayim 58: 1. For the evaluation of the end of 3 temporary hours or 1/4 of the day corresponding to the end of *Shema*, a Torah obligation, everyone agrees that one begins the day at daybreak. R. Jacob Emden in *Mor U Ketzia* objects that he does not see why such unanimity is obligatory. He probably means that the proof of *Magen Avraham* from B. Berakhot is not probing. Note that *Minhat Cohen* advises also to count from daybreak because we deal with a Torah obligation.
Orah Hayim 89: 2. *Magen Avraham* does not understand why Maimonides wrote in his commentary on Mishna Berakhot I: 1 that the length of dawn is 1h 12m; it should normally be 5 x 24m = 120m. He thinks that the solution is 4 x 18m = 72m, but this remains contradictory with the opinion 1 mile = 24 m.
Orah Hayim 89: 5. In the evaluation of the end of 1/3 of the day, he considers a day of 18h or 9h. Apparently, he considers a symmetrical day with regard to true noon.
Orah Hayim 89: 5. חצות i.e. true noon is theoretically the beginning of *Minha*. *Magen Avraham* does not give evidence of this statement but there is such evidence; in Nida 63b: מין המנחה ולמעלה. See Rashi and Tosafot.
Orah Hayim 233: 1. True noon is the theoretical beginning time of *Minh*a as we see in B. Yoma 28b.
Orah Hayim 233: 3. The temporary hours can be calculated either between sunrise and sunset or between daybreak and the end of twilight. The first opinion makes sense because the slaughtering of the sacrifice must happen before sunset (see Tosafot in B. Menakhot 20b: נפסל בשקיעת החמה) and this moment, the beginning of sunset is 72m before the appearance of the stars. But the second opinion is justified if we say that the prayer

corresponds to the offering on the altar, which is possible until the end of sunset and, according to this assumption, *Levush* should be corrected, we should understand: the end of sunset.
Orah Hayim 233: 4. The hours of the Jewish day are temporary hours and we don't work on the basis of the system of "the little clock" where 12 equinoctial hours are considered as belonging to the day and the twelve others belong to the night. *Shaharit* can be said until true noon (חצות ממש) and then begins the time of *Minha*.
Orah Hayim 235: 3. We accept Sabbath half an hour before the appearance of the stars.
Orah Hayim 261: 9. *Magen Avraham* quotes the Bah, championing an early acceptance of Shabbat according to R. Eliezer of Metz. Then he quotes the responsum 163 of Maharil:
"אבל לעינין תפילת מנחה וקבלת שבת נראה דמילתא פשיטא היא דאזלינן בכל יום ויום אחר שעותיו דילפינן מחלקיהו לשני ערבים ומכי ינטו צללי ערב, פסחים נ"ח ב, ומכי משחרי כתלי, יומא כ"ח ב, ואם כן לעולם חשבינן ו' שעות מחצות היום עד הערב ומנהו משערינן פלגא המנחה **ותוספת שבת ב' שעות לכל הקודם כדברי מהר"ח ויתישב בזה מנהג הקהילות" ומשמע דחשבינן עד צאת הכוכבים ממש וכך כתב מנחת כהן.**
Orah Hayim 261: 10. *Pelag ha-minha* is 3m or 1/6 mile before sunset. These 3m are certainly equinoctial minutes. Indeed, if *pelag ha-minha* is before sunset, he must consider a span of time of 4 miles between sunset and the night. He considers now a mile of 18m. He corrects a mistake of *Minhat Cohen*.
Remark: He could also consider a mile of 22.5 m and the 3 m would be temporary minutes, but *Magen Avraham* never speaks of a mile of 22.5 minutes.
Orah Hayim 293: 1. Sabbath ends at the appearance of three small and concentrated stars (small because we are not expert, concentrated in order to have *a tosefet*).
Orah Hayim 331: 2. *Magen Avraham* quotes Bah. If a child is born before 0.75 miles, before the appearance of the stars, the child belongs to the previous day. He notes a mistake in Bah 0.75 miles = 1 hour) and writes that it is less than one quarter, as he wrote in Orah Hayim 459. This last reference could mean that 0.75 miles = 13.5 temporary minutes representing 18 equinoctial minutes, and therefore 1 mile = 24m. However, he quotes Radvaz, who speaks of a BHS of a quarter, and finally he repeats a third time that it is about a quarter before the appearance of the stars; it seems that he counts the time in equinoctial minutes; this corresponds to 1 mile = 18 m. He mentions that it is the usual practice in this country to accept Sabbath a quarter before the night.
Orah Hayim 443: 3. *Magen Avraham* refers to Rema. The limit for eating *hametz* is the beginning of the fifth hour or 1/3 of the day, but according to a second opinion (of *Terumat ha-Deshen*) it is two equinoctial hours before noon. *Magen Avraham* writes that in a day of 15 hours the limit is at the beginning of the sixth hour, i.e. at 5 h according to the first opinion and at 5h 30m according to the second opinion. He quotes the Bah, who says to follow the first opinion and to count the temporary hours of the day from daybreak until the end of twilight. However, *Levush* and *Lehem Hamudot* count the hours from sunrise until sunset, and the difference between the two opinions mentioned by Rema is not very important according to the calculation of the temporary hours by those who count from sunrise to sunset. For example, if the day has 13 hours: the first opinion gives: 5h 30m + 4h 20m = 9h 50m a.m., while the second opinion gives 12 - 2 = 10h a.m.
Orah Hayim 459. The mile is 18m in temporary hours but, expressed in equinoctial time, it gives 24m.
Orah Hayim 623. *Magen Avraham* takes exception to Mehaber, and writes that *Ne'ila* must end before the appearance of the stars.
We note some contradictions between these different statements of *Magen Avraham*:
In Orah Hayim 261, he champions an early acceptance of Sabbath like Bah. In Orah Hayim

its classical understanding.[71] He indeed writes about the mile, equated by R. Joseph Caro to 18 minutes, that it is in fact 24 minutes if expressed in equinoctial time.[72] This proves that R. Abraham Gombiner also considers a halakhic day as lasting from daybreak until the end of twilight, from five miles before sunrise until five miles after sunset according to the scheme 5 miles + 30 miles + 5 miles = 40 miles, with, at the equinox, a long temporal hour equal to 1.33 equinoctial hours so that 18 m temporal time is equal to 24 m equinoctial time. The use of the scheme of Ulla, which was thrown out in the Talmud, is a conundrum. However, in other different places he considers a mile of 18 m (equinoctial time).[73]

R. Abraham Gombiner was greatly influenced by the publication of *Minhat Cohen* in 1668 and by Bah;[74] he quotes them both. He follows R. Tam and says that

235:3, he forgets it and writes that we accept Sabbath 0.5 h before night. In Orah Hayim 331 he writes that it is the usual practice to accept Sabbath a quarter before the night.
In Orah Hayim 459 he writes that 1 mile = 24m. This implies that he uses the scheme of Ulla: 5miles + 30 miles + 5 miles = 40 miles. Therefore, *pelag ha-minha* is (1.25/12) x 40 = 4 1/6 miles before the night or 5/6 miles after sunset.
But in Orah Hayim 261: 10, he quotes *Minhat Cohen* and writes that *Pelag ha-Minha* is 3m before sunset: this corresponds to the position 1 mile = 18 m. He also champions the thesis that 1 mile = 18 m in Orah Hayim 233: 3 and in Orah Hayim 331: 2.
In Orah Hayim 261: 9, after quoting Maharil, he concludes that the end of the day must be understood precisely at the appearance of three middle stars. However, this is not the correct understanding of Maharil. Firstly, Maharil used the word ערב and לילה. Secondly, it is evident from his early acceptance of Sabbath and early Kiddush of Sabbath that his *pelag ha-minha* is 1.25 hours before sunset. Thirdly, Maharil writes explicitly in his new response 45.4 that *pelag ha-minha* is 1.25 hours before sunset.

71 He writes in *Magen Avraham* on Orah Hayim 261: 9 that BHS is about a quarter of an hour before the appearance of three night stars. He writes further in *Magen Avraham* on Orah Hayim 331: 2 that BHS is a quarter before the night and therefore a child born before the beginning of this BHS belongs to the preceding day. He mentions that this is also the theoretical opinion of Radvaz, but that the latter did not dare decide alone without the agreement of other authorities because of the severity of the punishment of Sabbath transgression. *Magen Avraham* supposes that in Egypt people were accustomed to accept the Sabbath, *lehumra*, at sunset. But, he says, in our country, we work, on Friday evening, quite late, until a quarter before the night. We can thus conclude that the BHS of *Magen Avraham*, theoretically like that of Radvaz, began clearly later than sunset, a quarter of an hour before *tzeit ha-kokhavim*, according to R. Tam. The analysis of *Magen Avraham* is similar to that of *Minhat Cohen*.

72 See *Magen Avraham* on Orah Hayim 459. It appears that many commentaries on Shulhan Arukh considerered that the equation 1 mile = 18 m in Orah Hayim 459 is expressed in long minutes of 1.25 or 1.33 equinoctial minutes. Nevertheless, the lengths of BHS of 0.75 miles and of a twilight of four miles are generally considered as temporary spans of time.

73 See note 69.

74 Tor with *Bayit Hadash* was issued in 1631.

one must understand משתשקע in Yoreh Deah[75] as סוף שקיעה.[76] He has the same understanding in Orah Hayim 623[77] and 672. But when he speaks of *tzeit ha-kokhavim* with regard to the circumcision of a child at the end of the Sabbath,[78] or when he quotes Maharil and writes צאת הכוכבים ממש,[79] he probably means the first appearance of three middle stars.[80] Thus, when he says that BHS is about a quarter before *tzeit ha-kokhavim*,[81] and that people in his area do not accept Sabbath much earlier,[82] he certainly speaks about the practical first three stars which appear much earlier than four miles after sunset.

Therefore, when he speaks about long temporal hours from daybreak until the appearance of the stars, it is difficult to know whether he considers an extended day equal to the solar day increased by 4 or 5 miles before sunrise and 4 or 5 miles after sunset,[83] if he considers a symmetrical day beginning about 45-48 m before sunrise and ending about 45-48 minutes after sunset,[84] or if he considers a dissymmetric day beginning at daybreak[85] and ending at the appearance of three

75 Yoreh Deah 246: 9. *Magen Avraham* writes it clearly in Orah Hayim 331.

76 *Minhat Cohen* had already written the same in Maamar II; chapter 1 just before the paragraph beginning with והנה צריך עיון.

77 In contradiction to the ruling of R. Joseph Caro.

78 *Magen Avrahan* on Orah Hayim 331: 2.

79 *Magen Avraham* on Orah Hayim 261: 9.

80 See *Magen Avraham* on Shulhan Arukh Orah Hayim 261: 9.

81 He writes the same thing in *Magen Avraham* on Orah Hayim 233: 3. But his position here is contradictory. He takes issue with *Levush* who counts his temporary hours from sunrise until sunset. *Levush* considers that sunset is the "beginning of sunset" according to his classical understanding of R. Tam. *Magen Avraham*, who apparently does not follow the context, corrects him and says that sunset is "the end of sunset" according to his own understanding of R. Tam. This would give us a BHS beginning at sunset in contradiction to what he writes on Orah Hayim 331: 2, that in the area of Radvaz they accepted Sabbath, *lehumra*, at sunset but in his area they accept it later, a quarter before *tzeit ha-kokhavim*. In any case, BHS does not begin at sunset. *Magen Avraham* could also call the beginning of BHS "end of sunset." This moment follows then the astronomical sunset. In this case, his remark against *Levush* is unjustified.

82 *Magen Avraham* on Orah Hayim 331: 2.

83 In the same way as the calculation of the long temporary hours by *Minhat Cohen*. The latter considers a mile of 18m and a distance of 4 miles between sunset and the appearance of the stars. In the case of *Magen Avraham*, it is difficult to conclude which was his final solution: 4 miles of 18m or 5 miles of 24m.

84 This would give a very late daybreak.

85 He considers an early daybreak; he writes in Orah Hayim 89 that daybreak is marked by the first rays of light in the Orient. But Elijah Rabbah considers a later *alot ha-shahar*, when the Orient is lightened. This is probably the origin of the beginning of the day of Berthold

middle stars, about half an hour after sunset.[86] The first two methods would give him a symmetrical day with regard to true noon, according his own requirement.[87] In the first method, the hours of the day are counted until 4 miles after sunset, when *Minhat Cohen* and *Magen Avraham* accept that it is no longer day, even according to R. Tam.[88]

Thus, the two first methods of calculating the temporary hours do not take into account the specificity of the Jewish day of R. Abraham Gombiner, an early daybreak and an early appearance of the stars.

The third method would give a non-symmetrical day, in which the beginning of the seventh hour would not coincide with true noon,[89] but it would be more in

Cohn, when the solar depression is 12°, in his tables (Erstein, 1932). However in *Melamed le-Hoil* 30, it considers that the Orient is lightened about 6 minutes after *alot ha-shahar*.

86 He certainly considers an early night when he quotes Maharil, who speaks of *tzeit ha-kokhavim mamash*.

87 *Magen Avraham* on Orah Hayim 233: 4.

88 This first method, i.e. the method of *Minhat Cohen*, has been adopted by the *eidah haharedit* in Jerusalem. It should be noted that this community rules like the *geonim*; it accepts Sabbath nearly half an hour before sunset and ends Sabbath not later than two miles after sunset. The construction of the Jewish time schedule of the religious day based on a day lasting until 4 miles after sunset seems thus an absurdity.

89 But this solution also has its followers:

1. R. Hirshel Levin from Berlin (1721-1800) constructed a time schedule of the Jewish day throughout the year, departing from the table of R. Raphael ha-Levi from Hanover. This table is not symmetric with regard to true noon. The day begins when the solar depression is 8°; 05' and ends when the solar depression is 7°; 10'.
2. R. Mordekhai Karmi from Carpentras (1749-1825) considered a nonsymmetrical day with regard to true noon. He writes indeed in *Ma'amar Mordekhai* on Orah Hayim 233: 3 that the halakhic noon is about half an hour before true noon. It implies a day beginning about 72 m before sunrise and ending about 20 m after sunset.
3. R. Nathan Adler (1741-1800), who was among the first to use timetables, considered a dissymmetric time schedule; his halakhic noon was before true noon, at 11h! Nevertheless, a halakhic noon at 11h is hardly understandable and it should rather be at 11h 30m as championed by R. Karmi.
4. In the commentary *Sha'arei Tshuvah* on Shulhan Arukh Orah Hayim 1 [6] and 89 [3] by R. Hayim Mordekhai Margoliot (18th-19th centuries) and less clearly in *Yad Ephraim* on Orah Hayim 1 by his brother Ephraim Zalman Margoliot (1760-1828), it states that the halakhic middle of the night is the middle of the night counted from the beginning of the appearance of the stars until daybreak. Therefore, the temporary hours are not symmetric with regard to the true noon. This in contradiction to the commentaries *Shevut Yakov* and *Shalmei Tzibbur*, who place the middle of the night 12 equinoctial hours after true noon.
5. R. David Tzvi Hoffman in *Melamed le-Hoil* 30 addressed to the astronomer Berthold Cohn, also follows the principle of a dissymmetric day (although he does not seem

accordance with the duration and the limits of the day and the Sabbath. Furthermore at 6h, i.e. the beginning of the seventh hour of the day, it would be in fact 1/2 x (72-32) = 20m before true noon. All the times of the afternoon, *minha gedola*, *minha ketana*, and *pelag ha-minha* would occur 20 m too early. The extreme situation would be the calculation of the schedule of the Jewish day for people following the rules of *Levush*, and who agree also with the remark of *Magen Avraham* that for the limit of 3 hours for *Shema*, it must be counted from daybreak. How should they calculate the day's schedule?

The key to the problem can be found in the quotation by *Magen Avraham* of Maharil in Orah Hayim 261: 9. This rabbi divided – without any necessity, because he considered a symmetrical day limited from sunrise until sunset – the day into two parts and examined them independently. *Magen Avraham* could understand – especially when he thought that Maharil calculated *pelag ha-minha* with regard to the appearance of the first night stars – that the morning and the afternoon must not be symmetric but nevertheless that 6 h must be at true noon. Therefore, the morning lasts from daybreak until noon. The 3h of *Shema* and the four hours of prayer and *hametz* on the eve of Pessah are 1/2 and 2/3 of this morning. The afternoon lasts from noon until sunset or the appearance of three middle stars, and the moments of the afternoon, *minha gedola*, *minha ketana*, and *pelag ha-minha* are now 1/12,

convinced by the beginning of the day when the solar depression is 12° and would prefer to begin the day about 6 m after astronomical daybreak). Apparently, all the European calendars before the war (1940-1945) in Germany and Hungary were constructed on this basis.

6. Until 1925, the time schedule of the *eidah heharedit* in Jerusalem was dissymmetric with regard to true noon and was based on a day lasting from daybreak until the appearance of the first night stars, about 20 m after sunset.
7. See Benish, p. 118 for additional references and Sephardic authorities who, like ben Ish Hay, considered dissymmetric time schedule.

In my humble opinion, all these authorities, who are inspired by the *Magen Avraham* and wish to use a stringent time schedule, do not satisfy all the requirements of *Magen Avraham*: to consider an early daybreak, to have 6 hours at true noon, and to arrive at a system in which the stringency of the morning's times is not achieved to the prejudice of the afternoon's times.

There is only one way to satisfy all these requirements, and *Magen Avraham* hinted at it in Orah Hayim 261 when quoting Maharil; i.e. to consider separately the morning and the afternoon, separated by true noon, each of them with its own temporary hour. This is also the only way to understand *Magen Avraham* on Orah Hayim 58.

Similarly, the time schedule of the *eidah heharedit* of Jerusalem, based on the *Luah Eretz Israel* of R. Tucaczinski, would be more logical if it returned to the limits of the theoretical day used before 1925, according to this new principle.

3.5/6 and 4.75/6 of this afternoon. This must be the way of calculation of the Jewish time schedule of the religious day according to *Magen Avraham*. It satisfies the fundamental condition of Jewish time reckoning that 6 h is exactly at true noon. It avoids the calculation of the morning's times being done to the detriment of the afternoon schedule. The price of the solution is that the temporary hours are different in the morning and in the afternoon. This last method seems the most likely method advised by *Magen Avraham*. It is identical to the first method as regards the morning's schedule, but it allows also the calculation of the afternoon's schedule with precision, according to all the possible assumptions about the end of the day, without any influence of the assumption made about the beginning of the day, by contrast with other methods. Finally, the position of *Magen Avraham* concerning the method of calculating the temporary hours, whether we consider short or long temporary hours, is not clear. For the calculation of the limit of 1/3 of the day for saying *Shema* he considers that one should use long temporary hours calculated from daybreak,[90] but in the other cases he presents both methods without making a choice.[91]

It is then surprising that the calculation of long temporal hours, which is today the most accepted rule, on the basis of an extended day of four miles before sunrise and four miles after sunset, is attributed to *Terumat ha-Deshen* and *Magen Avraham*. Indeed, a careful study of the data of the responsa of *Terumat ha-Deshen* has already shown that this authority, like his master Maharil, used short temporal hours and more usually equinoctial hours.[92] Similarly, *Magen Avraham* did not take a firm position[93] on this issue, and considered both possibilities. It would be more accurate to ascribe this method to *Minhat Cohen*, but it is merely the counting of Tosafot.[94] We must again conclude that the practical position of *Magen Avraham* with regard

90 Orah Hayim 58: 1.

91 Orah Hayim 233: 3 and 443: 3.

92 See "Talmudic Metrology II, The Mile as a Measure of Time," *BDD 20* (2008).

93 In Orah Hayim 58, for the limit of *Shema*, he takes a more stringent position and considers hours counted from daybreak until the end of twilight. In Orah Hayim 261: 2 he refers to Maharil 163, who brings the rule of two hours before evening for the early acceptance of Sabbath. *Magen Avraham* would understand that these hours are long temporary hours counted from daybreak until the end of twilight. Nevertheless, a careful study of the responsum, which appears to be responsum 152 as well as the new responsum 45, 4, shows that Maharil counted short temporal hours and had *pelag ha-minha* 1.25 short temporal hours before sunset. Furthermore, in *Tshuvot R. Hayim Or Zarua* 186, it says that one can accept Sabbath from the end of the tenth hour. He surely counted short temporal hours because he considers that סוף שקיעה is not far after sunset.

94 B. Sanhedrin 41b and B. Pesahim 11b: אחד אומר.

to the limits of day and night and the limits of Sabbath according to R. Tam is in contradiction with his theoretical temporary hours, which are counted from five miles before sunrise until five miles after sunset.

d. *R. Hezekiah ben David Da Silva (1659-1695)*

In his book,[95] קונטרס דבי שמשי, he endorses the position of R. Abraham Cohen Pimentel and follows him completely. However, in his commentary on Orah Hayim 672 about the time of lighting the Hanukah candles, he has a completely opposite position. He writes:

עם סוף שקיעתה. פ׳ דהיינו צאת הכוכבים וזהו לפי׳ ר׳ תם דשקיעת החמה קודמת למשתשקע ואינו עיקר אלא היינו תחילת שקיעת החמה כדאמרינן בפי׳ הפועלים משיפקסו מכי מתחלי פיקוסייהו, ושוב מצאתי כן במרדכי ועיין בסי׳ רס״א באורך בס״ד

Apparently, R. Da Silva changed his mind.

e. *Conclusion*

There is great similarity between the positions of the three former authorities. There is no evidence of Bah's influence on R. Abraham Cohen Pimentel,[96] but the latter certainly influenced *Magen Avraham*,[97] which helps us understand him. These three authorities go on to explain the theory of R. Tam, in the Talmud, according to the classical theory; they explain B. Pesahim and B. Shabbat according to the classical explanation. It is only in the application to practical life that they adapt it without asking themselves too many questions about the theoretical validity of this process. We will consider this adaptation as the first stage of the mitigation of the theory of R. Tam.

There is an important difference between *Bayit Hadash* and *Magen Avraham* on the one hand and *Minhat Cohen* on the other. *Minhat Cohen* considers that sunset is the "first sunset"; he remains attached to the theoretical classical theory of R. Tam, but considers that the span of time of 72m between sunset and *tzeit ha-kokhavim* is practically shorter in Western Europe and in Holland. On the contrary, Bah and probably *Magen Avraham* consider that the "end of sunset," corresponding to the beginning of BHS and preceding the night by 0.75 miles, is after sunset.[98]

95 Printed at the end of the book שמן למאור by R. Ezra Malki (Constantinople, 1760).

96 Apparently *Minhat Cohen* did not see the Bah when he wrote the first section of his book.

97 *Magen Avraham* quotes *Minhat Cohen*.

98 See *Magen Avraham* on Orah Hayim 233: 3 where he writes about sunset, which *Levush* identifies with "the beginning of sunset": כותנתו בסוף השקיעה והוא כמו רביעית שעה קודם הלילה. The position of *Magen Avraham* is not very clear.

Therefore, the "beginning of sunset" is 72m before the three stars, or even more as they consider a span of time of 5 miles and a mile of 24 minutes, thus much before sunset.[99] All three remain attached to the theoretical symmetrical day defined in B. Pesahim, but they adapt the situation to define the limits of Sabbath.

3. Authorities of the 18th Century and R. Tam

a. *R. Jacob Poppers of Prague (?-1740)*[100]

R. Jacob Poppers, according to the tradition of the rabbis of Frankfort, follows the positions of the *geonim* and understands the ruling of R. Joseph Caro in Shulhan Arukh Yoreh Deah 266: 9 according to the understanding of R. Shabbetai Cohen (Shah), who follows the ruling of R. Moses Al-Ashkar in his responsum 96: BHS begins at sunset. Therefore, the child who is born on Friday evening after sunset, although before the span of time of 0.75 miles before the appearance of three middle stars, must be considered as having been born during BHS and the circumcision must be performed on Sunday.

b. *R. Joel Ingras (*dayan *in Frankfort am Main)*[101]

R. Joel Ingras objects, and says that the passage in Yoreh Deah must be understood, as already stated by Bah and *Magen Avraham* on Shulhan Arukh 331, according to R. Tam and in accordance with the other rulings of R. Joseph Caro in Orah Hayim. He ascertains that even R. Moses Al-Ashkar, who does not follow R. Tam, agrees that BHS is 0.75 miles before the appearance of the first night stars and does not necessarily start at sunset. Therefore, the child must be circumcised on the next Sabbath, even according to the opponents of R. Tam.

c. *R. Jacob Faraggi, Alexandria, Egypt (c.1640- c.1730)*[102]

R. Jacob Faraggi was asked in responsum 6 about the ruling of R. Joseph Caro in Orah Hayim 623: 2, that *Ne'ila* should begin when the sun is on top of the trees, near sunset. How is it then possible to end this prayer before sunset? R. Faraggi

99 *Magen Avraham* on Orah Hayim 459.

100 *Responsa Shav Yakov* (Frankfort, 1742).

101 The responsum of R. Jacob Poppers and the responsum of R. Joel Ingras, connected to the problem of the circumcision of a child born on Friday evening after sunset, have been printed in the book "*Simlat Binyamin*," *Kuntras ha-Mila*, R. Abraham Binyamin Wolf Hamburg (1770-1850) (Furth, 1840). R. J.G. Weiss of Jerusalem kindly sent me the text of this responsum before I could consult the book in New York Dorot Library.

102 Responsa, Alexandria, Egypt, 1901.

answered, in a responsum attesting to his astronomical knowledge, that R. Joseph Caro believes that the day lasts until 3.25 miles after sunset. The prayer of *Ne'ila* must end before "the end of sunset." He writes that the process of sunset ends when the solar depression is 18°; this is 72 m after sunset, at the moment when any light disappears in the sky and the night stars are then nearly all visible. We have thus the pure classical position of R. Tam, championed by an important authority living near Israel, where the theory of R. Tam is the most problematic. He considers then a mile of 18 minutes according to the plain reading of R. Joseph Caro in Orah Hayim 459: 2,[103] and must be one of the first, after *Levush*,[104] to explicitly adopt this value of the mile.[105]

d. *R. Raphael ha-Levi of Hanover (1685-1779)*[106]

In 1766 R. Raphael ha-Levi issued a printed timetable of the important moments of the religious day during the solar year.[107] It is expressed in true time, which was still used in civil life at that time. It is the first table ever published that was calculated on a scientific basis, and is still valid today. According to my investigation,[108] the assumptions underlying this table are the following:

Obliquity of the ecliptic = 23°; 29'[109]
Geographic latitude = 52.5°
Refraction = 0°; 32'[110]
hanetz ha-hamah and *shekiyat ha-hamah* = 0°; 32'

103 The true meaning of the text is not clear. According to R. Joseph Caro's understanding of *Terumat ha-Deshen*, Responsa 123 and 167 and his own explanation in *Beit Yosef* on Tor Orah Hayim 459, the mile should represent 18 m in long temporal time corresponding to 22.5 equinoctial minutes. R. Joseph Caro considers indeed a dawn and twilight of four miles.

104 *Levush ha-Hur*, 267: 4 miles represent 72 minutes.

105 The position of R. Faraggi was theoretical, as he conceded that he was not followed by the community nor even by his own wife (responsum 47). The community followed the theory of the *geonim*. Other authorities followed the position of the *geonim*: R. Isaac Rappaport, rabbi of Smyrna (d. 1755) in *Battei Kehuna*, *Get Mekushar* and Hida. However, R. Hayim Abulafia (~1660-1744) introduced a *takana* in Smyrna that Sabbath should be kept until 75m after sunset. This *takana* was also adopted in Aleppo under R. Samuel Laniado.

106 Timetable published in 1766 in Hanover. See a copy in *Ha-Zemanin ba-Halakha*, p. 525.

107 A copy of this table is given in *Ha-Zemanim ba-Halakha*, p. 525.

108 These calculations were confirmed by Engineer Yakov Loewinger of Tel Aviv and Rabbi Engineer Jacob Gershon Weiss of Jerusalem.

109 Bradley gave a new value of 23°; 28' in 1750, but R. Raphael ha-Levi was probably not yet aware of it.

110 This was the value considered at this time in the "*Connoissance des Temps*."

sunset and sunrise correspond to the apparent setting and rising of the center of the sun.

alot ha-shahar at a solar depression: 8°; 05'
tzeit ha-kokhavim at a solar depression: 7°; 10'

He explains that *alot ha-shahar* corresponds to the time when one can recognize a friend at a distance of four cubits, i.e. the time for saying *Shema*, and that the time of sunset[111] will allow one to know when to begin Sabbath. It is nevertheless impossible to know if he follows *Minhat Cohen* and begins early Sabbath to take into account the opinion of the *geonim*, or if he follows the position of the *geonim* and delays the end of Sabbath until the appearance of three medium stars in order to be sure,[112] instead of three stars of the first size.[113]

e. *R. Hirschel Levin of Berlin (1721-1800) and his son Solomon Hirschel (1762-1842)*[114]

These two established a timetable calculating the religious times of the day throughout the year using the table of Raphael Hanover.

This table calculates the long temporal hours of the day throughout the year. The calculation is similar to that of *Minhat Cohen*, but the beginning of the day is when one recognizes a friend at a distance of four cubits, corresponding to a solar depression of 8°; 05' and ending at the appearance of three medium stars, at a solar depression of 7°; 10'. The times of the beginning and ending of the day are those of R. Raphael of Hanover's table.

This day lacks complete symmetry with regard to true noon. This is a serious problem affecting the calculation of the long temporary hours based on a natural

111 Like the astronomers of his time, R. Raphael of Hanover considers that sunset is the moment when the center of the sun sets at the horizon, taking refraction into account; it is the apparent sunset of the center of the sun. This was the general scientific position at this time.

112 As we do today, under the assumption that we follow the theory of the *geonim*.

113 The great stars that are seen during the day and which the Talmud excludes are the planets Venus and Jupiter and the great and luminous star Sirius.

114 Manuscript table constructed based on the timetable of R. Raphael ha-Levi of Hanover. It was calculated by Tzvi Hirsh and Solomon, probably the rabbi of Berlin and his son. This table is constructed based on Hanover's table. It adds the temporal hours on the basis of a day beginning at *alot ha-shahar* given at the first line, and ending at *tzeit ha-kokhavim* indicated at the last line. There is a certain gap between the resulting noon and the true noon. See a Xerox copy of December in *Ha-Zemanim ba-Halakha*, p. 526. The manuscript is at the library of JTS in New York.

day beginning at daybreak and ending at the beginning of the night. This day is indeed asymmetric because the dawn is longer than the evening twilight.[115]

The end of the sixth hour of this day does not coincide with true noon,[116] even though this seems to be required by many Talmudic references.[117]

f. *R. Jacob Emden (Ashkenazi) (1697-1776)*[118]

R. Jacob Ashkenazi champions, in his Siddur, the plain application of the theory of R. Tam as explained in Shulhan Arukh Orah Hayim 261: 2. He writes that BHS begins 58.5 m after the "beginning of sunset" and that BHS is 0.75 miles before *tzeit ha-kokhavim*. But the conclusive evidence is that *pelag ha-minha* is 1/6 mile before sunset. This confirms the classical understanding: BHS begins 58.5 minutes after sunset and ends 72 minutes after sunset. He seems to consider equinoctial hours and does not consider the effect of geographical latitude or even of solar declination.[119] In the estimation of these spans of time, he accepts that the mile is 18 equinoctial minutes.

In his commentary and notes on Tor Shulhan Arukh: *Mor u-Ketziya* he writes:[120]

- About *Magen Avraham* in Orah Hayim 58 כתב דהכא לכ"ע מנינן ג' שעות מעלות השחר ואיני רואה הכרח לדעתו זו
- In Orah Hayim 672 he writes that one lights the Hanukah candles after the beginning of sunset as soon as one feels an advantage from their light. This occurs after sunset, near to the end of sunset. Therefore, one should not

115 For physiological reasons. At the same solar depression, the eye in the morning, after the darkness of the night, sees much better than at the beginning of the night after the end of a day. Furthermore, in the morning the eye is rested.

116 This point was emphasized by R. Mordekhai Karmi (Carpentras 1749 - Aix-en-Provence, 1829), probably the last French authority of international stature. In his *Ma'amar Mordekhai* on Orah Hayim 233, he writes that halakhic noon is about half an hour before what we call (true) "noon." He refers to *Magen Avraham* on Orah Hayim 233: 3 to justify that the temporary hours are counted from daybreak until the end of dusk. Apparently, he considers an early daybreak at about 1.5 h before sunrise and *tzeit ha-kokhavim* at about half an hour after sunset, giving the beginning of the seventh hour at 11h 30m local true time. However, from *Magen Avraham* on Orah Hayim 233: 4, it seems that the middle of the religious day should coincide with true noon, חצות ממש. This asymmetrical day remains theoretically problematic and rests on apparently secondary sources. The short temporary hours, from sunrise to sunset, do not raise all these difficulties.

117 See note 30 in the first part of the paper.

118 The law of Sabbath in his *siddur*.

119 In function of the season.

120 See also note 69.

> light the Hanukah candles from *pelag ha-minha*, which is near to sunset, and with greater reason not from the early *pelag ha-minha*, which occurs 1.25h before sunset.

This confirms that R. Jacob Emden understands R. Tam in the classical way and rules according to R. Tam in all situations, not only on Saturday evening but even on Friday at the entrance of Sabbath; this is really surprising.

g. *R. Elijah ben Solomon Zalman (1720-1797)*

His opinion is expressed in his commentary on Shulhan Arukh Orah Hayim 261: 2 and 331: 2.

He rejects the answer of Tosafot[121] because it implies that the span of time between daybreak and sunrise would be equal to the span of time between sunset and the appearance of the first three night stars. This is contrary to the observation; the first span of time is much longer than the second. According to Tosafot, who equate these two spans of time, there would be no *tzeit ha-kokhavim* during the four months of summer (in northeastern Europe). In reality, he says, BHS begins at the beginning of sunset and it lasts until the upper[122] part of the horizon darkens. The span of time of 0.75 miles corresponds to the situation at the latitude of Babel and at the equinox. This moment (sunset) corresponds also to the time when it is permitted to eat at the end of the minor fasts.

The contradiction raised by Tosafot between B. Shabbat and B. Pesahim is not a problem at all. In B. Pesahim they speak about the thickness of the firmament, and *tzeit ha-kokhavim* means the appearance of all the stars, after 4 miles when there is no light any more. But in B. Shabbat, where they speak of middle stars, not little stars that are not seen before the disappearance of any light, when all the stars become visible. But *tzeit ha-kokhavim* in general means the vision of three middle stars. They become visible when the zenith darkens and becomes as dark as the eastern horizon. The Talmud gave the rule of 0.75 miles because it is very difficult to fix the exact moment when the three first middle stars become visible. As written above, BHS begins at sunset; it belongs between sunset and the setting of the light that corresponds to the darkening of the zenith when the light diminishes and it no longer gives reddish glows. Similarly, it is at sunset that blood becomes impure and unsuitable and it is also at this time that one should no longer pray *Minha* and

121 B. Shabbat 35a: תרי תלתי. The *bein ha-shemashot* of 0.75 miles in B. Shabbat is situated at the end of the 4 miles mentioned in B. Pesahim.

122 In the printed text it writes "the under par of the horizon." It must be a printing error.

that the dictum about the malediction of the person praying *Minha* when the sun becomes reddish at sunset applies.[123] *Now, according to Tosafot, at this moment* (when the sun becomes reddish at sunset we are still far from BHS which occurs only 3.25 miles later) *it is still day for a long time* (and why would it be forbidden to pray *Minha* and would the Palestinians curse those praying *Minha* at this moment?).

Similarly, it is at about this time that Sabbath begins and this is the meaning of the dictum "Beth Hillel authorize working until sunset." This is also the opinion of R. Eliezer of Metz, who writes that *mishetishka* on the Sabbath means the "beginning of sunset" (before sunset), and it is the same for the lighting time on Hanukah. It is then easy to understand, according to Ram, the dictum of Rava to light the candles when the sun is seen at the summit of the palms or, on cloudy Fridays, when the hens go perching, *but according to R. Tam we are still before the time of accepting Sabbath*. According to Ram, BHS is before sunset. The Gra takes now issue with Ram, who writes:[124] "and it seems also that *the three first middle stars* (according to the opinion of Rabbi Jose) *become visible five miles after sunset, as it is indeed also the opinion of R. Tam....*" Thus, Gra understands that the BHS and the three middle stars of Rabbi Jose appear five miles after sunset as much for Ram as for R. Tam (and also for Ravan). But he takes issue with Ram, because he cannot accept such a great span of time between the BHS of Rabbi Judah and Rabbi Jose.

It appears thus that Gra understood the theory of R. Tam according to the classical understanding and, furthermore, he understood also that R. Eliezer of Metz understood it in the same way.

Today, the opinion of the *geonim* is considered to be identical to Gra's position. BHS begins at sunset and lasts 0.75 miles, a mile being 22.5 m. In fact, his position is similar to that of the *geonim*, Rif, Maimonides, R. Moses Al-Ashkar and Maharal, but each position has its specificities, and it would be a dangerous simplification to confuse these different positions. For example, it is certain that Rabad considered that BHS begins slightly after sunset.[125] This seems also to be the position of the Babylonian *geonim*.[126]

123 B. Berakhot 29b.

124 According to the quotation of Mordekhai:ועוד נראה שם דג' כוכבים שהוא לילה הוא מהלך חמש מילין אחר השקיעה כדעת רבינו תם.

125 See the first part of the paper "Talmudic Metrology VI: Sabbath Limits and Jewish Time Reckoning," B.D.D. 24: note 71 ("Rabbi Abraham ben David of Posquière..."), p. 33 and note 128 ("The commentators didn't wonder..."), p. 51.

126 See Or Meir, p. 79.

h. *R. Ze'ev ha-Levi Olsker of Brody (19th century)* Hidushei ha-Rezah[127]
This book was completed in 1754, long before its publication, when the two approbations were written, the first by R. Ezekiel Landau in Yampol and the second by R. Saul Loewenstamm in Dubno. In his introduction, the author writes that he examined the subject of this book with R. Landau during three weeks at the rate of about 2-3 hours a day. He seems convinced that he persuaded R. Landau and writes that R. Landau smiled at him at the end of these study meetings. However, in the approbation that he wrote, R. Landau adopts a much more cautious position and writes:ואם בקצת דברים שחולק על דברי הקדמונים כל מי שיראה בספרו, אם יש בידו להכריע מה טוב ואם לאו לא יסור מדברי הקדמונים.
The author writes (p. 36):

נמצא שיש לפרש דבריו בתרי גווני או דתחילת שקיעה היינו שכבר שקעה ואינה נראית על הארץ ומתחלת לעבור עובי הרקיע וכמו שפרשו הרמב"ן והרשב"א והר"ן והמ"מ את דבריו כמו שמביא הב"י בשמם בא"ח ס' רס"א ובמ"מ בפ"ה מהלכות שבת ע"ש. גם יש לפרש דתחילת שקיע היינו שמתחלת מעט מגוף החמה לכנוס בעובי הרקיע וסוף שקיע היינו שכבר שקעה כל גוף החמה בעובי הרקיע וזהו משתשקע החמה שאמר רבי יהודה בשבת שמשם מתחיל בין השמשות דהיינו משעה שאינה נראית על הארץ וכדעת הגאונים ממש.

The second possibility is precisely the opinion of some of the modern scientists mentioned below. This was the first time that such an opinion was expressed,[128] but its author, by contrast with these modern scientists, accepts that he is in contradiction with all the former interpreters of R. Tam. Apparently, R. Landau remained unconvinced.

This is the last stage of the mitigation of the theory of R. Tam: there is no difference at all between the position of R. Tam and the *geonim*!

He writes (p. 53b) that, according to the exponents of R. Tam and the Shulhan Arukh, the day of the Torah lasts from daybreak until the appearance of the stars, 4 miles after sunset. He personally thinks that this day is a day in men's language, but the day of the Torah begins at daybreak and ends at sunset. He develops a new theory of temporary hours of this day during which one covers 44 miles.

All this author's theories seem questionable. This new scheme is aimed at solving the contradictions of R. Tam's theory, but raises more problems than it solves; it raises untenable objections. Here are the main objections:

127 *Hidushei ha-Rezah* (Zolkiew, 1771 and Jerusalem, 1885).
128 The same theory was developed in *Responsa Bnei Tzion* by R. David Shapira, Vol. 2 (New York, 5716).

- In the classical theory of R. Tam, the main sunset is the beginning of sunset: it is the astronomical sunset, symmetrical to sunrise. In this new exposition of R. Tam, the main sunset is the end of sunset, corresponding to the astronomical sunset. The appearance of the stars follows the second sunset by 0.75 miles. In this scheme, daybreak occurs now 0.75 miles before sunset if we want to consider the symmetry of B. Pesahim; this seems quite strange.
- Under the assumption (accepted by R. Olsker) that an average walker covers 40 miles between sunrise and sunset on the day of the equinox in 12h, a mile represents 18m. If we neglect the 4m difference between the true sunset at 18h on the day of the equinox and 18h 04m, the time of the apparent sunset, we can conclude that the first sunset is at 17h 01m 30s; the second sunset is at 18h and the appearance of the stars is at 18h 13m 30s. Similarly, daybreak is at 5h 46m 30s, the beginning of sunrise is at 6h and the end of sunrise is at 6h 58m 30s. In the afternoon, the crossing of the firmament begins thus at about 5h 1.5m p.m. and it ends at about 6h 13.5m p.m. In the morning it begins at about 5h 46.5m and it ends at 6h 58.5m.This scheme is in contradiction with the scheme of sunset expounded by R. Hananel, which aims to explain the transition, after sunset, from full light to complete dark and complete apparition of the stars. Similarly, in the morning, it aims to explain the transition from complete dark to full lighting at sunrise. According to this scheme, the sun begins to cross the atmosphere at about 5h a.m.; it ends at about 6h 13m a.m. This scheme does not explain why, after apparent sunset and after the completion of the crossing of the firmament, when the sun is already in the upper vault, it is going on to darken during the next hour, and why the stars continue to appear more and more during this period.
- This theory does not take into account the fact that *rishonim* like Ravan and probably Ram, considered that the BHS of R. Jose ends 5 miles after sunset.
- The distance covered between sunrise and sunset is 40 miles. The distance covered between daybreak and the appearance of the stars is now 41.5 miles; therefore the long temporary hours are equal to 41.5/40 = 1.0375 short temporary hours. Thus, on the day of the equinox, the long temporary hours are not significantly different than the equinoctial hours.
- R. Tam states in B. Zevahim 56a that blood is rejected at the beginning of sunset four miles before the apparition of the stars. This would be at about 17h 01m, and the apparition of the stars must be understood as the apparition of the first three stars. Tosafot writes about the same in Menahot 20a, but they use here a length of five miles for twilight; this would give us an even earlier beginning of sunset.

- It is generally accepted that the walkers leaving Modi'im at noon on the eve of Pesah arrive in Jerusalem at 6 p.m., the time of sunset and the end of the slaughtering, because the blood becomes impure at sunset (the beginning of sunset). Under the assumption that 1 mile is 18m, the distance of Modi'im from Jerusalem is then 20 miles. But according to this new theory, the blood must become impure and the slaughtering must end at 5h 01m 30s. The walkers should thus reach Jerusalem by this time, after a walk of 16.75 miles.
- The prayer of *Ne'ila*, which, according to Rabbi Johanan must end before the closure of the sanctuary's gates, should then end by 5h p.m!.
- When Tosafot in B. Avoda Zara 34a consider that in principle we could end the (little) fasts at the beginning of sunset, five miles before the stars appear, they would consequently end the fast at about 16h 30m! It is not for nothing that Tosafot write that we cannot take such a risk!
- In Tosafot אחר אומר,[129] it says that sunrise is a precise moment, which everyone is supposed to know, and which can be used to invalidate a testimony. Tosafot mention that it is between 1 and 2h or in the second hour.[130] According to this new understanding, sunrise occurs at (0.75/40) x 12 = 0.225h = 0h 13m 30s. The end of sunset, which is a fictitious moment, occurs at (3.25/40) x 12 = 0.975h = 0h 58m 30s. This new understanding does not fit this Tosafot.

4. Authorities of the 19th Century and R. Tam

a. *R. Abraham Danzig (1748-1820)*[131]

R. Abraham Danzig writes in his *Hayei Adam* that one must accept Sabbath at least half an hour before the night.[132] This ruling follows R. Tam according to the understanding of *Minhat Cohen*, considering the appearance of three middle stars as the beginning of the night of R. Tam, without taking the opinion of the *geonim* into consideration.

Sabbath should not be accepted before *pelag ha-minha*, 1.25 h before the night.[133]

129 B. Sanhedrin 40a and B. Pesahim 10b.

130 In temporary time, sunrise occurs at (4/40) x 12 = 1.2h or 1h 12m. This is indeed between 1 and 2h.

131 The laws of Sabbath in *Hayei Adam* (Vilna, 1810).

132 Hilkhot Shabbat 5: 1.

133 Hilkhot Shabbat 5: 1.

Hayei Adam calculates his temporary hours from daybreak until the end of dusk.[134]

b. *R. Moses Sofer (1762-1839)*[135]

R. Moses Sofer holds a similar position to the authorities of the 17th century considered above. In responsum Orah Hayim 80, he considers a mile of 22.5 m based on an extended halakhic day beginning 4 miles before sunrise and ending 4 miles after sunset.[136]

R. Moses Sofer does not mention at all the opinion of the *geonim*.

He further ascertains that everyone in his area follows R. Tam as they interrupt any work 0.75 or 1 hour before the night.[137] In fact the data given in the responsum allows one to conclude that he follows the understanding of *Minhat Cohen*, except for the fact that he does not mention the time of sunset. Furthermore, R. Sofer ends Sabbath earlier than *Minhat Cohen* and he calculates the time of the night very roughly.[138]

134 *Hayei Adam* Hilkhot Tefila 21: 3, 27: 1 and 123: 3 for the schedule of the eve of Pesah. However, in 33: 1 he casually proposes the two methods of calculation.

135 Responsa Hatam Sofer, Orah Hayim 80 (Presburg, 1856). See also *Likutei Hearot al Sifrei Tshuvot Hatam Sofer*, Isachar Dov Goldstein (Jerusalem, 1969).

136 See Responsum Orah Hayim 80. In his notes on Shulhan Arukh Orah Hayim 89 he championed a mile of 22.5 minutes but finally, at the end of the note, he seems to accept that a mile is 18 minutes because of the opinion of *Kaftor ve-Ferah* based on the experience in Israel, *Eretz ha-Tzvi*. Of course, a mile of 22.5m contradicts an early *tzeit ha-kokhavim* adopted by R. Sofer according to R. Tam.

137 This passage of the responsum is difficult; it does not contain any element proving that they followed R. Tam. Perhaps the text should be corrected by "we all work until 0.75 miles or 1 mile before *tzeit ha-kokhavim*." This would indeed prove that they followed R. Tam. See also R. Hayim Benish in *Ha-zemanim ba-halakha*, p. 442.

138 *Hatam Sofer*, responsum 80 deals with the case of a boy born on 28 Sivan 5563 or 18 June 1803 after sunset, at 20h 30m in Eisenstadt, near the end of Sabbath, after sunset. The sky was cloudy and the stars could not be observed. The latitude of Eisenstadt is 47°; 50' = 47.83°. According to R. Sofer, the night was at 20h 55m and BHS began, according to him, about 17 m before, at 20h 38m. R. Moses Sofer therefore considered that the child was born on Sabbath before BHS. All these times are expressed in true time.
We calculate that apparent sunset was at 20h, and at 20h 55m the solar depression was 7.6°. This of course is much too late for the time of the first appearance of three night stars for the purpose of circumcision, i.e. without any *humra* and without any *tosefet*. Eng. Yakov Loewinger has shown that R. Moses Sofer used in Mattesdorf and Eisenstadt a table adapted by R. Nathan Adler for Frankfort from the table of Raphael ha-Levi from Hanover. The

c. *R. Jacob Lorbeerbaum of Lissa (1760-1832)*[139]

He follows the theory of R. Tam according to the understanding of *Minhat Cohen*, considering the appearance of three middle stars as the beginning of the night of R. Tam.

BHS lasts 13.5 m before the night. From 15m until 13.5 m before the night, he prescribes an obligatory supplement, and from 72 m until 15 m before the night he considers a facultative supplement to the Sabbath. These times are independent of the season and the latitude of the location. We have now reached a second stage of the mitigation of the theory of R. Tam; the first sunset, or the beginning of sunset, is no longer apparent sunset, but a moment preceding it by nearly an hour. It can correspond to the moment when the sun becomes reddish near sunset. The opinion of R. Lorbeerbaum is not original; it was already championed by previous authors, such as the authors of *Olat Tamid*[140] and *Hidushei ha-Rezah*.[141] It was further explained by R. Joseph Zevi Duschinsky[142] in the 20th century.

d. *R. Benjamin Wolf Hamburger (1770-1850)*

R. Hamburger examines the problem of the circumcision of a child born on Friday evening before the appearance of the stars.[143] He writes that R. Jacob Poppers was right to oppose R. Ingras, since BHS begins at sunset according to *geonim*. He writes, however, that he inclines toward the position of *Magen Avraham* and Radvaz. They still work on Friday evening in all the Jewish communities, even though the sun has already set. Therefore, this period is not yet considered to be night, although it involves, in the case of Sabbath, violation, stoning or *karet*; all the more, is it still

result was very problematic and if, in fact, the child was born at 20h 30m when the solar depression was already 4.65°, at the end or even after the end of the theoretical BHS, after the appearance of the first three night stars, the child should have been considered as belonging to the next day.

139 The laws of Sabbath in *Derekh ha-Hayim* (Zolkiew, 1828).

140 *Olat Tamid* by R. Samuel ben Joseph, commentary on Shulhan Arukh Orah Hayim (Amsterdam, 1681), with an approbation by R. Isaac Aboav and R. Jacob Sasportas. The introductions of R. Joseph Caro and R. Moses Isserles, generally omitted in modern editions, are printed on the front page. In Orah Hayim 261, about the beginning of sunset, when the sun no longer shines on the earth, the author adds "with its strength," meaning that this moment is before sunset, when the sun's power diminishes.

141 By R. Zecv ha-Levi Olsker (Zolkiew, 1771).

142 *She'elot u-Teshuvot Mahariz* I, 1956, 28. I must thank Eng. Yakov Loewinger who told me about it.

143 Simlat Binyamin, *Kuntras ha-Mila*, 2, pp. 76a-78b (Furth, 1840-1841).

day for circumcision, especially as R. Joseph Karo also ruled in this way in Orah Hayim 261.

e. *R. Solomon Ganzfried (1804-1886)*[144]
R. Solomon Ganzfried follows the *Hayei Adam* and writes in his *Kitzur Shulhan Arukh* that one must accept Sabbath at least half an hour before the night.[145] This ruling follows R. Tam according to the understanding of *Minhat Cohen*, considering the appearance of three middle stars as the beginning of the night of R. Tam, without taking the opinion of *geonim* into consideration. Furthermore, the acceptance of Sabbath must not occur more than 2 hours before the night.[146] He counts the temporary hours of the day between sunrise and sunset[147] but, for the limits of the prayer of *Shema*, he considers a day lasting from daybreak until the beginning of the night.[148]

f. *R. Jehiel Michal Epstein (1829-1908), Arukh ha-Shulhan*
He mentions the two ways of calculating the temporary hours, but he rules for temporary hours calculated from sunrise until sunset.[149] He rules for an early acceptance of Sabbath according to the *geonim*.[150]

g. *R. Israel Meir ha-Kohen Kagan of Radin (1838-1933)*[151]
In Orah Hayim 261. 2 he follows the theory of R. Tam according to its plain explanation: BHS begins 58.5 m after sunset and ends 72 m after sunset. Nevertheless, he recommends refraining from working after sunset, out of consideration for the opinion of *geonim*.[152]

144 *Kitzur Shulhan Arukh*, 75, the laws of lighting Sabbath candles.
145 75 § 1.
146 75 § 1.
147 69 § 2.
148 17 § 1.
149 *Arukh ha-Shulhan* Orah Hayim 58 § 11, 261 §10 and 443 §5.
150 261 §8. However he mentions the theory of R. Tam in 261 §7.
151 *Mishna Berura* on Shulhan Arukh Orah Hayim 261 and 331.
152 See also *Ha-Zemanim ba-Halakha*, p. 397 where the author, R. Benish, shows that R. Israel Meir took the opinion of the *geonim* regarding the time of the beginning of BHS more and more into consideration in his *Mishna Berura*.

5. 20th-Century Trends

The latest trends are the following:

- The mile is generally considered as 18 m.
- The limits of Sabbath are considered according to the *geonim*, but those who take the opinion of R. Tam into consideration wait 72 m after sunset. This tendency developed in Poland beginning in the second half of the 19th century.[153] But this position was already advocated by R. Hayim Palaggi[154] (1788-1869) and his predecessors in Smyrna.
- Temporal hours are reckoned on the basis of a day beginning 4 miles before sunrise and ending 4 miles after sunset, even in rabbinical matters, contrary to the ruling of *Minhat Cohen*.
- Neither laymen nor rabbis seem bothered by the flagrant contradiction between the use of long temporal hours for the religious divisions of the day and a ruling about the Sabbath's limits according to *geonim*.

C. LAST STAGE OF THE MITIGATION OF THE THEORY OF R. TAM

There was already a tendency among rabbis to follow a revisionist reading of the theory of R. Tam in order to bring it more into accordance with scientific reality.[155] Nowadays, Orthodox scientists have reached a new third stage; they champion the

153 See nevertheless note 142. This author follows the adapted theory of R. Tam (stage 2).

154 *Moed le-kol Hay* 16, 28 and *Kaf ha-Hayim* 31, 6.

155 The contradiction between the two statements of Rabbi Judah in B. Pesahim 94b and B. Shabbat 34a has found different solutions.

1. The exposition in B. Pesahim contradicts the physical reality and is no longer taken into consideration. (R. Moses Al-Ashkar, responsum 96).
2. The span of 3/4 miles (*bein ha-shemashot*) is just before the span of 4 miles. It ends at sunset when the span of 4 miles begins (this is the common understanding of R. Eliezer from Metz who actually works with 5 miles).
3. The span of 3/4 miles begins at sunset, at the beginning of the span of 4 miles. The night of Rabbi Jose follows the end of the span of 3/4 miles quite quickly (Maimonides, Gra).
4. The span of 3/4 miles is in the span of 4 miles; it begins a little later (a little after sunset, when the light is diminishing) and ends much earlier (R. Hai and R. Sherira Gaon according to Or Meir, in contradiction with Benish, for whom the span of 3/4 miles begins at sunset).
5. The span of 3/4 miles is in the span of 4 miles; it begins a little later and ends much earlier. But the night of Rabbi Jose is much later (Ravan according to Or Meir, in contradiction with Benish for whom the span of 3/4 miles begins at sunset).
6. The span of 3/4 miles is at the end of the span of 4 miles; both spans end together (R. Tam).

idea that there is finally no practical difference at all between R. Tam and *geonim*, neither in the limits of Sabbath nor in the comprehension of B. Pesahim 94a. According to them, the beginning of the night is 0.75 miles after sunset and *alot ha-shahar* is symmetrically 0.75 miles before sunrise. According to them, the beginning of sunset occurs 3.25 miles before sunset and the end of sunrise occurs 3.25 miles after sunrise.

The main objections were already detailed above with regard to the theory of R. Ze'ev ha-Levi Olsker, which they follow.

By contrast with R. Olsker, they generally try to demonstrate that all the former authorities, who followed R. Tam, shared their point of view.[156] Therefore their

7. A mitigated interpretation of R. Tam by R. Abraham Cohen Pimentel – *Minhat Cohen* – is similar to solution 5 and considers that it is night when three night stars become visible. The *Magen Avraham* and the *Hatam Sofer* and other authorities followed a similar position and were persuaded to follow R. Tam. Our custom today is to begin Sabbath not later than sunset and to end it at a solar depression of 7°; 05', 8° or 8.5° according to the stringency of the communities and their rabbis. I have always considered that we are in case 3, with a security prolongation at the end of Sabbath until we are sure to have three concentrated small stars. But others consider that we are actually in case 7, with an anticipation of the beginning of the Sabbath in order to take opinion 3 into consideration. In fact, the simple acceptance of Sabbath after sunset, 0.75 miles before the early appearance of the three first night stars would already be considered as a way of following R. Tam. See, for example, responsum 80 of *Hatam Sofer*. The difference between both positions is so tiny that it becomes difficult to make the distinction.

156 R.Y.G. Weiss has brought to my attention the two following passages, which would contradict the position championed in this paper.

1. In B. Pesahim Ran on the first page of the Rif: וכתב הראב"ד ז"ל דמ"ה נקט אור לומר שבתחילת הלילה שיש בו אור עדיין ראוי לברוך כדי שלא יתרשל ר"ן, בד"ה: ותנא דידן מ"ט לא תני לילי. This passage could be invoked in order to prove that the Ran also considers that there is still light in the sky at the beginning of the night and therefore the "end of sunset" would correspond to apparent sunset.
   We know that Rabad began BHS slightly after sunset (see first part of the paper in *B.D.D. 24*, notes 71 and 128), but he ended Sabbath at about the same time as Maimonides. Rabad, indeed, doesn't contradict Maimonides' rulings in *Hilkhot Shabbat* V:4 or in *Hilkhot Terumot* VII:2. In the latter ruling, Maimonides rules that Sabbath ends about 20 minutes after sunset. The origin of this contradiction is probably that the mile of Rabad is not 24m but 18m. This allows him theoretically to begin BHS after sunset and nevertheless end BHS together with Maimonides.
   As Rabad ends *bein ha-shemashot* together with Maimonides, there is surely still a little light in the sky after the beginning of the night. But we don't know how Ran (R. Nissim Gerondi of Barcelona, c. 1310-c. 1375) understood this sentence. Probably he understood, as proposed in the commentary on Shulhan Arukh, *Be'er Hetev*, in the

name of Ran and R. Jacob Weill, that it means near to the night (i.e. slightly before the beginning of the night), contrary to other opinions that require one to wait until the effective beginning of the night. In other words, it is quite possible that Rabad and Ran don't consider the same beginning of the night. Rabad says that at the beginning of the night there is still a little light, while Ran understands that *bedikat hametz* must be performed a little before the night, when there is still a little light. See however *supra*: "The understanding of R. Tam by R. Nissim ben Reuven Gerondi." This passage of Ran could be written according to his opinion expressed in Ta'anit 26a, that the span of time between sunset and night is a short span of time.

2. B. Berakhot p. 2b, Tosafot

בד"ה דילמא: וי"ל דה"פ ממאי דהאי ובא השמש וטהר ביאת שמש הוא ממש וטהר יומא דהיינו צאת הכוכבים דילמא ביאת אורו הוא דהיינו תחילתה של שקיעת החמה והוא תחילת הכנסתה ברקיע ועדיין יש שהות ביום חמש מילין עד צאת הכוכבים

The first impression indeed is that *bein ha-shemashot* begins at sunset (ממש), and that it is then followed 0.75 miles later by the apparition of three stars; this corresponds to what is called the theory of the *geonim*.

Actually *biat shimsho* represents here the end of sunset, when the sun has already crossed the sky, 3.25 miles after apparent sunset, and *biat oro* is just after the beginning of sunset, i.e. our apparent sunset. R. Samuel Strashun confirms this understanding in his commentary (Novellae of the Reshash). This point of view is also evident from the Novellae of the Rashba בד"ה וממאי. Rashba actually prefers the reading of the *geonim* (probably because the vanishing light of the sun follows the disappearance of the sun below the horizon).

The vanishing of the light, ביאת אורו, he explains, is when the light disappears completely, at the "end of sunset," while ביאת שמשו is at the beginning of sunset, i.e. our physical sunset, when the sun begins to cross the sky.

We have already discussed the difference of understanding between the *geonim*, followed by the Spanish rabbinical authorities and Tosafot of the two concepts: ביאת שמשו וביאת אורו. See above the understanding of R. Tam by R. Simeon in *Sefer ha-Ittur*.

Geonim	**Tosafot**
biat shimsho = sunset, the sun is no longer visible	*biat oro* = diminution of the light after sunset
biat oro = disappearance of the light	*biat shimsho* = end of sunset after crossing of firmament.

The *geonim* understood the disappearance of the light on the earth at the end of the civil twilight. The Spanish rabbis, influenced by the theory of R. Tam, adapted the notion of ביאת אורו to a later moment, when the light disappears from the sky in the western part of the celestial vault, at the end of the astronomical sunset.

Concurrently, in Tosafot B. Berakhot 2a ד"ה מאימתי. The moment at 10h 45h temporary time, when we are allowed to pray *Ma'ariv*, must represent *pelag ha-minha*, slightly before sunset, the temporary hours being counted on the basis of a long day. Similarly, the moment that seems to be known by people, משעה שקדש היום, the moment when it becomes Sabbath and the moment when they make kiddush משעה שבני אדם נכנסים להסב דהיינו סעודת ערב שבת represent about the same moment, i.e. sunset. It would be unthinkable that the natural moment when it becomes Sabbath: משעה שקידש היום would already begin 4 or 5 miles before sunset when the sun still shines.

exegesis is often far-fetched.[157] notably in Shulhan Arukh Orah Hayim 261: 2,[158] Nahmanides, *Torat ha-Adam*, chapter about *tosefet Shabbat*,[159] *Sefer ha Ittur*, Hilkhot Mila,[160] Rashba on Berahot,[161] Ritva on Sabbath[162] and Ran on the Rif in Sabbath.[163]

All those who wish to reinterpret R. Tam in order to move forward the "end of sunset" so that the end of BHS coincides with the appearance of the first three middle stars must realize that, already before R. Tam, a theory, similar to that of R. Tam, was championed by Ravan. The latter began Sabbath at the beginning of the BHS of Rabbi Judah, at sunset or slightly later according to the reading adopted in his responsum, but he ended Sabbath, with Rabbi Jose, 5 miles later, at the time of the appearance of all the stars, and he held that it is still day, on Saturday evening *lehumra*, until this last moment. Here it is impossible to move this last moment forward. We see thus that an elder fellow of R. Tam considered that the halakhic day lasts until the appearance of all the stars. This was also the understanding of R. Eliezer of Metz.[164]

157 R. Y.G. Weiss does not share my point of view and defends this exegesis of the different passages; see Weiss in *Or Israel* (*Nisan* 5762 and *Tishri* 5763).

158 וזמן תוספת זה מתחילת השקיעה, שאין השמש נראית על הארץ which they understand according to the explanation of *Olat Tamid*, see note 139.

159 Edition Shavel, pp. 252-54.
אלא שמע מינה שקיעת החמה האמור בפסחים היינו תחילת השקיעה, משעה שאינה זורחת בארץ והאמור בבמה מדליקין, סוף השקיעה, שנכנסה ברקיע.

160 ופ׳ הר״ר שמעון בשם הר״ר יעקב, משתשקע החמה, לאו ביאת שמשו הוא, שאינו נראה ברקיע, דהא משתשקע החמה עד צאת הכוכבים ד׳ מילין ובין השמשות לא הוה אלא ג׳ חלקי מיל, אלא משתשקע החמה דהיינו ביאת אורו סמוך ללילה.

161 היה קרב והלך עד פלג המנחה ומשום הכי תפילת המנחה שהיא כנגדה אינה אלא עד אותו זמן ומשם ואילך ראוי לתפילת הערב מפני איברים ופרדים שקרבין והולכין. אבל ודאי אינו לילה ותדע לך שהרי עדיין השמש על הארץ כדי מהלך שתות המיל ואיך הוא לילה... ופלג המנחה קודם ליצאת הכוכבים מהלך ד׳ מילין ושתות

162 שזהו הזמן הנזכר בכל התלמוד לתוספת שמוסיפין מחול על הקודש שאי אפשר לומר שיהיה בעוד שהשמש זורחת על הארץ.. אלא ודאי זמנו של תוספת היינו מתחילת השקיעה שאין השמש נראה על הארץ...

163 Penultimate entry, he says:
כבר פירשתי למעלה שאף לאחר שנסתלק השמש מעל הארץ הוא יום גמור כשיעור שלשה מילין ורביע ואותו זמן הוא ראוי לתוספת

164 Even those who understand R. Eliezer of Metz according to the classical understanding, that his BHS is before sunset, agree that for R. Eliezer of Metz the crossing of the firmament begins at sunset and lasts 5 miles. The BHS of R. Jose is probably at the end of these 5 miles. Similarly for R. Eliezer of Metz, the BHS of R. Tam is at the end of these 5 miles: קודם להראות הכוכבים החוצה, הופלג זמן וסימן התרנגולים מזו השיעור הרבה...., meaning that the BHS is at the end of the 5 miles before the appearance of all the stars and therefore this BHS is far from the moment corresponding to the sign of the hens.

D. CONCLUSIONS

According to the Talmud, divergence between the Sages is the result of insufficient assiduity and application before the Sages when they themselves were pupils.[165] The Sabbath is the typical example of the continuity and the certainty versus the uncertainty of the festivals, which depend on human decision with regard to the fixation of the Neomenia and the leap years, i.e. the organization of the calendar; hence the expression שבת בראשית marking the certitude of the Sabbath in Jewish tradition. The time of beginning and ending the Sabbath are transmitted from generation to generation without a gap longer than six days. They should not have raised any doubt, and give rise to such important and fundamental discussions between the rabbis. It is difficult to understand how such differences of opinion could have been borne as early as the time of Abaye and Rava and, later, from the time of R. Tam onwards. The theory of R. Tam was apparently like dozens of his other ingenious findings or actualizations of older theories, an inventive solution to a Talmudic contradiction that should not revolutionize Jewish practice. It is then by an exceptional hazard of history that this theory gained such fame and so deeply influenced Jewish practice until today. I attribute this to the conjunction of two elements.

1. The theory of R. Tam was a revelation for Nahmanides. This theory fits the principles that he received from Rabad that the time of the *tosefet* (the voluntary acceptation of Sabbath) cannot begin before sunset. The position of Nahmanides is at the origin of the adoption of the theory by all Spanish authorities.
2. A second decisive element at the origin of the tremendous success of R. Tam's theory is the adoption of this theory by R. Joseph Caro in his Shulhan Arukh, followed by Rema and *Levush*, and, above all, its popularization by the effects of its printing.

Even areas that had never followed R. Tam's rulings, such as Germany, began to follow him. The only place that remained faithful to ancient practice was Frankfort-am-Main. Now we have seen that this theory had very weak points; this led to a profound evolution of its concepts and application.

When we examine the history of the issue, with the hindsight of the 1,600 years that separate us from the Talmudic period, we are astonished how such elementary

165 משרבו תלמידי שמאי והלל שלא שמשו כל צרכן רבו מחלוקת בישראל.
B. Pesahim 87b, B. Sotah 47b.

and quasi-evident Talmudic notions of the hours of the day and the limits of Sabbath have evolved. In a world opposed in principle to any change, especially on such a fundamental matter, it is extraordinary how the community could evolve rapidly and adapt itself in short periods as if it had no memory.