J. Jean Ajdler: Letter to the editor.
Concerns: A Categorization of Errors Encountered in the Study of Zemanim.
For some sophisticated readers the subject of this paper is really interesting. Nevertheless it requires some, and in fact, important knowledge on the subject. Unfortunately this paper, which covers a broad subject, remains imprecise, vague, indefinite and even sometimes mysterious. It proceeds more by allusions than by precise remarks. The average reader must be incapable to understand the author's intend. We will try to give the average reader some references and throw him a lifebuoy. My fear is that some unsophisticated reader could be tempted to pour out the baby with the bath's water, the Jewish halakhic tradition because of the rabbis' lack of a scientific doctrine.
Let us examine the paper.

p. 93 top: the halakhic hours of the day. In the seventeenth century (R. Abraham Pimentel) calls the short temporary hours, calculated from geometric sunrise till geometric sunset,[1] the system of *Levush* (R. Mordehai Jaffe) and the long temporary hours, calculated from daybreak till the end of twilight, the system of *Terumat ha-Deshen* (R. Israel Isserlein). The first attribution makes sense while the second is completely erroneous. Today the first system is called the system of Gra (R. Eliahu of Vilna) while the second is called the system of *Magen Avraham* (R. Abraham Gombiner). The first attribution makes sense while the second is questionable because he generally (except in O.H. 58) does not take position between the two systems.
p. 94 bottom: the span of 96m for length of dawn and dusk must not be considered because the conclusion of Pesahim 94a is that dusk/day = 1/10.
The length of 96m corresponds to 4*24 when each mile is 24m. But in this assumption the day = 30*24 = 720m and the length of dusk can be 3*24 = 72 m because 3/30 = 1/10 or 3.75 * 24 = 90m because 3.75/37.5 = 1/10 but there is no room for the solution 4*24=96m.
p. 96 top: There are even reasons to believe that R. Tam's earth was flat.
p. 98: the clocks were regulated morning and evening in order to indicate (short) temporary hours. However the great clocks on top of churches (because of technical difficulties) gave the time in equinoctial hours. This was the case of the clock of R. Israel Isserlein and his disciple *Leket Yosher*. Therefore they did not use and even barely knew about temporary hours (Terumat ha-Deshen, Responsum n°1) and also for this reason (but not only) the attribution to him of the long temporary hours, is mistaken.
p. 98 note 14: the errors of R. Pimentel. The author speaks in riddle. Let us debunk the problem. R. Pimentel observed (and it is a precious indication) that on the day of the spring equinox, three stars, which seemed of middle size, were seen 48m or 1/15 of the day after sunset. At summer solstice, he wrote, sunrise was at 3;45 a.m. and sunset was at 8;15 p.m. the length of the day was 16;30h and the three middle stars must be seen 66m after sunset at about 9;20h p.m. (more precisely: 9;21h p.m.) (see edition Lemberg 1841, p. 21b column 1). First error: the phenomena are linear. The three middle stars are seen 1/15 of the day after sunset. Second error: The times of sunrise and sunset, which he considers, are the times of geometrical sunrise and sunset found in a rough table. But his definition of sunset is the moment when the upper limb of the sun disappears, taking the semi-diameter of the sun and refraction into account, when the depression of the sun is 0°;51'. Third error: The end of Shabbat according to R. Tam at the equinox is in Amsterdam at 6;48h p.m. and in Jerusalem at 7;12h (true time): He explains this discrepancy by the low height above sea level of the

[1] In fact, certainly the only system in use in the Jewish and in the surrounding society in the time of the Talmud.

Netherlands, the "lowlands". Important conclusions: three middle stars are seen at a solar depression of 7.29°[2] and not 8.1° as given by Benish (1996) p. 390 in note 82.
p. 99 bottom: depression angles. Rambam and R. Joseph Solomon Delmedigo mastered the problem. See Mishnah Berakhot I: 1 in Tossefot Yom Tov the discussion about the thickness of the firmament.[3] A thickness of 51.8 miles corresponds to a depression of 19° at the end of astronomical twilight.
p. 99 note 16: the formula to compute the depression angle. The name of R. Schlesinger is mentioned in Levi's introduction but I did not see such an attribution.[4] Anyhow this formula is already given in Berthold Cohn's tables for the beginning of day and night (second edition in French of 1932). In fact this formula is a classic formula, available in any textbook of spherical astronomy. It results of the fundamental formulas of spherical trigonometry[5] applied to the parallactic triangle.[6]
p. 100, middle: a depression of 5 – 6° for the halakhic end of the day.
Indeed Rambam ended the halakhic day[7] and the beginning of the night[8] on the day of the equinox, at 6;24h p.m. true time, corresponding to a depression of 5.1°.
Some authors ended it at a depression of 6°[9] corresponding to the end of civil twilight, when the zenith is not more lighted directly.[10]
In the first scientific table ever established, by R. Raphael ha-Levi from Hanover, for the areas of latitude comprised between 52° and 53° [11] in 1766, the Zeit ha-Kokhavim corresponds to a depression of 7;10° and Alot ha-Shahar defined as the moment mi she-yakir corresponds to a depression of 8;05°. This table calculated in local true time is available in Benish (1996) p. 525. The two depressions given above[12] Tseit ha-kokhavim 7;10° and mi she yakir 8;05° are in contradiction with the values given by Benish (1996) on p. 524.
This table had an extraordinary fate. It was used and even transformed and completed by R. Zevi Hirsch Levin (1721 – 1800) and his son R. Solomon Hirschel (1762 – 1842) who used it in London, latitude 51.6°.[13] R. Nathan Adler (1741 – 1800) used it also in Frankfurt an-Main (latitude 50.1°) and he gave a transcript of its adaptation to his pupil R. Moses Sofer (1762 – 1839) in 1785 when they separated from each other in Furth, on their way back from

[2] And not a depression of 8.1° according to Benish (1996) p. 390. For more details see Benish (1996) pp. 389 – 391). See also ajdler (2012) pp. 34 – 38.
[3] See Ajdler (2005) pp. 24 – 28, Ajdler (2008) pp. 22 – 31 and Ajdler (2016) pp. 26 – 28.
[4] It would indeed be completely unjustified.
[5] This formula was given for the first time by François Viete in his Canon Mathematicus, Paris 1579. This formula is not logarithmic and people in the seventeenth century (R. Joseph Solomon Delmedigo) and even in the eighteenth century (R. Raphael ha-Levi from Hanover) preferred decomposing the spherical triangle into two rectangular spherical triangles.
[6] The triangle on the celestial sphere formed by the intersection of the celestial meridian, the vertical circle and the horary circle. His vertices are the celestial pole P, the Zenith Z and the celestial body M.
[7] See Rambam Hlkhot Terumot 7; 2.
[8] See Rambam Hilkhot Kiddush ha-Hodesh 11; 16 and 14; 6.
[9] Authors of the 19th century considered the end of civil twilight at a depression of 6.5° but today the depression of 6° for the end of the civil twilight is generally accepted.
[10] הכסיף העליון.
[11] Hanover, Berlin and Amsterdam.
[12] Calculated by me and confirmed by engineer Jacob Loewinger from Tel Aviv.
[13] A manuscript extract of this table, dated 1773, is available in Benish (1996) p. 526.

Boskovice.[14] R Nathan Adler went back to Frankfurt and R. Sofer left to Moravia and would never see his master again. R. Moses Sofer still had it in Mattersdorf (latitude 47.83°).[15]

p. 101 top: The depression of 8.5° is almost universally accepted. This however a recent tendency as in the mid twentieth century the value of 7;05° was still applied.[16] The value of 8.5° was championed by R. Meir Posen (Or Meir 1973) after R. Tukatzinski.[17] This value is the result of a general mistake. Indeed the origin of this depression is the opinion of R. Hida (Azulai) who adopted for the end of Sabbath the moment when the sun is in "the middle of the thickness of the firmament" thus at the equinox, at 6;36h p.m. true time[18]. Indeed in the gemara Pesahim 94a, at the equinox, the (short) day lasts 12 equinoctial hours and for reason of symmetry, sunset is the geometric sunset and sunrise is the geometric sunrise, when the solar depression is 0°. Similarly the end of the 4 miles is at 7;12h.[19] Therefore the corresponding depressions are 7.65° and 15.225° and not 8.5° and 16.1°. This is a universal mistake that the author did not denounce![20]

p. 104, note 30. The circumcision of the baby born Saturday evening at 8;30h p.m. in Mattersdorf, Burgenland.[21]

p. 109 top: I did not see any consideration of R. Pimentel about the winter period. But indeed he discussed the case of the circumcision of a child born after sunset. He was fearing that the criterion adopted was too stringent and therefore a child born before the moment adopted for Zeit ha-Kokhavim – 0.75 miles, would be considered as belonging to Sabbath when he really was born during Bein ha-Shemashot calculated with a less stringent Zeit ha-Kokhavim. Therefore he proposed a double test to make sure that such a situation could not happen. In other words the stinginess of Sabbath, could become a source of laxity. We must make sure that at the birth three mean stars were not already visible or even only two greater stars, which could already be the beginning of Bein ha-Shemashot stricto sensu.

p. 110, Ramban:[22] The equation in note 52 is written on the day of the equinox. We can also note that there are two possibilities: whether the division of the day is 4miles-32 miles-4miles on the day of the equinox. Then 32 miles = 720 m and 1 mile = 22.5 m. But referring to the extended day: 40 miles = 12 temporary hours and 1 mile = 18 temporary minutes.
Sunset is 4 miles before Zeit ha-Kokhavim and Pelag ha-Minha is 1;15h = 1.25h before Zeit ha-Kokhavim. = (40/12 miles) *1.25 = 4.1667 miles. Pelag ha-Minha = 0. 1667 miles before sunset = 1/6 mile * 18 = 3 temp. m. Or second assumption: day of 4miles-40 miles-4 miles. Then Pelag ha-Minha is 1;15h = 1.25h before Zeit ha-Kokhavim = (48/12)* 1.25 = 5 miles before Zeit ha-Kokhavim. Pelag ha-Minha is thus 5 – 4 = 1 mile = 18 temp. m = 22.5 m before sunset. **The position of Ramban corresponds thus to the first assumption.**

p. 110 note 51: before condemning any author it is necessary to check that he does not consider a mile of 18 temporary minutes.

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[14] The largest Jewish community of Moravia.

[15] See Wikipedia about the exile of R. Nathan Adler to Boskovice in 1782 https://he.wikipedia.org/wiki/%D7%A0%D7%AA%D7%9F_%D7%90%D7%93%D7%9C%D7%A8 and see Ha-Ma'ayan n°200 :
הבנת חתם סופר בשיטת רבינו תם:יעקב לוינגר

[16] Based on the table of B. Cohn endorsed by R. David Tsvi Hoffman (Melamed le-Hoïl)

[17] See Benish (1996) p. 528.

[18] and not 6;40 h as generally admitted.

[19] And not 7;16h as generally admitted.

[20] See Ajdler (2016) pp. 36 – 38.

[21] See Benish (1996) pp. 441 – 442 and Ajdler (2012) p. 55 and Loewinger in Ha-Ma'ayan n° 200.

[22] For the original text of Ramban, see Benish (1996) pp. 657 – 658.

p.114: the division of the hour in 1080 halakim. The explanation given by Rambam in H.K.H. 6; 2 is insufficient. The reality is the following: the Jewish month was 29-12-792 or 29-12 and 11/15. When the translation of the Almageste became known during the eight century they were obliged to increase the ancient lenght by 1/1080 and they introduced the Helek by dividing the hour by a sufficiently large multiple of 360 and so they adopted the division of the hour in 3 * 360.[23]
p.112 note 56: the teminology used by *Terumat ha-Deshen* is very deceiving. The Rabbis understood that he considers an extended day and long temporary hours. R. Joseph Karo ascribed to him a mile of 18 minutes as R. Isserlein indeed wrote but the rabbis of the seventeenth and eighteenth centuries accused him of misunderstanding *Terumat ha-Deshen* and not understanding that the 18 minutes were temporary hours of 1.25 equinoctial hours. Until today the doubt remains and it is likely that he was tricked. Nevertheless we proved that R. Isserlein used only equinoctial hours, that his day was limited by sunrise and sunset and his terminology of Alot and Tseit was deceiving and the mile was indeed 18 equinoctial hours.[24]
p. 113: R. Abraham Cohen Pimentel in ma'amar 2 , chapter 5, escaped this type of error. By contrast the baby of Hatam Sofer in O.H. : 80 was apparently born during Bein ha-Shemashot and should have been reported to the next day.[25]
p. 118 dissymetric extended day. The champion of long temporary hours calculated on the basis of an extended day were confronted with the fact that religious duties are valid from alot ha-Shahar until Zeit ha-Kokhavim. Alot ha-Shahar is 4 miles before geometric sunrise and Zeit ha-Kokhavim, today, following Hida, is 2 miles after geometric sunset. The division of such a extended day in temporary hours will lead to Hazot, on the day of the equinox, 1 mile before noon. This situation is unacceptable and contrary to the Talmudic requirement that Hazot, the beginning of the seventh hour coincides with noon. Therefore the solution is to place Hazot at noon and to have a morning temporary hour longer than the afternoon temporary hour. This solution is better than the solution adopted by the Jerusalem Eidah Haredit since 1924, when they replaced the ancient solution with Hazot preceding noon by a symetric solution of a day, lasting from Alot ha-Shahar 4 miles before sunrise until Zeit ha-Kokhavim 4 miles after sunset, on the day of the equinox definitely later than their end of Shabbat !!!

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[23] See Ajdler (2015) pp. 157 – 161.
[24] See Ajdler (2008) pp. 34 – 36 and Ajdler (2016) pp. 29 – 32.
[25] See Ajdler (2012) p. 55 note 138.