Dr. Richard A. Parker
Oriental Institute
Chicago University
Chicago, Ill.

Dear Dr. Parker:

Perhaps if I restate my argument I can make it clearer.

All lunar periods ascend to a peak and descend, and that continuosly. In other words, an increasing and decreasing acceleration is shown in all lunar motion--latitude, declination, altitude, azimuth, parallax, time of moonset, lunation, lunar phases, etc. Obviously, therefore, this kind of motion is a characteristic of the moon's anomaly and the waxing period; and the translation period, which marks the beginning of a lunation, should be no exception. The periodic differences to which you refer, may increase and decrease with their periods, or the variation may be somewhat irregular; but there can be no rule of correspondence such as you propose. The moon's motion is too irregular to maintain that the variation at Nisan visibility should be about the same as at full moon. This would mean that the Nisan moon would annually have the same anomaly, which is not true.

On the contrary, the great factor which governs the length of the paschal periods--translation period, first quarter, and waxing period--is the anomaly. If the Nisan waxing moon passes through perigee, her corresponding epochs will be short, and if she passes through apogee, they will be long--a variation of days. The hours and minutes are taken care of by the position of the conjunction, and this point of time depends upon the place of the perigee or apogee, which is closely related to the length of the waxing period.

There is also another factor that comes into play in determining the length of the Nisan translation period. This is the hour of day when the moon fulls. If this point of time is late--toward midnight--the moon will rise full at the subsequent sunset, when the Babylonians said, "the god was seen with the god." Thereby the ancient passover was deferred one day, and likewise the previous calendar phasis. But Schoch ignores this calculation of the ancient Jewish Senate, which nevertheless agrees with the biblical dates.

Are you not begging the question a little? You call "unjustifiable" the translation period of 1.95 day in 29 A.D. in my table, when the table of Schoch has the same figure.

If you still question these facts, why not put your argument in lunar motion up to Dr. Chandrasekhar at Yerkes Observatory? At present he is interested in celestial motion and its causes.

Yours very sincerely,

checked by Dropper — "no error"

December 10, 1943
4 Crescent Place
Takoma Park, Md.

THE ORIENTAL INSTITUTE

THE UNIVERSITY OF CHICAGO

Cables: ORINST CHICAGO CHICAGO, ILLINOIS, U.S.A. 1155 EAST FIFTY-EIGHTH STREET

Nov. 2, 1944

Miss Grace Amadon
4 Crescent Place
Takoma Park, Md.

Dear Miss Amadon,

I have your letter of Oct. 25. You may find what you want in Ginzel, Chronologie, I, 136-37.

I have intended writing you for some time, but I had to allow myself a cooling-off period after reading your reply to my criticism. To say I was shocked is putting it mildly. I had pointed out to you again and again in my correspondence with you that you must clearly differentiate between Schoch's Table M which is, of course, only to be used to derive dates about which there is no argument at issue and all dates which are calculated by the use of his tables on pages I to IX. I told you that the dates for Nisan 1 for years 28 to 34, listed in my article, were all calculated dates. Why then in your rebuttal you devoted some four pages to the possible errors in Schoch's Table M dates and to the possible errors in the tables in Babylonian Chronology (for which I claimed only 70% correctness) I simply cannot understand. There is absolutely no connection between my calculated dates (for Jerusalem) and the possible errors you talk about in Table M and my tables, so why bring in such a smoke screen to obscur the issue? You do a great injustice to Schoch by continually confusing his table M and his other tables and also by giving his name to the results for which I must be held responsible (the tables in Babylonian Chronology). Obviously your list of impossible conjunctions on p. 181 (those with asterisk) is well within the 30% possible error which I had stated the tables might have (my tables, not Schoch's tables, as you refer to them).

Other points. On p. 180 you claim that Schoch's hours required for visibility range from only 17 to 23. That happens to be the range for the Nisan dates for the seven years I calculated. But you have only to read the bottom of p. 97 of Ammizaduga to know that Schoch was fully aware of the possibilities in September rather than March, when for Babylon the hours required might be 42. ---On p. 184 you state that the Egyptians regarded the 13th as full moon day. The evidence is overwhelming that it was the 15th not the 13th. For one thing, you have only to note in Brugsch that the 7th was first quarter and the 23rd last quarter.

More comment is unnecessary. I myself do not intend to write any further public criticism of your position, but it does seem to me that you owe Schoch and the scholarly world some explanation or apology.

Richard A. Parker

Dr. R. A. Parker
Oriental Institute
Chicago University
Chicago, Ill.

My Dear Dr. Parker:

Thanks for your reference to Ginzel. It is nice to hear from you once more even if your letter is not very friendly. You think that I am too hard on Schoch. But scholarship says that I am not hard enough. Long before I came into the picture, Schoch's tables were under criticism and analysis both abroad and here in America. His low limits for the moon's age at visibility are even lower than those of ancient Chaldea. My greatest criticism of any personal conclusion of yours is your assumption that the dates in "Babylonian Chronology" are applicable to the meridian of Jerusalem. Take for example, the date March 4 = 1 Adar, 75 B.C. If this were Jewish, then

April 1.39 (Conjunc.)	= 29 Adar Bab. Civ. Time
April 2	= 1 Nisan
April 15	= 14 Nisan
April 16.90 (F.Moon)	= 15 Nisan Jewish day of F.M.

Yet every 14 Nisan in Jewry was introduced by the rising full moon on the eastern horizon and the setting sun in the west. In this case this astronomical event occurred at sunset of April 16 or 17--two or three sunsets too late to mark the feast day if we accept Schoch's computations.

Your criticism of my reference to the "17-23" hour limit for the moon's age at visibility I do not understand. This limit was used long before Schoch's day--was employed by Airy in 1855 (he raised it to 18-23), and was later discussed by the English astronomers. Schoch took a minimum even lower than that of Fotheringham or Maimonides. He worked for fourteen years trying to get a calendar table that would support the world calendar date for the crucifixion. He got what he sought. On the azimuth--altitude table read R. Courtenay's criticism in "The Observatory," July, 1911, p. 229ff. Here Fotheringham's computations are made to support the high limits of from 62 to 84 hours. "Startling," Courtenay says. Well, I suppose that you would say the same. Nevertheless, they are worth thinking over. In the mean time, a Merry Christmas.

Yours very sincerely,

Nov. 27, 1944
4 Crescent Place
Takoma Park, Md.

Dr. Richard Parker,
Oriental Department,
Chicago University,
Ill.

Dear Dr. Parker:

Recently Dr. Neugebauer mentioned to me that in your Babylonian tables you had found a succession of four full lunar months. Would you mind sending me the date and reference for this calendar incident? I have frequently found three, but never four.

Yours very sincerely,

Grace Amadon

Takoma, Md.
4 Crescent Place,
April 2, 1942.

30 days 30 30 30

621 B.C. 9/3 (Ululu) 10/3 11/2 12/2 1/1 (Tebetu)

436 B.C. 8/29 (Ululu) 9/28 10/28 11/27 12/27 (Tebetu)

136 B.C. 7/14 (Duzu) 8/13 9/12 10/12 11/11 (Arahsamnu)

119 B.C. 8/5 (Abu) 9/4 10/4 11/3 12/3 (Kislimu)

117 B.C. 8/12 (Abu) 9/11 10/11 11/10 12/10 (Kislimu)

111 B.C. 5/10 (Aiaru) 6/9 7/9 8/8 9/7 (Ululu)

33 A.D. 6/17 (Simanu) 7/17 8/16 9/15 10/15 (Tashritu)

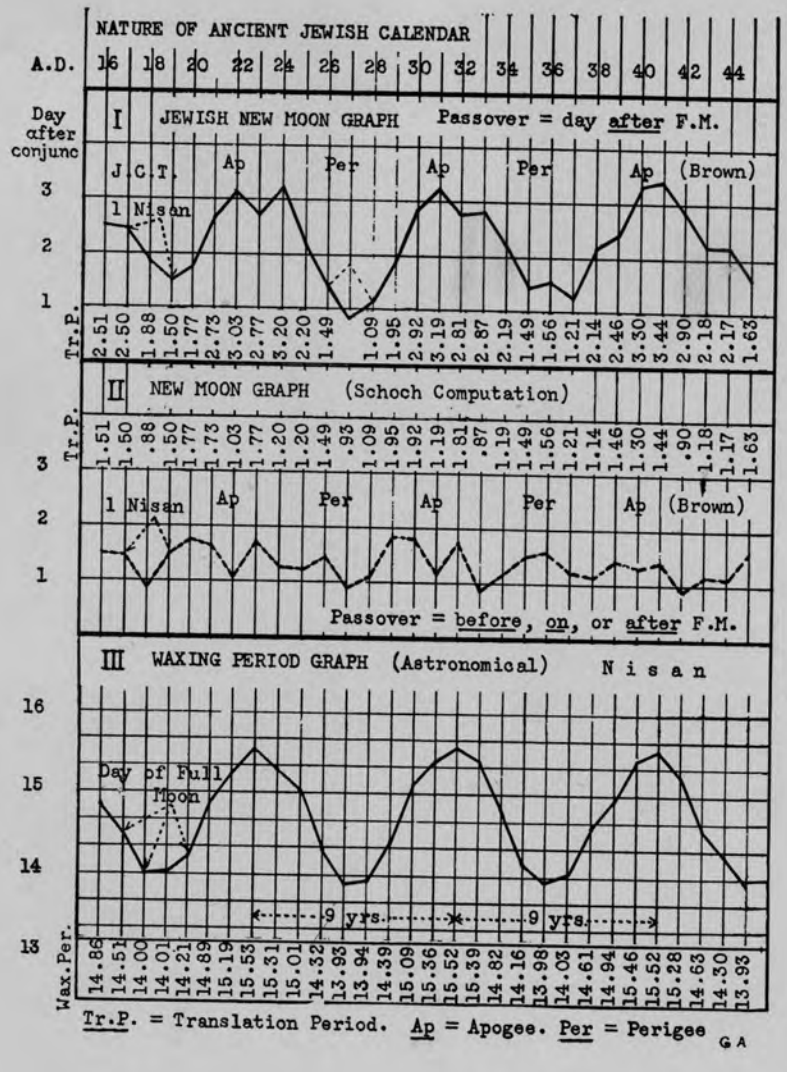
There are undoubtedly others which I failed to catch. They result from the coincidence of the lengthening lunar period and the lengthening of the time period required for visibility. The above results of course are purely calculated dates. Whether the Babylonians recognized the possibility of four full months in succession I do not know. Three 29 days months in succession are also not uncommon. In this respect correct Schoch, Venus Tablets etc., p. 98,

and cf. Schaumberger in Erganzungsheft 3 to Kugler, Sternkunde und Sterndienst (1935), p. 255.

Sincerely yours,

Richard A Parker

— AMADON —



Tr.P. = Translation Period. Ap = Apogee. Per = Perigee G A

With ancient Jewish law the case was similar, for a very precise relation necessarily existed between a fixed passover date on a fixed meridian, and both neulicht and full moon. The passover always occurred exactly on the 14th day after the appearance of the crescent in the western evening sky. With regard to the full moon, the nations of the Near East have left significant records of the lunar date on which the Nisan moon fulled.

insert I

With the Romans, whose earliest calendar was lunar, the "ides" marked the day of full moon. In the time of corn harvest, this obviously occurred on the lunar 13th, for ultimately this same date became an ideograph on the Julian calendar, in whose paschal month April the ides were always commemorated on the illustrious "13th."[24]

insert II

Likewise, in the earliest calendar of Egypt, the full moon was feasted on the 13th day, and the feast was called "feier des leuchtenden Aufgangs."[25] That this date was patterned after the spring month, is indicated by the feast of the 14th, which was named "feier der Majestat des Widders."[26]

The Arabs also honored the spring moon on their calendar. Their year wandered through all the seasons, yet they had ideographic names for certain nights in the month. They observed the night following the 13th as "badr," a word signifying that the moon is full and her light complete.[27] In Arabia, the paschal moon at least periodically full-ed on the calendar 13th.

On the contrary, the Greeks so adjusted their lunar year that their Olympic games were continuously celebrated on the full moon as of the lunar 15th, thus paying respect to the first full moon after the summer solstice, when this contest occurred.[28] (The ides of July were always on the 15th.)

And the Babylonians had rules for the days of Nisan. On the day of the 13th, "Sin bears a full crown!" Regularly on the important 13th of Nisan, an offering was made to the moon god with his full crown of light,[29] which shone throughout the whole first night.

Such was calendarial law in the countries around Jerusalem. Astronomical law too, it is to be noted, with which the Jewish festival law and its lunar calendar undeniably had to agree. Hence, the fixed passover date on 14 Nisan must have occurred on the day after the Jewish date of full moon, and surely not on, or before!

Dear Mr. Graf:
Is this page convincing? If not, why? Please write your answer.
G.Q.

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24 Martin P. Nilsson, Primitive Time-Reckoning, London, 1920, 167.
"Nonnullis placet, Idus dictas vocabulo Graeco, a specie, quae apud illos eidea vocatur, quod ea die plenam speciem luna demonstret."--Venerabilis Bedae, Opera Omnia, ed. Giles, Vol. VI, 1843, 176. Londini. Cf. also Webster.
25 Heinrich Brugsch, Astronomische und astrologische Inschriften altaegyptischer Denkmaeler, Leipzig, 1883, 50.
26 Ibid.
27 Albîrûnî, Chronology of Ancient Nations, tr. Sachau, London, 1879, 75.
28 Joseph Scaliger, De Emendatione Temporum, Francofurt, 1593, 8.
29 S. Langdon, Babylonian Menologies and the Semitic Calendar, London, 1935, 76.

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ANCIENT JEWISH CALENDATION: A CRITICISM

In a recent article in this Journal (LXI, part IV, 1942, pp. 227-80) Miss Grace Amadon presented a theory of ancient Jewish calendation strikingly at variance with the commonly accepted idea that observation of the crescent was the controlling factor in beginning the Jewish months and year. It is the purpose of the writer to bring forward certain objections to this new theory, objections which he feels must be satisfactorily met before it can be accorded approval.

Since Miss Amadon is primarily interested in the crucifixion period, let us first of all tabulate the data which determine the 1st of Nisan for the years 28 to 34 from the standpoint of the first possible visibility of the crescent at Jerusalem.

Year	Conjunction	Hours that must elapse before crescent can be visible	Nisan 1*	Latitude of moon at conjunction
28	Apr. 13, 4:40 p.m.	21.6	Apr. 15	−4°.92
29	Apr. 2, 8:01 p.m.	23.6	Apr. 5	−4°.74
30	Mar. 22, 8:13 p.m.	23.6	Mar. 25	−4°.49
31	Apr. 10, 2:00 p.m.	22.5	Apr. 12	−2°.13
32	Mar. 29, 10:27 p.m.	19.9	Apr. 1	−1°.46
33	Apr. 17 9:38 p.m.	18.5	Apr. 19	+1°.82
34	Apr. 7 2:07 p.m.	17.1	Apr. 9	+2°.48

* In each case Nisan 1 actually begins with sunset of the day before but this is the conventional way of dating to the Julian calendar.

This tabulation has been made by the use of the new moon tables of Carl Schoch in The Venus Tablets of Ammizaduga (Oxford, 1928). While these tables are particularly for Babylon they may also be used for Jerusalem because of the very slight difference in latitude (Babylon, 32°.5 Jerusalem, 31°.8).[2]

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[2] Cf. Schoch, Ammizaduga, 94.

Correction for the difference in longitude requires that 37 minutes be subtracted from the time of conjunction at Babylon to give the correct time of conjunction at Jerusalem. Schoch's tables G and H permit the calculation of the hours that must elapse between conjunction and 6:00 p.m. of the following day (sunset) in order to have visibility of the new crescent. Thus in A.D. 28 the period from conjunction to 6:00 p.m. of the next day is 25 hours, 20 minutes. Since only 21.6 hours are necessary, the crescent will surely be visible on the evening of April 14, weather permitting, and April 15 will be Nisan 1.

The dates for Nisan 1 tabulated above are the same as those on which the Passover Graph II (p. 267) is based. This is the graph labelled False by Miss Amadon and she further states (p. 268): "And neither is the conclusion valid that Graph II represents an 'observed' new moon in ancient times."But this is exactly what Graph II does represent unless Miss Amadon is able to demonstrate that Schoch's new moon tables have been incorrectly compiled and give inaccurate results. If that is her opinion it is certainly not shared by other astronomers and chronologers.[1]

[1] Cf. Fotheringham, Ammizaduga, passim; P.V. Neugebauer, Astronomische Chronologie (Berlin, 1929), I, 34.

Miss Amadon's conclusion derives from her belief (p. 253) that the most important factor bearing on the length of time from conjunction to visibility (her "translation period") is the moon's anomaly as revealed in its waxing period (the time from conjunction to full moon). Let us assume, for the moment, that she is correct and that an increase in the waxing period should be reflected in a corresponding increase in the translation period. Her Table I gives the following figures:

Year	Translation Period (Days)	Waxing Period (Days)
28	1.09	13.94
29	1.95	14.39
30	2.92	15.09
31	3.19	15.36

Dr. Richard A. Parker
Oriental Institute
Chicago University
Chicago, Ill.

Dear Dr. Parker:

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On the contrary, the great factor which governs the length of the paschal periods--translation period, first quarter, and waxing period--is the anomaly. If the Nisan waxing moon passes through perigee, her corresponding epochs will be short, and if she passes through apogee, they will be long--a variation of days. The hours and minutes are taken care of by the position of the conjunction, and this point of time depends upon the place of the perigee or apogee, which is closely related to the length of the waxing period.

There is also another factor that comes into play in determining the length of the Nisan translation period. This is the hour of day when the moon fulls. If this point of time is late--toward midnight--the moon will rise full at the subsequent sunset, when the Babylonians said, "the god was seen with the god." Thereby the ancient passover was deferred one day, and likewise the previous calendar phasis. But Schoch ignores this calculation of the ancient Jewish Senate, which nevertheless agrees with the biblical dates.

Are you not begging the question a little? You call "unjustifiable" the translation period of 1.95 day in 29 A.D. in my table, when the table of Schoch has the same figure.

If you still question these facts, why not put your argument in lunar motion up to Dr. Chandrasekhar at Yerkes Observatory? At present he is interested in celestial motion and its causes.

Yours very sincerely,

December 10, 1943
4 Crescent Place
Takoma Park, Md.

As the moon's anomaly increases, it apparently slows down and takes longer to reach full moon. Thus in A.D. it requires 1.42 more days to become full than in A.D. 28, an increase of 10.1 per cent. The translation period for the same years, however, has increased 2.10 days, or 192.6 percent. Clearly the only necessary increase would be 10.1 percent of 1.09, giving a translation period for A.D. 31 of 1.20 days, which would place Nisan 1 on April 12, in agreement with our table and two days in advance of Miss Amadon's dates.

It will be noted that our table of required hours does not increase by 10.1 percent between A.D. 28 and 31. That is because (contra Miss Amadon) there is another element in the moon's movement, its latitude, which is of equal importance with its anomaly. Schoch states (Ammizaduga, 97): "In spring the mean anomaly of the moon is of the same importance as her latitude, but in autumn her latitude is far more important." Thus in our table the lengthening waxing period of the moon may be reflected in an increase in the number of hours necessary for visibility, or in a movement of the latitude of the moon from south toward north of the ecliptic, or in a function of the two. In A.D. 28, for example, the hours for visibility are 21.6 and the latitude of the moon is $-4.^{\circ}92$. In A.D. 31, the hours required are only 22.5, but the latitude has decreased to $-2.^{\circ}13$.

If we now compare the dates for Nisan 1 which depend on first visibility of the crescent and the dates which Miss Amadon proposes we have the following interesting table:

Year	Nisan 1 (First Visibility)	Nisan 1 (Miss Amadon)	Difference
28	Apr. 15	Apr. 15	0
29	Apr. 5	Apr. 5	0
30	Mar. 25	Mar. 26	1
31	Apr. 12	Apr. 14	2
32	Apr. 1	Apr. 2	1
33	Apr. 19	Apr. 21	2
34	Apr. 9	Apr. 10	1

In two years out of seven, Miss Amadon finds it necessary to place Nisan 1 on the third day of lunar visibility. It is inconceivable to the writer that any ancient people using a lunar calendar should follow such a practice.

Miss Amadon is forced to this treatment of lunar visibility by her theory that the 14th of Nisan must follow astronomical full moon; but all that her quotations from Jewish and Christian sources really indicate is that the full moon normally occurred sometime on the 14th. It hardly seems necessary to go deeply into this theory as it is sufficient to point out that nowhere in Jewish law is there set forth any statement of a necessary relationship between the feast of Passover and the full moon.[1]

[1] My authority for this statement is Dr. Samuel I. Feigin of the Oriental Institute.

Moreover, Miss Amadon has made the blunder (diagram B, p. 245) of placing the slaying of the paschal lamb on the eve between the 13th and the 14th of Nisan and the Passover supper on the night of the 14th. This results no doubt from her belief that the Last Supper and the Passover Supper were one and the same meal (p. 247). But Dr. Feigin has shown that this was not the case;[2] and we must assume that in the crucifixion year the normal order of

[2] Samuel I. Feigin, "The Date of the Last Supper," Anglican Theological Review, XXV, No. 2 (April, 1943), 212-17.

events obtained, that the lamb was slain in the late afternoon of the 14th and the Passover supper was eaten that evening, on the 15th.

This, together with the other inconsistencies brought out above, seem to the writer to constitute insuperable objections to the acceptance of Miss Amadon's theory.

Richard A. Parker
Oriental Institute
University of Chicago.

Dr. W.F. Albright,
Gilman Hall,
Johns Hopkins University,
Baltimore, Md.

My Dear Dr. Albright:

Since the publication of the study on Ancient Jewish Calendation, the questions which have come back to me mainly center around three principal points. Inasmuch as the JBL readers may be interested in a brief review of the subject, ~~enclosed~~ the following is a summary of the answers which were returned to ~~to~~ those making requests.

1. How Was the Barley Harvest Related to the Ancient Calendar?

Many of the primitive nations appear to have employed agricultural calendars. In support of this conclusion the Gezer stone is possibly a witness, ca. 900 B.C.[1] Schoch also reports the following with reference to early Babylonians:

"Die Babylonier regulierten nach dem Stande der Wintergerste den Jahresbeginn von — 3500 bis — 500. War die Gerste im Addaru zurück, so wurde ein Addaru b geschaltet, damit sie in Airu reif war." [2]

And again, Schoch recites almost the same with regard to the ancient Jews:

"Die alten Juden regulierten also ähnlich wie die Babylonier ihr Jahr nach dem Stande der Wintergerste. Fiel aber der erste eines Monats auf Mars 16 oder früher, so war dieser Monat ein Veadar (oder Adar) des alten Jahres." [3]

Some time after the redaction of the calendar by Hillel II, a severe polemic overtook the Jews regarding the problem of intercalation, and the Karaites challenged the Rabbanites with these words:

"They [the Rabbanites] have introduced the calculation of the calendar, and changed the divine festivals from their due seasons." [4]

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[1] K. Marti, "Ein landwirtschaftlicher altpalästinensicher Kalender." Ztschr. f. alttestamentl. Wiss. 29, 1909, 222 ff. The date follows Albright.
[2] Karl Schoch, Planeten-Tafeln für Jedermann, col. xlii. Berlin, 1927.
[3] Ib. col. xliii.
[4] Philip Birnbaum, The Arabic Commentary of Yefet ben ʿAli the Karaite on the Book of Hosea. Philadelphia, 1942, xxviii.

But earlier, about 1000 A.D., Albîrûnî had explained how barley harvest affected the calendar reckoning:

"The mode of prognosticating the state of the corn was practically this, that one of his [Anan's] followers went out on the 23rd Shebât, to examine--in Syria and the countries of a similar climate--the state of the barley-seed. If he found that the Safâ, i.e. the prickles of the beard of the ear of corn, had already come out, he counted from that day till Passover 50 days; if he found that it had not yet come out, he intercalated a month into the year." [5]

in view of their extreme consevatism it may

Such was Karaite reaction about the ninth century A.D., and ∧ possibly have corresponded in some respects to the ancient calendar. However, Albîrûnî mentions a Jewish calendar reform about 200 years after the time of Alexander. These are his words:

"The mathematicians, therefore, computed for them [the Jews] the cycles, and taught them how to find by calculation, the conjunctions and the appearance of the new moon, etc." [6]

Sidersky agrees with Albîrûnî, stating that he had particularly good Jewish sources in hand, although they are not mentioned by name. Nevertheless, Sidersky insists that calculation of the calendar went back much farther in point of time than the Arabic chronologer allows, and refers, among others, to the men of Issachar, whom David appointed as calculators about 1000 B.C. (I Chron. 12:32). They were leading officers in the ranks that crowned David king, and in Jewish literature they are commonly recognized as astronomers.

In support of ancient calculation, we should also include Posnanski's reference to an interesting fragment from Saadiah Gaon (ca. 900 A.D.):

"But we know that Saadiah asserted that the new moons had always been fixed by calculation, and that they commenced summoning witnesses, etc., only after Zadok and Boethos and others had maintained that the Torah enjoined to fix the new moons by observation; and that they did

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[5] Albîrûnî, The Chronology of Ancient Nations, tr. Sachau, London, 1879, 69.
[6] Ibid. 68.

so for the purpose of showing that calculation and observation coincided." [7]

I see no difficulty in the widely quoted Gamaliel citation in itself--a "single passage," however, which Dr. Ogg brings forward in support of empirical adjustment of the ancient lunar year to the solar. In the first century A.D. we find an ~~astronomical~~ court in session in Jerusalem, known as the Beth Din, which also dealt with calendaric matters. Possibly the ancient Jews were stirred to this activity through Babylonian influence. But more probably they had always observed the skies like Job and Abraham. However, this court of witness was conducted with great secrecy--sod ha-'ibbur was the name for intercalation. And when outcry was made for sanctification of the new month, if a very young crescent, or possibly even a cloud streak had been seen, the officers of the Jewish senate had to know exactly what course to pursue, and what answer to return to the insistent people. "The tribunal knew beforehand," is Maimonides' claim, "whether the moon could be seen or not." [8] And they obtained this experience through the "calculation of the synagogue" in relation to agriculture and stellar science--not by empirical adjustment.

And of material consequence to this problem of intercalation is the fact that pentateuchal law had given the Jewish people an exact point of time to which the full moon of barley harvest could tie. According to ancient command, the first matured heads of barley were to be plucked from the ripening harvest, and offered in the temple on the second day of the feast of unleavened bread--the sixteenth of the first month (Lev. 23:11 and Antt.III.X.5). A sheaf of ripe barley on the sixteenth day of Nisan in the season of full moon--this was a very exact ~~the~~ synchronism! We have

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[7] Samuel Poznanski, "Anti-Karaite Writings of Saadiah Gaon," Jewish Quarterly Review, Vol. X, 273.

[8] Rabbi Mosis Maimonidae, De Sacrificiis Liber, tr. Compiegne de Veil, Londini, 1683, 384.

not as yet any record from ancient Babylonia with so ~~exact~~ precise a formula for starting the lunar year. From the documents in hand it is difficult to tie the ancient Sumerian loan contracts or the return of the corn even to a definitely fixed month of the year, much less to a certain fixed day of the month, as with the primitive Jews.[9] Landsberger admits--

"Andere Angaben der Wirtschaftstafeln, wie Bewässerung, Aussaat, Dattel-, Sesamernte, heranzuziehen, scheint vorläufig, teils wegen der Unsicherheit der Deutung, teils wegen der Geringheit des Materials, nicht ratsam." [10]

And so, the Jewish witnesses who reported on the new moon in the first century served about the same purpose as the astronomers in the clock house here at the Naval Observatory. For our standard almanacs are computed in harmony with the laws of gravitation several years in advance; but the solar and lunar constants are checked from time to time by actual observation of sun, moon and planets. For all practical calculations these values are unchangeable.

And although we do not know all with reference to the ancient Jewish secret of calculating the year, yet we do know that the barley and wheat harvests, the oil and vintage, the state of the flocks, and the positions of sun, moon and stars were all in agreement with the various seasons. And it is also clear that the ancient lunar year was an epoch in a cycle with all the astronomical details of which it had to be in harmony. These facts make it possible to ~~establish~~ outline a biblical chronology that is based upon both natural law and calculation of the stars and planets.

Now with regard to intercalation in the year 33 A.D. On page 232 of the December JBL, if April 3 be substituted for May 4, the embolismic passover date for 33 A.D., then there would result a succession of four

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[9] Benno Landsberger, Der Kultische Kalender der Babylonier und Assyer, Erste Hälfte, Leipzig, 1915, 21.

[10] Ibid.

common years--from 32 to 35 inclusive. And the resulting lunar year would then be over 40 days shorter than the solar! But why not make an adjacent year embolismic instead of 33 A.D.? For the reason that each of the other years--32, 34 and 35--have a passover date about the middle of April, when barley is beginning to ripen in southern Syria. They therefore do not require intercalation as in the case of 33, which had a full moon in very early April. And it can be added that all the moon tables in JBL are based upon the plan to date the passover as near as possible to the middle of April. When the full moon occurs the first week in April, it will commonly happen that the new moon occurs before the equinox, and this seems always an event to have been avoided in the ancient calendation. The circumstance is demonstrated in the dates of the Assuan papyri. If the Assuan embolisms be carried forward in a projected series to the first century, it will be discovered that the year 33 A.D. turns out to be a Jewish leap year, that is, with a Veadar month in the spring.

2. Time of Eating the Passover Lamb. ~~Yes, Professor Albright, Most~~ It is true that most scholars do count the ancient passover as being slain at the end of the fourteenth day, and therefore eaten in the early evening of the fifteenth. But where is the authority for this except in the Talmud, Maimonides, and the modern rabbinical calendar? Neither the Bible nor Josephus says anything about a 15-Nisan passover. According to these two authorities the ancient passover was slain, kept, and eaten on 14 Nisan. Such was the case with the "second" passover (Num. 9:11), and also with the first passover, in connection with which it was commanded to eat unleavened bread "on the fourteenth day of the month at even" (Ex. 12:18). That this eating of unleavened bread accompanied the lamb supper is inferred in verse 8; and obviously, "that night" must refer to the only night mentioned--the

night of the fourteenth in verse six.[11]

It seems a reasonable demand that the burden of proof for a 15-Nisan passover should rest with the scholars. But, if they accept the Talmudic 15th, they should consistently employ in their calendation the dehiyoth and the resulting 353 and 385 days to the lunar year. And in addition, the feast of pentecost should then in conformity occur on the 7th of the third month, instead of the Talmudic 5th or 6th. However, these calendaric features the biblical synchronisms challenge.

3. The Chronology of Luke and John. The diagram on page 276 of the December 1942 JBL represents the writers Luke and John as each having an independent method of chronology. Luke definitely infers that his 40-day period begins on resurrection Sunday (Acts 1:3). But he apparently continues the same period on to the "fiftieth day" (τῆς πεντηκοστῆς), which is translated (iterated) "pentecost." To this computation Paul adds his testimony. The argument with respect to Paul's succinct reasoning is as follows:

> For, since the sacrifice of "Christ our passover" (1 Cor. 5:17) is an expression that points to crucifixion Friday as the day of slaying the passover lamb, even so does the resurrection of Christ as the risen "first fruits" point to resurrection Sunday as the day of offering the symbolic sheaf (1 Cor. 15:20).

This we may conclude from the law in Leviticus, and with Luke, Paul and Josephus,[12] to have been the sixteenth day of Nisan. Consequently, the independent computation of Luke would appear to have counted our commonly accepted Sunday pentecost from Sunday of the resurrection as the typical day of offering the sheaf of first fruits. Hence this sixteenth day of the first Jewish month automatically reverts to death Friday as the fourteenth.

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[11] If it is but remembered that the Jewish day has always begun with the evening, the problematic passover of the OT and NT thereby becomes simplified.

[12] Antt. III.X.5.

John, on the contrary, reckons in at least two ways that Friday of the crucifixion was fourteen Nisan. First, by designating the fourth day after the previous feast of tabernacles to have been the Jewish Sabbath. This computation made 22 Tishri = Tuesday, as given in the diagram. By counting forward, the intervening 28 weeks and 3 days (199 days in all) end on Friday as the Jewish fourteenth. In addition, John presents a second simpler reckoning by merely stating that the Sabbath during which Jesus lay in the tomb was a "high day" (John 19:31). That it was indeed the first day of the convocation feast of unleavened bread can be concluded from the decision of the chief priests, who said, "Not on the feast," with which they hoped to escape conflict by hurrying through the arrest and illegal night trial of Jesus.

John also refers to this feast sabbath in his description of the communion supper (John 13:29). "Buy those things that we have need of against the feast" is a thought ~~that~~ he imputes to ~~the mind~~ some of the ~~other~~ disciples. But, the feast mentioned could not have been a passover supper, which, according to the Synoptic report at least, had already been eaten, or else was then in progress. Obviously, therefore, it must have been the feast of convocation, the first day of unleavened bread (Lev. 23:3) occurring on 15 Nisan. And thus we may account for John's high day as the coincidence between the feast sabbath on the fifteenth, and the Jewish seventh-day Sabbath. And so, according to John, crucifixion Friday was the fourteenth, the same as with Luke!

And as further evidence of agreement in the time of Christ with respect to the festal dates, let us not pass over the unity that existed on the day of pentecost, which all the disciples observed on one and the same day, together with Jews from all over the world. This circumstance would imply that no discord had as yet materially disturbed the ancient Jewish calendar.

A good book to read on early calendation is Professor Martin P. Nilsson's Primitive Time-Reckoning (Lund, 1920).

Grace Amadon

CRUCIFIXION CALENDAR

The Problem.--The criticism by R.A. Parker with reference to the lunar argument published in the December number of JBL (1942) is a contribution inviting consideration from those who are interested in biblical chronology. With regard to the computation of OT and NT dates, scholarship has commonly employed only a "rough rule," and hitherto little progress has been made in producing a Jewish calendar table that both harmonizes with the motion of sun and moon, and at the same time is in agreement with the ancient historical synchronisms, of which the Bible has even a larger number than ~~even~~ the Babylonian and Assyrian monuments.

About the turn of the present century, simultaneous study of the problem was renewed in various universities and other centers of research. Inscriptional chronology was perhaps the moving impulse that promoted investigation on the part of universities and museums, while the leading observatories, which constantly receive inquiries concerning the crucifixion date, have been necessarily interested in the Jewish phase of this calendarial argument. Standard almanac computers know that the modern rabbinical institutions are not the exact counterpart of the ancient Jewish feast dates. It is further admitted by Jewish writers that their forefathers--in the words of Piniles--

> "die 34 Jahre nach dem Nicäer Concil den Kalendar geregelt, darauf Bedacht genommen, dass kein Fremder und Unbefugter in seine Principien eingeweiht werde."[1]

This procedure has been in direct contrast to the Babylonians, who have left their chronological imprints on tablet and stone. It has not been difficult therefore for Christian scholarship to postulate that the Jews, upon the return from Babylon, continued to use the same calendar as they were compelled to sign in their contracts during captivity. And especially has this assumption had appeal because Jewish history, from the time of Ezra and Nehemiah, has retained the Babylonian names of the months. But in addition, a second hypothesis now claims, inasmuch as the Schoch tables[2] appear to satisfy the Babylonian observations of the moon, that by these same tables the biblical dates can be computed. From the time of Ezra, Jewish chronologers have challenged this first assumption,[3] and this short study again calls in question the second. The principal features of Dr. Parker's criticism we shall discuss in the same order as submitted.

1. The Application of Schoch's Tables to Biblical Dates

The following statement from Babylonian Biblical Chronology testifies to the degree of accuracy of Schoch's neulicht dates for the meridian of Babylon:

> "Schoch claimed for his Table M an accuracy of about 75 per cent (op. cit. p. 101) in the dating of the beginnings of months, but was less certain as to the identification of the months themselves. This figure is not borne out; for, after adjusting his Table M in accordance with the intercalations given in our Plate I, we find his dates for the beginnings of years to be but 61.5 per cent accurate."[4]

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[1] Adolf Schwarz, Der Jüdische Kalender, Breslau, 1872, 42.
[2] Richard A. Parker and Waldo H. Dubberstein, Babylonian Chronology, Studies No. 24, Oriental Institute, University of Chicago, 1942.
[3] Schwarz, loc.cit., 15. According to Ezra 3:2-5 and Neh.10:29-33, the returning Jews consecrated the Mosaic new moons, not the Babylonian.
[4] Babylonian Chronology, p. 23.

This answer was the one sent to Parker

Dr. Richard A. Parker
Oriental Institute
Chicago University
Chicago, Ill.

Dear Dr. Parker:

Perhaps if I restate my argument I can make it clearer.

All periodic motion of the moon ascends to a peak and descends. In other words, an increasing and decreasing acceleration is shown in all lunar periods--latitude, declination, altitude, azimuth, parallax, range of moonset, lunation, lunar phases, etc. Hence this kind of motion is a characteristic of the moon's anomaly and the waxing period; and the translation period, which marks the beginning of a lunation, should be no exception. Commonly the periodic differences increase and decrease with their periods; but there is no rule of correspondence such as you propose. To maintain that the variation at Nisan visibility is about the same as at full moon would mean that the Nisan moon would annually have the same anomaly, which is not true.

On the contrary, the great factor which governs the length of the paschal periods (tr. period, first quarter, and wax. period) is the anomaly. If the Nisan waxing moon passes through perigee, her corresponding epochs will be short, and if she passes through apogee, they will be long. That is my thesis; but <u>how</u> short or <u>how</u> long, depends upon the position of the perigee or apogee, and not upon a period difference.

There is also another factor that comes into play in determining the length of the Nisan translation period. This is the hour of day when the moon fulls. If this point of time is late--toward midnight--the moon will rise full at the subsequent sunset, or, as the Babylonians said, "the god was seen with the god." Thereby the ancient passover was deferred one day, and likewise the previous calendar phasis. But Schoch ignores this calculation, which nevertheless agrees with the biblical dates and with the decisions of the Jewish Senate.

Are you not begging the question a little? You call "unjustifiable" the translation period of 1.95 day in 29 A.D. in my table, when the table of Schoch has the same figure!

If you still question these facts, why not put your argument in lunar motion up to Dr. Chandrasekhar at Yerkes Observatory? At present he is interested in celestial motion and its causes.

Yours very sincerely,

December 10, 1943
4 Crescent Place
Takoma Park, Md.

The foregoing degree of accuracy was ultimately raised to 70 percent by careful checking and calculation, that is, for the meridian of Babylon; but for the meridian of Jerusalem, the percentage is said to be a little lower. The conclusion is then drawn that for historical purposes this uncertainty is not important, even though 30 per cent of the dates may be off by one day! It is this latter hurdle that makes these tables of so little value for the meridian of Jerusalem. For thereby it would not only be impossible to tie ~~celestial motion to~~ to celestial motion, a particular event on a definite Julian date, thus identifying the corresponding year, but the same handicap would also make impossible the solution of any ancient synchronism that equates a Jewish date with a certain day of the week. Of this kind are many of the biblical date constructions, whose synchronisms hold an indispensable relation to the chronological outline of the Bible, and whose importance is unquestionable.

As regards the season of the year and the time of the festivals, the Jewish form of date is even more revealing than its Julian substitute; but, by means of the latter, the positions of the heavenly bodies can be brought into telling relation with the biblical text. Hence the futility of calendarial tables with equivocal Julian dates whose most obvious function is to tie up the chronological outline of some period of consequence.

It is not Schoch's mathematics which have thrust doubt into the validity of his neulicht dates. P.V. Neugebauer acknowledges the accuracy of his calculations, but at the same time states that Schoch's exactness does not relieve an uncertainty that exists with respect to the arc of vision. These are Neugebauer's words with reference to Schoch's new values which he had corrected for refraction:

> "Die Resultate werden damit rechnerisch genauer; es ist jedoch zu beachten, dass die immer noch bestehende Unsicherheit im Sehungsbogen erheblich grösser ist als die Ungenauigkeit der Werte in Tafel 28."[5]

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5 P.V. Neugebauer, Hilfstafeln zur Berechnung von Himmels-Ersheinungen, Leipzig, 1925. Anhang, 1.

Both Fotheringham and Neugebauer made protest at first against the lunar theory of Schoch; but ultimately his tables were accepted because "his astronomical formula appeared to agree with the attested Babylonian dates." But why not? Schoch deduced his empirical rule from about 400 observations of the moon in the Neo-Babylonian period plus about 100 personal observations of the moon and planets.[6] His rule necessarily would exactly conform to the kind of neulicht he selected. The application of his formula precisely shows that in general he chose the youngest moons possible--those in which the neulicht appeared within one day, or at the most two days--never three--after conjunction. In other words, Schoch's limits for the arcus visionis are invariably minimum values. This his table definitely illustrates, whose extremes are only 17 to 23 hours, as Dr. Parker states.

On the contrary, astronomers from Aratus to Fotheringham, who have left records of the moon's visibility, are in agreement that the moon takes over one to three days after conjunction in which to appear.[7] Hevelius, who observed the moon in northern latitudes around Danzig, even stresses the fourth day.[8] And observers further state that the moon's early or late appearance in the spring largely depends upon her distance from the earth. There are many instances on record that confirm these facts.

There is, however, an outstanding theory that disagrees with this lunar postulate--that of Maimonides. He says--I give Mahler's German translation:

> "Der Mond wird verdunkelt in jedem Monate, und wird nahezu 2 Tage nicht gesehen, ungefähr 1 Tag vor der Conjunction und ungefähr 1 Tag nach der Conjunction."[9]

Maimonides found a supposed proof for his theory in the ancient astronomy of the Greeks,[10] who in turn had studied in the Chaldaean schools.[11] And so Sidersky is probably correct in stating that the new moon limits of Mai-

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6 S. Langdon and J.K. Fotheringham, The Venus Tablets of Ammizaduga, London, 1928, 95.
7 A few instances cited in JBL, December, 1942, 259-264.
8 Johannes Hevelius, Selenographia, Gedani, 1647, 274.
9 Maimonides, Kiddusch Hachodosch, tr. into German by Mahler. Wien, 1889, 2.
10 Karl von Littrow, "Zur Kenntnis der kleinsten sichtbaren Mondphasen," Sitzungberichte der kaiserlichen Akademie der Wissenschaften, Wien, 1872, 480.

monides were in concordance with those of the Chaldaean priests, who wished to determine in advance the neomenies.[11] Fotheringham computed the angle of vision of Maimonides' tables, and found it to occur on the average about twenty minutes after sunset.[12] But on this basis the lunar theory of Maimonides breaks down, for the ~~new~~ crescent moon must set about an hour after the sun in order to be seen at all. This fact is easily deduced from any standard almanac. Hence not only the tables of Maimonides are based upon too low a limit for the arc of vision, but so also are the visibility limits of Fotheringham and Schoch, who ultimately built ~~on~~ upon the same theory.[13]

As further evidence that Schoch's values for the arcus visionis are altogether too low, the following instances are taken from his tables in Babylonian Chronology, years 16 to 45 A.D.:

Instances of Too Short Translation Periods in Schoch's Tables
(Computed to a 6:00 p.m. sunset, Jer. Civ. Time)

A.D.	Date	Tr.P.° (Day)	Wax.P.°° (Days)	A.D.	Date	Tr.P. (Day)	Wax.P. (Days)	A.D.	Date	Tr.P. (Day)	Wax.P. (Days)
17	I 18	.81	13.98	27	IV 26	.51*	14.07	37	III 7	.83	14.30
	II 16	.27*	14.03	28	III 16	.65*	14.13		V 5	.66*	13.91
	III 18	.82	14.21		V 14	.59*	13.91	38	II 24	.83	14.97
18	I 7	.75*	14.32	29	VI 2	.76*	13.93	39	V 13	.78	14.56
	III 7	.33*	13.94	33	IV 19	.85	15.39	42	IV 10	.88	15.28
19	V 24	.54*	13.99	35	I 29	.46*	13.97	43	III 31	.52*	14.30
20	VI 11	.68*	13.91		V 27	.86	14.82	44	I 20	.61*	14.03
25	III 19	.51*	14.67	36	II 17	.60*	14.07		III 19	.51*	14.04
27	II 26	.46*	13.99	37	II 5	.56*	14.66		V 17	.84	.4.61

° Translation Period °° Waxing Period

Comments.--The foregoing table represents the extremely short translation periods found on the last page of Babylonian Chronology. With those marked by an asterisk, the neulicht occurs on the very day itself of conjunction--an astronomical event which is commonly impossible. This fact was well known to the ancients, as pointed out by Pliny,[14] and also by Scaliger, Bucherius, and

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11 D. Sidersky, "Le Calcul Chaldéen des Néoménies," Revue D'Assyriologie et D'Archéologie Orientale, publiée sous la Direction de V. Scheil et F. Thureau-Dangin. Seizieme Volume. Paris, 1919, 25,28.

12 J.K. Fotheringham, "Astronomical Evidence for the Date of the Crucifixion," Journal of Theological Studies, Vol. XII, October, 1910, 121.

13 For ascertaining the neulicht, Fotheringham first followed the rules of Hevelius (JBL, December, 1942, 266), but 25 years later, changed to the theory of Maimonides. He and Schoch both were interested in a world calendar.

14 Pliny, Natural History, I, tr. Bostock and Riley, London, 1855, 49.

others.[15] It is easy to see that the new moon could not be visible when only 6 to 11 hours ($0^d.27$ to $0^d.46$) east of the sun. But when the moon is far from the earth, and for that reason in slow motion, it is equally impossible that the earth's satellite can be seen within two days after conjunction, and hence the neulicht is carried to the third day.[16] This condition Schoch's lunar theory fails to meet.

As early as the sixth century B.C., the Babylonians are said to have recognized the moon's anomaly.[17] Therefore their lunar observations should periodically show longer translation periods than Schoch's calculations allow. If, however, the conjunction date had been tabled with each neulicht, the series would have increased in value; for thereby each date would be subject to constant checking, and the most important dates would ultimately receive correction, an extremity which Shoch himself concedes:

> "If in any particular year Nisan is known to have begun earlier or later than the date given in these tables, the whole calendar should be shifted by one or two months so as to bring it into the correct position, regard being had to the intercalation of a second Ulul where that is known to have taken place."[18]

While this method of correction is not dependable, yet it is a significant witness to the uncertainty of Schoch's dates.

2. A "Percentage Rule" for the Neulicht!

There never has been anything more simple than trigonometric functions by which to compute the moon's exact place in her orbit. However, the simple relationship between the translation and waxing periods, as described in the JBL article, has been understood for centuries. Similar analogies have been made by Pliny, Maimonides and his interpreters, and Reinhold and Kepler. The age of the crescent is to be known by its size;[19] the broader the crescent, the greater the elongation;[20] and from Maimonides the following:

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15 Bucherius, De Doctrina Temporum, Antverpiae, 1634, 372.
16 The 1st of Nisan in the 6th of Darius I, 516 B.C. is an example of a third day neulicht, Jewish reckoning (Ezra 6:15).
17 Venus Tablets of Ammizaduga, 1928, 45.
18 Ibid., 100.
19 Johannes Kepler, Gesammelte Werke, Band II, Astronomiae Pars Optica, München, 1939, 207.
20 E. Baneth, "Maimuni's Neumondberechnung," Teil III, Zwanzigster Bericht über die Lehranstalt für die Wissenschaft des Judenthums in Berlin, 1902, 118.

"Atque ex his, qui de luna nascente renunciarent, tentandae fidei causa, quaerebatur etiam & illud, luna quam altè ferebatur. Id cognoscitur ex arcu visionis, qui si brevior est, cursus lunae propiùs à terra volvi, si longior, luna moveri videtur altiùs. Ut enim visionis arcus longus est, ita lunam oculi altam à terra percipiunt."[21]

In other words, when the moon is near the earth, the arc of vision is short, and when the moon is far from the earth, the arc of vision is long. In ancient Israel, ~~the~~ astronomers could evaluate this lunar distance by the eastern movement of the moon among the stars, and her height above the horizon. We can get the same information by comparing the arc of vision, or its time equivalent, the translation period, with the waxing period of the moon. For the waxing period is also long or short according as the moon, in this part of her orbit, passes through perigee or apogee, particularly in the spring of the year. Similarly, therefore, the Nisan arc of vision has an approximate relation to the length of the waxing period--when the one is long or short, so also is the other. That is simple; but the relation is merely an approach to the length of the arc, as was clearly stated in my study.

3. "Nowhere in Jewish law is there set forth any statement of a necessary relationship between the feast of the passover and the full moon."

Dr. Feigin is cited as authority for the foregoing assertion. If by Jewish law the Talmudic teaching is referred to, then the Doctor is quite right, for nowhere, it appears, in the tractates of the Talmud is even the current calendar of Hillel II found under discussion.[22] Nevertheless, the relation of the rabbinical passover to the full moon is definitely set forth by modern Jewish chronologers, as for example, the following from Sidersky:

"Nous savons, en effet, que de soir de la pâque juive doit coincider avec la pleine lune (d'après des textes cités plus haut de Josèphe et de Philon), et ne pouvait en aucun cas précéder ce phenomène physique. Il peut arriver quelquefois que, par suite de certaines circonstances la néoménie soit fixée au surlendemain de la conjonction et que la paque soit célébrée 24 heures après la pleine lune, mais de contraire est impossible."[23]

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21 R. Mosis Majemonidae, Sacrificiis Liber, tr. de Compiegne de Veil, Londini, 1683, 424.
22 Schwarz, loc. cit., 37,38.
23 D. Sidersky, "Etude sur l'origine astronomique de la chronologie juive," Mémoires presentés par divers savants à l'Academie des Inscriptions et belles-lettres de l'Institut de France. Vol. XII, part 2, 1913, 636. Paris.

With ancient Jewish law the case was similar, for a very precise relation necessarily existed between a fixed passover date on a fixed meridian, and both neulicht and full moon. The passover always occurred exactly on the 14th day after the appearance of the crescent about sunset of the same day of the week two weeks earlier. ~~in the western evening sky.~~ With regard to the full moon, the nations of the Near East have left significant records of the lunar date on which the Nisan moon fulled.

With the Romans, whose earliest calendar was lunar, the "ides" marked the day of full moon. In the time of corn harvest, this obviously occurred on the lunar 13th, for ultimately this same date became an ideograph on the Julian calendar, in whose paschal month April the ides were always commemorated on the renowned "13th."[24]

Likewise, in the earliest calendar of Egypt, the full moon was feasted on the 13th day, and the feast was called "feier des leuchtenden Aufgangs."[25] That this feast was patterned after the spring month, is indicated by the festival of the 14th, which was named "feier der Majestät des Widders."[26]

The Arabs also honored the spring moon on their calendar. Their year wandered through all the seasons, yet they had ideographic names for certain nights in the month. They observed the night following the 13th as "badr," a word signifying that the moon is full and her light complete.[27] The paschal moon at least periodically fulled on the calendar 13th of the Mohammedans.

On the contrary, the Greeks so adjusted their lunar year that their Olympic games were continuously celebrated on the full moon as of the lunar 15th, thus paying respect to the first full moon after the summer solstice, when this contest occurred.[28]

And the Babylonians had rules for the days of Nisan. On the day of the 13th, "Sin bears a full crown!" Regularly on the important 13th of Nisan, an offering was made to the moon god with his full crown of light,[29] which shone throughout the whole first night.

Such was calendarial law around Jerusalem. Astronomical law too, it is to be noted, with which the festival law and its lunar calendar in Jewry undeniably had to agree. Hence, the Pentateuchal fixed passover date on 14 Nisan must have occurred on the day after the Jewish date of full moon, and certainly not on, or be-

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24 Martin P. Nilsson, Primitive Time-Reckoning, London, 1920, 167.
"Nonnullis placet, Idus dictas vocabulo Graeco, a specie, quae apud illos εἰδέα vocatur, quod ea die plenam speciem luna demonstret."--Venerabilis Bedae, Opera Omnia, ed. Giles, Vol. VI, 1843, 176. Londini. Cf. also Webster.

25 Heinrich Brugsch, Astronomische und astrologische Inschriften altaegyptischer Denkmaeler, Leipzig, 1883, 50.

26 Ibid.

27 Albîrûnî, Chronology of Ancient Nations, tr. Sachau, London, 1879, 75.

28 Joseph Scaliger, De Emendatione Temporum, Francofurt, 1593, 8.

29 S. Langdon, Babylonian Menologies and the Semitic Calendar, London, 1935, 76.

fore! According to this interpretation has the frequently cited commentary of the Jewish philosopher Aristobulus been understood. He dedicated his exposition of the Pentateuch to Ptolemy Philometor,[30] and his precepts regarding the ancient passover were taught by his disciples--the Agathobuli. The very same passover-full-moon doctrine was proclaimed in the significant Greek of Philo Judaeus in the time of Christ.[31] Presently it is acknowledged by the Christian church--John, Polycrates, Anatolius, Theophilus, Ambrose. In the language of astronomy in the Reformation of 1582, the following is what Aristobulus taught:

> "Quum duo sint aequinoctia, veris & autumni, aequis spatiis diremptа: & 14. die mensis primi sit statua solemnitas post vesperam, quando Luna Soli opposita è regione deprehenditur, sicut etiam oculis probare licet: invenitur utique vernalis aequinoctii partem Sol obtinens; Luna verò è contrario, autumnalis."[32]

"On the 14th day of the first month after the evening when the moon is caught in the region opposite to the sun, the feast is fixed!" Clearly, then, this point of time was the end of the 13th, on which day the moon must have fulled. The Church received this passover-full-moon doctrine from Jewish interpretation of Pentateuchal law, adjusted her Easter cycles in harmony with this principle,[33] and henceforth contended that "never, according to the custom of the Church, was the paschal limit on the full moon."[34]

The accompanying table of graphs further demonstrates the difference between the reckoning of the Nisan new year in harmony with the ancient position of the passover after the full moon, and the new moon formula of Schoch, who

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30 Eusebii Pamphili, Chronici Canones, ed. Fotheringham, Londinii, 1923, 221.

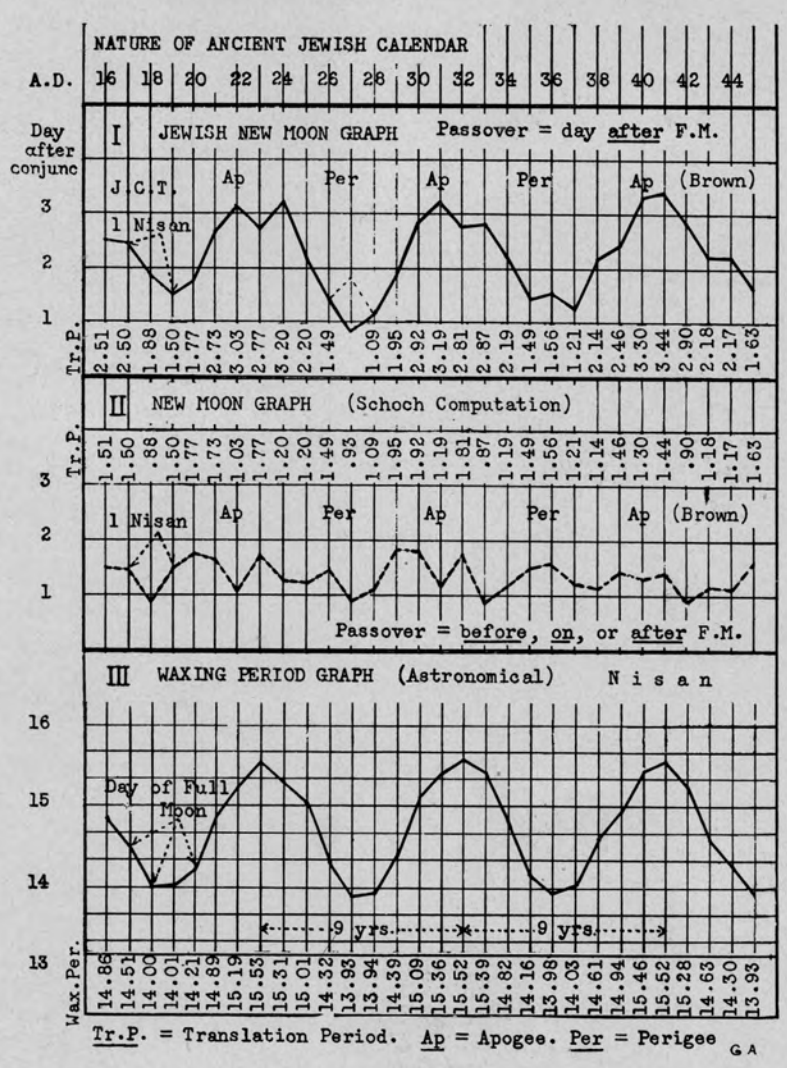
31 The following excerpt from Special Laws II, 210 is similar to the one from Nancel: "ἵνα μὴ μεθ' ἡμέραν μόνον ἀλλὰ καὶ νύκτωρ πλήρης ὁ κόσμος ἢ τοῦ φύσει παγκάλου φωτός, ἡλίου καὶ σελήνης κατ' ἐκείνην τὴν ἡμέραν ἀλλήλοις ἐπ-ανατελλόντων αὐγαῖς ἀδιαστάτοις, ἃς μεθόριον οὐ διακρίνει σκότος." The double prepositioned ἐπ-ανατελλόντων is significant - ἐπί obviously referring to the setting sun, and ἀνά, to the rising full moon on "that day", the paschal 14th.

32 Nicolai Nancelii, Analogia Microcosmi ad Macrocosmi, Secunda Pars, Paris, 1611, col. 1204.

33 J.G. Hagen, Catholic Encyclopedia, art. Lilius, New York, 1910, IX, 251.

34 Joseph Scaliger, Thesaurus Temporum Eusebii Pamphili, Canonum Isagogicorum, Liber Tertius, 1558, 183. Amstelodami.

34 Dionysius Petavius, Animadversiones in Epiphanii Opus, 1682, 195. Coloniae.



Tr.P. = Translation Period. Ap = Apogee. Per = Perigee GA

places the passover before, on, and after the moon has filled her disk, as the case may be.

(INSERT ENGRAVING)

Description. In Graph I, each 1 Nisan date is found by placing 14 Nisan on the day after the Jewish date of full moon on the Jerusalem meridian, and from thence counting back to 1 Nisan. The translation period equals the difference in time between the local conjunction and the sunset beginning of the 1st of Nisan.

In Graph II, 1 Nisan is taken from Babylonian Chronology. Translation periods are computed the same as for Graph I.

In Graph III, the Nisan waxing periods are obtained by subtracting the corresponding new moon dates from those of the full moon.[35] The peak of each wave answers to the longest interval, and the valley, to the shortest. Graph III is not hypothetical, for it is based upon known figures.

Comments. It is not difficult to see that Graph I more nearly conforms to the known figures of the third graph than does Graph II. This relation is a reliable check upon the lunar theory involved, for the translation period is necessarily governed by astronomical factors which advance the moon east of the sun at the time of conjunction. The most consequential factor in the paschal period is the moon's perigee or apogee, for in the spring of the year the moon's latitude is not of so great importance, a fact which Schoch has clearly stated, along with Maimonides, Sidersky, Baneth, Ferguson, Fotheringham, Draper, and many others. The following is Schoch's argument:

> "Besonders bemerkenswert ist, dass im Frühling das notwendige Alter viel mehr darauf an, dass der Mond sich ~~sich~~ möglichst schnell von der Sonne entfernt, um eine bestimmte Elongation zu erreichen . . .Dagegen ist im Frühling eine grosse positive Breite weniger wichtig, da dann die Ekliptik schon so steil am Abend gegen den Horizont aufsteigt, dass die positive Breite die Höhe des Mondes über dem Horizont nur wenig vermehrt."[36]

Consequently, if it were not for the moon's perturbations and other irregularities due to the shape of her orbit, lunar motion at passover time would be a simple problem for the mechanic. With reference to Graph II, however, it is clear that Schoch's lunar theory almost wholly annulls any anomalistic relation between his dates and the moon's true motion. In very few years does his 1 Nisan outline mesh with the moon's actual course as portrayed in Graph III.

As to the question whether Schoch's tables correspond to lunar observation in Babylonia, I will give an interesting example of his table date being too early, as is frequently the case. Let us go back to the 37th year of Nebuchad- on the meridian of Jerusalem.

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35 Ginzel's Chronologie.

36 Karl Schoch, "Christi Kreuzigang am 14 Nisan," Biblica 9, 1928, 50. Rome.

nezzar II (– 567/566), as reported by Neugebauer and Wiedner.[37] The computed lunar eclipse was not seen in Babylon, but the recorded Nisan full moon date is sufficient for our purpose:

> "oder 12. [Nisan] ging Jupiter scheinbar akronychisch auf. Am 14. war der Gott mit dem Gotte sichtbar; 16^{m} vergingen zwischen Sonnenaufgang und Monduntergang am nächsten Morgen. Am 15. war es bewölkt."[38]

The small interval of only 16 minutes between sunrise and moonset "on the next morning" at once identifies this morning as the first after the full moon rose at sunset, or, namely, after Gott mit dem Gotte sichtbar war. If it had been the second morning after, then the interval would have been over an hour long. Hence we have the equation 13 Nisan = May 6 (Schram's Nisan date for full moon). Reckoning back to 1 Nisan we get --

13 Nisan = May 6	9 Nisan = May 2	5 Nisan = Apr 28
12 " = " 5	8 " = " 1	4 " = " 27
11 " = " 4	7 " = Apr 30	3 " = " 26
10 " = " 3	6 " = " 29	2 " = " 25

Therefore 1 Nisan = April 24 (same as passover reckoning in this instance).

In Babylonian Chronology, Schoch's date is April 23!

4. Paschal Routine in the Crucifixion Year

Dr. Parker is not convinced that the ancient passover was sacrificed at the sunset beginning of 14 Nisan, and cites Dr. Feigin's discussion of this problem.[39] It is indeed to the merit of Jewish scholarship to try to discover harmony in NT chronology; and one can hardly refrain from questioning just how real the so-called controversy over the crucifixion calendar was, seeing that within fifty days after the resurrection, we find all the disciples keeping one and the same day for the feast of the omer!

However, the explanation of the passover routine in Dr. Feigin's argument is not too clear. The Friday evening supper is a common meal! And he

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37 P.V. Neugebauer and E.F. Weidner, "Ein astronomischer Beobachtungstext aus dem 37. Jahre Nebuknezars II," Berichte über die Verhandlungen der Königl. Sächsischen Gesellschaft der Wissenschaften zu Leipzig Philologisch-historische Klasse. 67. Band, 2. Heft, 1915, 34. Leipzig.

38 Ibid.

39 Samuel I. Feigin, "The Date of the Last Supper," Anglican Theological Review, Vol. XXV, No. 2, April, 1943.

Dr. Richard A. Parker
Oriental Institute
Chicago University
Chicago, Ill.

Dear Dr. Parker:

Perhaps if I restate my argument I can make it plainer.

All periodic lunar motion ascends to a peak and descends. This, for example, is a characteristic of the moon's anomaly and waxing period; and the translation period, which marks the beginning of a lunation, should be no exception. Commonly the periodic differences increase and decrease with their periods; but there is no rule of correspondence such as you propose, for the great factor which governs the length of the paschal periods (tr. period and wax. period) is the anomaly. If the Nisan waxing moon passes through perigee, her corresponding epochs will be short, and if she passes through apogee, they will be long. That is my thesis; but how short, or how long, depends upon the position of the perigee or apogee, and not upon a period difference. Moreover, an increasing or decreasing acceleration is shown in all the moon's periods--latitude, declination, altitude, azimuth, parallax, range of moonset, lunation, lunar phases, etc. To maintain that the variation at Nisan visibility is about the same as at full moon would mean that the Nisan moon would annually have the same anomaly, which is not true.

There is also another factor that comes into play in determining the length of the Nisan translation period. This is the hour of day when the moon fulls. If this point of time is late--toward midnight--the moon will rise full at the subsequent sunset, or, as the Babylonians said, "the god was seen with the god." Thereby the ancient passover was deferred one day, and likewise the previous calendar phasis. Schoch ignores this calculation, which nevertheless agrees with the biblical dates,

Are you not begging the question a little? You seem to question a translation period of 1.95 day in 29 A.D., and call it "unjustifiable" for my table. But how about Schoch? He has the same figure!

If you still question these facts, why not put your argument in lunar motion up to Dr. Chandrasekhar at Yerkes Observatory? At present he is interested in celestial motion and its causes.

Yours very sincerely,

December 10, 1943
4 Crescent Place
Takoma Park, Md.

wishes to correct Luke 22:7 to agree with an assumed "first day of the festival" in the companion texts (Matt.26:17 and Mark 14:12). But on what authority should Hebrew translators, as Salkinson and Delitzsch, introduce the ~~word~~ phrase חג into these texts when the corresponding Greek has no word for "feast," and speaks only of the "first of the unleavened bread"--a common expression for the Jewish 14th with practically all first century writers. Furthermore, why attempt to change Luke's account of an actual passover meal (22:15) to agree with an assumed common meal, after which, nevertheless, the Hallel was sung![40] This hymn was chanted on only one night in the year. If chronology has to base its conclusions upon scribal error, or upon an isolated textual criticism, then many similar arguments follow, and in the end few are convinced.

A most important feature with reference to the crucifixion problem is the calendar and the lunar theory by which it is to be established. Dr. Feigin's critical analysis has not changed the astronomical riddle, namely, to find a year with the Jewish 14th of Nisan coinciding with a sunset to sunset sixth day of the week, which, on this occasion, he has been accustomed to call the "eve of the passover." Without this calendar, no critical theory is of much aid to chronology. Allow me to restate the problem. Modern scholarship, more commonly than in earlier centuries, consents to a Jewish date of the crucifixion as 14 Nisan. All, however, do not acquiesce as to the hour of slaying the national paschal lamb, which, clearly, the death of Christ fulfilled. But, on calendaric grounds alone, what actual difference does it make whether the sacrifice was antemeridian or postmeridian? The calendar cannot tie to a particular hour of the oriental nychthemeron. It can only connect with the Jewish date as a whole!

If Dr. Feigin and his colleagues see the paschal lamb slain "late on Fri-

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40 Pesahim X 5-7; Matt.26:30; Mark 14:26.

day afternoon," the point of time is still admitted to be the 14th of Nisan, and this is the same Jewish date proposed in my JBL study. The calendarial problem, therefore, has not changed.

At least four different forms of lunar calendar have hitherto been presented as the answer to the crucifixion problem: (1) with the passover before full moon (Greswell); (2) with passover on full moon (Edersheim); (3) with passover before, on, and after full moon (Schoch); and (4) with passover only after full moon--my thesis. The first puts the calendar neulicht before or on conjunction, when the moon could not possibly be seen; the second results in the neulicht occurring either on the day of conjunction, or in any event, too near the sun to be seen; the third has its neulicht dates commonly too early by one and even two days for the meridian of Jerusalem; and the fourth--I am defending, and will repeat again its postulates:

1. The passover occurred on 14 Nisan on the next day after the Jewish date of the full moon of barley harvest.

2. On the longitude and latitude of Jerusalem, the barley harvest moon regularly fulled on the Jewish 13th of Nisan.

3. The astronomical rhythm of the Nisan neulicht is similar to that of the full moon--when the one is early or late in its period, so also is the other early or late in its period.

4. The calendar neulicht, therefore, did not ever precede the conjunction, or occur on the day itself of conjunction on the meridian of Jerusalem.

All of Dr. Parker's criticisms are interesting. Some are of material importance because they reflect the opinion of ~~many~~ other scholars. It is impossible in this limited paper to give consideration to other than the most essential of his arguments. statements. The postulate that the ancient Jewish Passover occurred after the moon fulled on the meridian of Jerusalem is fully confirmed by the biblical dates. These will be demonstrated in a later study.

Grace Amadon, Washington, D.C.
October 27, 1943.

With ancient Jewish law the sase was similar, for a very precise relation necessarily existed between a fixed passover date on a fixed meridian, and both neulicht and full moon. The passover always occurred exactly on the 14th day after the appearance of the crescent in the western evening sky. With regard to the full moon, the nations of the Near East have left significant records of the lunar date on which the Nisan moon fulled.

With the Romans, whose earliest calendar was lunar, the "ides" marked the day of full moon. In the time of corn harvest, this obviously occurred on the lunar 13th, for ultimately this same date became an ideograph on the Julian calendar, in whose paschal month April the ides were always commemorated on the renowned "13th."[24]

Likewise, in the earliest calendar of Egypt, the full moon was feasted on the 13th day, and the feast was called "feier des leuchtenden Aufgangs."[25] That this feast was patterned after the spring month, is indicated by the festival of the 14th, which was named "feier der Majestat des Widders."[26]

The Arabs also honored the spring moon on their calendar. Their year wandered through all the seasons, yet they had ideographic names for certain nights in the month. They observed the night following the 13th as "badr," a word signifying that the moon is full and her light complete.[27] The paschal moon at least periodically fulled on the calendar 13th of the Mohammedans.

On the contrary, the Greeks so adjusted their lunar year that their Olympic games were continuously celebrated on the full moon as of the lunar 15th, thus paying respect to the first full moon after the summer solstice, when this contest occurred.[28]

And the Babylonians had rules for the days of Nisan. On the day of the 13th, "Sin bears a full crown!" Regularly on the important 13th of Nisan, an offering was made to the moon god with his full crown of light,[29] which shone throughout the whole first night.

Such was calendarial law around Jerusalem. Astronomical law too, it is to be noted, with which the festival law and its lunar calendar in Jewry undeniably had to agree. Hence, the Pentateuchal fixed passover date on 14 Nisan must have occurred on the day after the Jewish date of full moon, and certainly not on, or be-

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24 Martin P. Nilsson, Primitive Time-Reckoning, London, 1920, 167. "Nonnullis placet, Idus dictas vocabulo Graeco, a specie, quae apud illos εἰδέα vocatur, quod ea die plenam speciem luna demonstret."--Venerabilis Bedae, Opera Omnia, ed. Giles, Vol. VI, 1843, 176. Londini. Cf. also Webster.

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29 S. Langdon, Babylonian Menologies and the Semitic Calendar, London, 1935, 76.

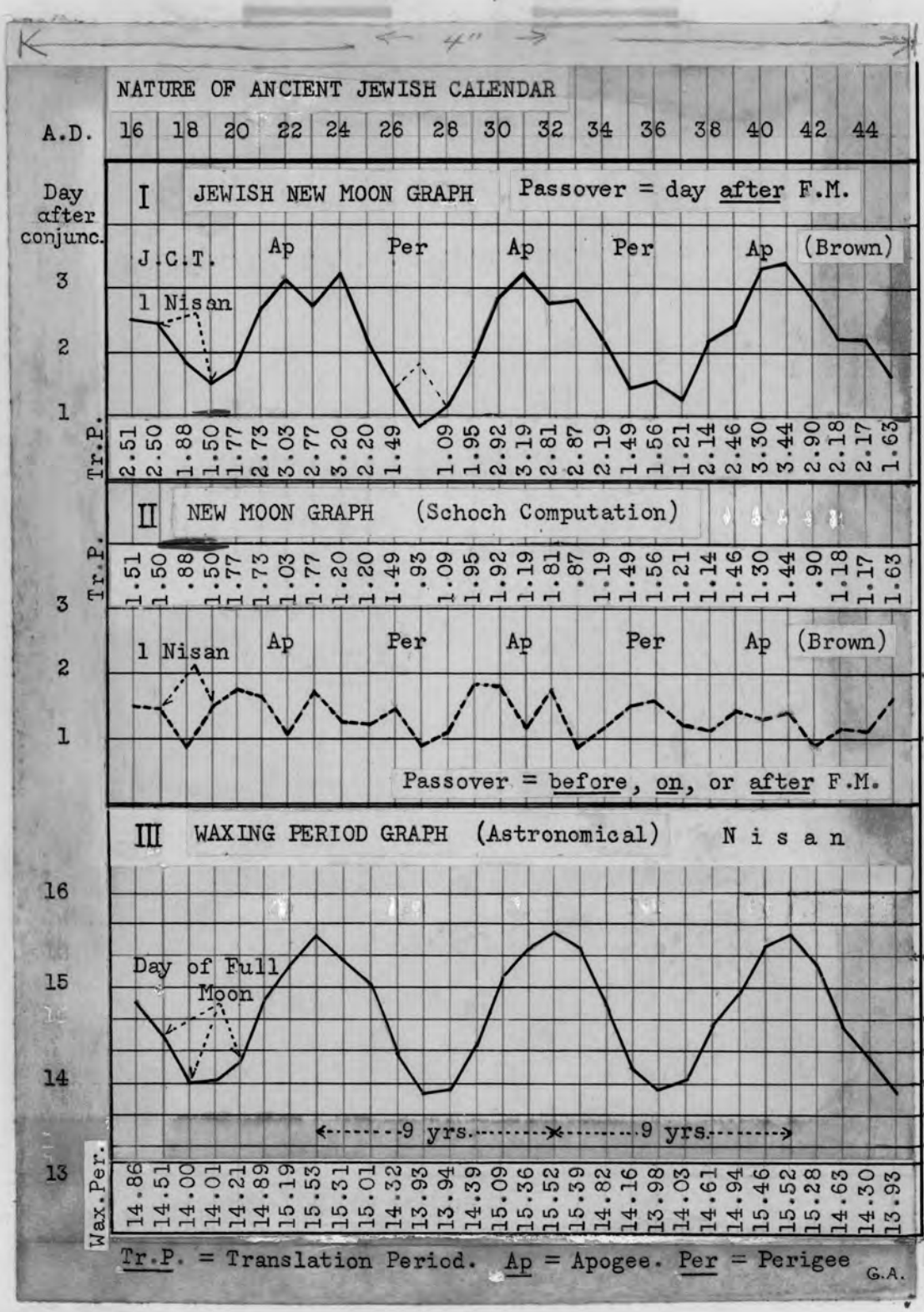
Corrections for "Crucifixion Calendar"

1. On page 1, line eight from bottom, change "Biblical Chronology" to read: Babylonian Chronology.
2. On page 3, line twelve from top, insert before "Parker" the title: Dr.
3. On page 3, second paragraph, line five, insert after the word "appearance" the following phrase: in the spring.
4. On page 4, line five from top, for the word "new" substitute crescent.
5. On the same page, line nine from top, for the word "on" substitute upon.
   In reference 14, delete comma after title of book.
5. On page 5, line two from top, change the word "far" to farthest.
   On same page, under Part 2, cut out the first sentence and the word "However," thus beginning the paragraph with: The simple relationship.
   On same page, last paragraph, after the word "interpreters," insert and.
6. On page 6, at the end of paragraph closing with the word "study," finish up with the following sentence:

   If the Nisan waxing moon passes through perigee, her corresponding epochs will be short, and if she passes through apogee, they will be long--a variation of days. The hours and minutes are largely governed by the position of the conjunction.

7. On page 7, line one, correct "sase" to case.
   On same page, line four, after the word "crescent," delete "in the western evening evening sky," and insert the following:
   about sunset of the same day of the week, two weeks earlier. And if the crescent moon appeared a day earlier than usual, as sometimes happened in intercalary years, the paschal "fourteenth" still maintained its customary relation to the full moon.
   On same page, single space paragraph 2, capitalize the two German nouns Feier.
8. On page 10, under Part 4, line 4, change "hermony" to harmony.
9. On page 11, line three, change the last "word" of line to phrase.
10. On page 12, line eight, insert word calendar before neulicht.
    On same page, line eleven, insert words to be seen after word "sun."
    On the same page, at the very end, finish up with the following sentence:
    The postulate that the ancient Jewish Passover occurred after the moon fulled at Jerusalem is amply confirmed by the biblical dates. These will be demonstrated in a later study.

Grace Amadon



Nisan	Tr. Per.	Wax. Per.
28 A.D.	1.09	13.94
29 A.D.	1.95	14.39

Dr. Richard A. Parker,
Oriental Institute,
Chicago University,
Chicago, Ill.

Dear Dr. Parker:

I will restate the anomaly argument--perhaps I can make it plainer.

The main reason that the paschal periods are short in the years 28 and 29 A.D. is because the waxing moon in both years passes through perigee. For the same reason the accompanying tr. periods in these two years are also short, ~~but how short~~, depends upon where the perigee is, whose influence is at the peak at the half way point between new and full.

In the year 28 A.D. the Nisan perigee is in the first half of the waxing period, ~~and therefore the tr. period is very short--not much more than a day.~~ In 29 A.D. the perigee is in the second half, with the result that the moon around the previous conjunction is slower, just as you say, and the tr. period longer. However, both these tr. periods are in the one day range, and in my thesis are cataloged as short, while in Schoch's tables the 29 A.D. tr. period, for which we both have 1.95 day, is his extreme Nisan limit for page 46, and apparently you count it long! That is the conclusion I challenge with reference to ancient Jewish time.

To maintain that the variation in time at Nisan visibility is about the same variation in time as at full moon, surely would mean that the Nisan moon would annually have the same anomaly, which is impossible.

Yours very sincerely,

December 8, 1943.
4 Crescent Place,
Takoma Park, Md.

Dear Mr. Draper:
How about this answer?
Please jot down your remarks on this sheet and mail.
gaa

C O P Y

Miss Grace Amadon
4 Crescent Place
Takoma Park, Md.

Dear Miss Amadon:

I have read carefully your letter of November 26. I hardly think it likely that any further remarks of mine will have more force than my previous criticism, but I am moved to say this at least.

(a) You must differentiate, in your comments on Schoch's tables, between his Table M and his tables for computing lunar visibility. All the dates for Nisan which are used in my criticism of your article are calculated for Jerusalem and are not dates derived from Table M, which might be off one day.

(b) I cannot grant any validity to your rebuttal of what you call my ratio. It seems elementary to me that if in A.D. 28 the moon's waxing period is 13.94 and in A.D. 29 it is 14.39, an increase of 0.45 day, your increase in the translation period from 1.09 to 1.95, when the 0.45 ought to be spread out somewhat evenly over the 14 days of the moon's waxing period, is completely unjustifiable. In effect, you are saying that in A.D. 29 the moon travelled about twice as slow immediately after conjunction as it did in A.D. 28, but that upon visibility it increased its pace and then actually travelled faster from visibility to full moon in 29 than in 28.

But in these years Schoch has the same figures and the same increase!

Very truly yours,

Richard A. Parker

December 1, 1943
Oriental Institute,
The University of Chicago,
Chicago, Illinois, U.S.A.

THE ORIENTAL INSTITUTE

THE UNIVERSITY OF CHICAGO

Cables: ORINST CHICAGO

CHICAGO, ILLINOIS, U.S.A.

1155 EAST FIFTY-EIGHTH STREET

December 1, 1943

Miss Grace Amadon
4 Crescent Place
Takoma Park, Md.

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Very truly yours,

Richard A. Parker

Richard A. Parker

RAP:ma

My Dear Dr. Parker:

I appreciate the opportunity of answering your criticism of my study on Ancient Jewish Calendation, and I wish to thank you for asking Dr. Pfeiffer to write me about it. In reply I have mentioned those features of the problem which I thought would be most interesting to the JBL readers. I should like to add, however, that I do not have unshakable confidence in Herr Schoch's empirical terms. His repeated criticism of Brown's master treatise on the moon first led me to examine and later to question his own values.

It is difficult to understand the assurance with which Morgenstern asserts that Schoch's Julian dates are the same as the ancient Jewish, especially since you have candidly acknowledged that they answer to only 60 or 70 per cent of the table. We have too many historical instances of a difference in date between eastern and western Jews in early centuries to maintain that one and the same lunar calendar would satisfy the meridians of both Babylon and Jerusalem, especially if it is insisted that "observation" alone is the basis of calendation. Actually, no number in Schoch's series is dependable unless proved by either observation or computation to be so, and certainly should not be linked with any biblical synchronism without attestation.

Hence, when any Schoch date is equated with a known day of the week, thereby to discover the corresponding Julian year, as in the case of the crucifixion, what certainty is there that the computed year is correct? If a date, by even one day, is in error, then the synchronizing year is bound also to be in error. This is a hurdle which Schoch's astronomical terms cannot encompass. The conclusion seems unavoidable that his dates are too uncertain for the biblical synchronisms, and he himself recognized this uncertainty in his computation.

As regards your challenge against my astronomical thesis, your ingenious ratio actually does not support Schoch, whose difference in the extremes of lunar velocity should average out--not increase--as the Nisan new moon advances toward the full. For if perigee occurs between new and full, then the waxing period is necessarily shorter than the waning period, in which apogee must fall, and vice versa. And the length of the translation period is similarly affected. For example, at the end of the moon's synodic course, the variation is about .5 day; at the end of the waxing period, the variation is about 1.7 day; but at Nisan visibility, Schoch's difference averages about 1 day only--a value that distorts both the translation period and the arcus visionis. My postulate demands the variation at Nisan visibility to be greater--not less--than at the paschal full moon. I have found that this relation agrees not only with the very exact biblical synchronisms, but with ancient astronomy as well.

If you can disprove this relation in the ancient Jewish calendar, please let me have your proof, Doctor! But no percentage, please. If travel is no worse, I am still hoping to come to Chicago after the New Year, and shall look forward to seeing you. In the mean time, the Season's Greetings and success in your study.

Yours very sincerely,

November 26, 1943.
4 Crescent Place,
Takoma Park, Md.

My Dear Dr. Parker:

I appreciate the opportunity of answering your criticism of my study on Ancient Jewish Calendation, and I wish to thank you for asking Dr. Pfeiffer to write me about it. In reply I have mentioned those features of the problem which I thought would be most interesting to the JBL readers. I should like to add, however, that I do not have unshakable confidence in Herr Schoch's empirical terms. His repeated criticism of Brown's master treatise on the moon first led me to examine and later to question his own values.

It is difficult to understand the assurance with which Morgenstern asserts that Schoch's Julian dates are the same as the ancient Jewish, especially since you have candidly acknowledged that they answer to only 60 or 70 per cent of the table. We have too many historical instances of a difference in date between eastern and western Jews in early centuries to maintain that one and the same lunar calendar would satisfy the meridians of both Babylon and Jerusalem, especially if it is insisted that "observation" alone is the basis of calendation. Actually, no number in Schoch's series is dependable unless proved by either observation or computation to be so, and certainly should not be linked with any biblical synchronism without attestation.

Hence, when any Schoch date is equated with a known day of the week, thereby to discover the corresponding Julian year, as in the case of the crucifixion, what certainty is there that the computed year is correct? If a date, by even one day, is in error, then the synchronizing year is bound also to be in error. This is a hurdle which Schoch's astronomical terms cannot encompass. The conclusion seems unavoidable that his dates are too uncertain for the biblical synchronisms, and he himself recognized this uncertainty in his computation.

As regards your challenge against my astronomical thesis, your ingenious ratio actually does not support Schoch, whose difference in the extremes of lunar velocity should average out--not increase--as the Nisan new moon advances toward the full. For if perigee occurs between new and full, then the waxing period is necessarily shorter than the waning period, in which apogee must fall, and vice versa. And the length of the translation period is similarly affected. For example, at the end of the moon's synodic course, the variation is about .5 day; at the end of the waxing period, the variation is about 1.7 day; but at Nisan visibility, Schoch's difference averages about 1 day only--a value that distorts both the translation period and the arcus visionis. My postulate demands the variation at Nisan visibility to be greater--not less--than at the paschal full moon. I have found that this relation agrees not only with the very exact biblical synchronisms, but with ancient astronomy as well.

If you can disprove this relation in the ancient Jewish calendar, please let me have your proof, Doctor! But no percentage, please. If travel is no worse, I am still hoping to come to Chicago after the New Year, and shall look forward to seeing you. In the mean time, the Season's Greetings and success in your study.

Yours very sincerely,

November 26, 1943.
4 Crescent Place,
Takoma Park, Md.

The Oriental Institute
University of Chicago
Chicago, Ill.
December 24, 1943

Dear Miss Amadon,

I do not think that you yet appreciate the bases of my criticism of your thesis. You maintain that an increase in the waxing period means an increase in what you call the translation period. I agree in general (leaving out of consideration for the moment the latitude of the moon), but I reject as unwarranted the extent of the increase in the translation period which you are willing to give as the result of a slight increase in the waxing period.

You state that the moon's anomaly is the great factor in determining the length of the paschal period. Schoch says that the anomaly is of no more importance than the latitude (in the spring). Now I am not a professional astronomer, nor, I believe, are you. Schoch was, and his tables for the calculation of lunar visibility are approved by such men as Fotheringham and P. V. Neugebauer. Until you can quote eminent modern astronomers who believe Schoch's tables to be incorrectly compiled, I shall continue to use them and believe in their correctness.

I don't know what you mean when you say that Schoch "has the same figure" in 29 A.D. Schoch does not use the loose term "translation period" but instead gives accurately and precisely "the hours required for visibility" that is, the period which must elapse after conjunction before the crescent can be visible in the evening. It so happens that in 29 A.D. both you and he start Nisan 1 on the same day but that does not mean that he agrees with you thesis. However, if you wish, take the result for 31 A.D. where visibility precedes your date for Nisan 1 by two days. Do you or do you not accept Schoch's calculation here?

You are aware that I reject as unproven your theoretical connection between the passover and full moon, that is that passover must follow full moon. Your statement that it agrees with biblical dates means nothing in the absence of citation of such dates and proof of their relevancy. I fail to see how any date can be of real value, since not one is given in terms of the Julian calendar.

Very truly yours,

Richard A. Parker

Dr. R.A. Parker,
Oriental Institute,
Chicago University,
Chicago, Ill.

My dear Dr. Parker:

I went up to New York in December, have had the flu, and am therefore wofully behind in my correspondence. In your last letter you speak of the "loose" term translation period. This technical term is not original with me. I first found it in Scaliger, then later in Hevelius. Albiruni also has the expression.

It is uncertain when Dr. Pfeiffer will publish my answer to your criticism, but I have been hoping that it would be soon. I have quite fully covered the main features which you have touched upon, and will have to refer you to this article for the answers to the questions which you have repeated in your last letter.

With regard to your insistence that "Schoch says that the anomaly is of no more importance than the latitude (in the spring)", please consider the following statement by Schoch in Biblica, 1928, Vol. 9:

> "It is especially worthy of note that in the spring the necessary age depends much more on the average irregularity of the moon, "g", than on her geocentric latitude; that is, it is much more important that the moon is distancing itself as quickly as possible from the sun so as to reach a certain elongation." Karl Schoch.

If you read again his statement in The Venus Tablets of Ammizaduga, I think that you will find that you are misquoting him. At first reading I too gathered the same idea.

With regard to the Biblical synchronisms, THE MINISTRY has accepted a series from me on this subject, and I will send them on to you as they appear. That will be easier for me than to repeat the discussion by letter. Let us be friends, Doctor. We are both searching for truth, and I pray that we both find it. Please write me again.

Yours sincerely always,

February 4, 1944
4 Crescent Place
Takoma Park, Md.