

Astronomical Evidence for the Date of the Crucifixion.

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COLONEL MACKINLAY'S article in last July's *CHURCHMAN* may be taken as proof of the tenacity with which chronologers who have accepted the year 29, for the date of the Crucifixion, will endeavour to maintain their position. Bluntly and briefly, the date is impossible. It is hardly to be expected, however, that a chronology so ably and persistently advocated will be abandoned at once by scholars, of whatever eminence and distinction, who are unable to appreciate the full weight of the astronomical evidence against it. Even so, if the witness of astronomy were merely negative and destructive, I would be content to let the matter rest. There is, however, a positive value in the results of astronomical research. The uncertainty of the year of our Lord's Crucifixion is narrowed down to a choice between the two years 30 and 33; and what is even more important, the long-standing dispute as to whether the Passion occurred on the fourteenth or on the fifteenth day of Nisan is definitely settled—to the relief of all who look to the Gospel story for the fulfilment of the symbolism of Mosaic ritual and law.

In the year 29 there fell a conjunction of the sun and moon—just such a conjunction as occurs every month—on March 4. At Jerusalem the dawn was then coming on, though it was still night. Throughout the whole day following, the moon would certainly be lost in the rays of the sun. When next the thin crescent of the moon could be detected in the evening sky, a new month would begin. Colonel Mackinlay thinks it might be seen on the evening of the same day. To this we may reply that, if it were so, there was a sight seen that evening to which no parallel can be produced among all the records of ancient or modern astronomy. And, further, from a series of observations made for the special purpose of determining the limits of the moon's visibility, as well as from the empiric rules deduced by ancient astronomers accustomed to the working of

the Jewish Calendar, and from the calendar dates of the Babylonians and other nations wherever we have had the opportunity of testing them, we are bound to conclude that the moon was still absorbed in the radiance of the sun's glory, and would not be seen by the human eye till the evening following. At the next sunset, on March 5, the moon would be thirty-seven hours old, and standing sixteen degrees above the western horizon, and of its easy visibility then there can be no question.

So a new month began early in March, A.D. 29. It cannot have been Adar, the twelfth month of the Mosaic year. Colonel Mackinlay, and other supporters of his Crucifixion-date, take it for granted that the new month was Nisan, the month of the Passover. It seems almost unkind to suggest that in all probability it was Veadar, the intercalary month inserted seven times in nineteen years. Under ordinary circumstances, indeed, no one would have doubted that it was Veadar. However, for the purpose of their chronology, it is necessary for Colonel Mackinlay, and those who think with him, to assume an unusually early date for Nisan; and since I believe their chronology can be shown to be false on other and quite unmistakable grounds, it is hardly necessary to express any difference of opinion or judgment yet. None the less, I compliment Mr. Bothamley on the determination shown, in his useful little comment,¹ to maintain, in spite of all pleading, the natural date for the Mosaic New Year.

Granting therefore that this month may have been Nisan, and assuming for the present that it was so, let us see what becomes of Colonel Mackinlay's chronology. And first of all it must be definitely insisted that the commencement of the month was determined by actual observation of the moon, and by no artificial rule. On this point the Mishna is perfectly clear. The evidence of two independent witnesses, each of whom had actually seen the crescent, was required. Messengers hastened with the tidings to Jerusalem, and refreshment was provided for them on their arrival. On important occasions, such as the

¹ CHURCHMAN, May, 1911, p. 394.

first and seventh months, they were allowed even to profane the Sabbath, if need were, in order to make their tidings known. The supposition that the Jews may have used an arbitrary and sometimes inaccurate calendar, as different Christian Churches do for Easter, is but a desperate expedient of chronologers anxious to defend an impossible date. It is vain to cite artificial calendar rules invented centuries after the Jews had ceased to be a nation. Timid chronologers are afraid, however, that if the calendar depended on observation, and if observation were ever in doubt, discrepancies might sometimes result. They need have no fear! Such discrepancies actually occurred. Thus, on one occasion the famous Gamaliel, believing the messengers, cut the month Elul short with twenty-nine days; while the other Rabbis thought the message false, and wished to add a thirtieth day. Yet neither Gamaliel nor his opponents either knew or imagined any other rule than that dependent on direct observation, though the great Day of Atonement was at stake. Similarly, on another occasion it is reported of the zealous Rabbi Isaac that, being in doubt as to the true date of this Day of Atonement, he fasted two whole days instead of one, and died in consequence: and other instances of such doublings of fasts or festivals are on record. In this artificial age we live by artificial rules. We depend on calendars printed in books and on watches worked by a spring. The great clock of Divine workmanship, whose dial is on the firmament of heaven, and the infallible almanack that is graven on the spheres, are things of no account to us. Our month has long been divorced from the moon, and can by no means be reconciled to her. The men of the East were neither so mechanical nor so dull. When they celebrated the new moon, they saw God's signal for the feast in the western sky, and rejoiced to think He had lighted the first lamp at their festival.

The commencement of a month therefore depends on direct visual observation of the new moon. Mr. C. H. Turner has no authority for suggesting¹ the existence, in the time of

¹ "Dictionary of the Bible," i., p. 412.

Christ, of any rule limiting the month before Nisan to twenty-nine days. There seems to be some misapprehension, too, as to the method of observation employed. Thus, Colonel Mackinlay speaks of Jewish observers specially trained to search for the new moon with the naked eye. "Probably," he adds,¹ "they were among the most skilful of such observers who have ever lived," and then he goes on to speak of their "constant practice for hundreds of years from a fixed position"—all which would undoubtedly be a very great advantage to them, if the picture drawn were not the very opposite of the actual facts of the case. The Jews had no specially trained observers appointed for the purpose. Casual watchers of the sky they were, whose evidence was desired. Nor did they make use of a fixed point. The records speak, instead, of messengers of the common folk, shepherds and the like, coming in with their tidings from miscellaneous directions, out of all the country round. Am I right in suspecting the mind and inspiration of Mr. Maunder behind the pen of Colonel Mackinlay here? At all events, Mr. Maunder, in a letter to me on the subject, speaks of the thousand years' experience of the priests in looking for the moon from the tops of the Temple towers. Alas! this is but a vivid imagination, fired by too intimate acquaintance with the ways of Greenwich Observatory. The priests were not the astronomers, and the Temple towers were not the points of observation. The plain and simple testimony of the country folk to a common and familiar object in the sky was what the Rabbis and the priests desired. Best of all it was when the moon was clearly visible to everyone who looked. Occasionally, as we know, but only very rarely, a little doubtfulness might arise; but, as a rule, when anybody saw the moon everybody might see it. And certainly there could be no opportunity for doubt on March 4, A.D. 29; and there would be no room for doubt on March 5.

Is it possible for us to determine the circumstances under which the moon could be seen? I think it is, within very narrow

¹ CHURCHMAN, July, 1911, p. 512.

limits. The crude rule dependent only on the moon's age has been found a broken reed ; yet, as a matter of fact, even that elementary rule is not very far from the truth in the case of the month Nisan. At the spring equinox the ecliptic approaches very nearly to the prime vertical of Jerusalem, at sunset, and cuts the horizon at an angle of eighty-two degrees. This accounts for the good results obtained by Salmon's rule, to which Mr. Bothamley has already drawn attention. And though the efficiency of the rule is somewhat in the nature of a fortunate accident (for it might be very misleading at any other season of the year), yet it is right to acknowledge once more the credit that is due to Salmon. A much better rule is obtained by calculating the distance between the sun and moon at sunset. Roughly speaking, there should be twelve degrees of arc between the luminaries. If more, the moon should certainly be visible ; if less, we should not expect to see her. Mr. Maunder has kindly illustrated the effect of the rule by a diagram.¹ When the new moon is directly, or almost directly, above the setting sun—as is always the case at Jerusalem in March—the line of limiting visibility is clear and distinct. When the moon stands far to the south (a circumstance that does not affect the present inquiry) the line may be a little less easy to define. For a "line," taking the strict Euclidian definition, Colonel Mackinlay suggests there should be a "band," across which the visibility is doubtful. The correction, of course, is just, though hardly important. It is gratifying to notice how narrow the band will be. The chronologer need not fear any disturbance of his reckoning by the introduction of a large element of uncertainty.

It is worth remarking, perhaps, that my brother's calculation has resulted less in the discovery of a new law (though it appears to have been unknown to any living chronologer) than in the rediscovery and independent confirmation of a very ancient rule. My brother's line is practically identical with that drawn by the almost forgotten Maimonides, in illustration of this very problem of the commencement of the Jewish month. According to

¹ See the *Journal of the British Astronomical Association*, June, 1911, p. 361.

Pliny, indeed, the moon becomes visible when *fourteen* degrees distant from the sun. Possibly Pliny may not have had the opportunity of observing it closer, and he certainly had not the same practical interest in the lunar calendar; but the fact that he gives a higher number than the rule requires, suggests that watchfulness was needed to catch the moon even at twelve degrees' distance. It is more important to notice that Theon, Alfraganus, and Albategnius all make a distance of twelve degrees the limit of visibility. From the two last at least we have every reason to expect accurate knowledge; because of their interest in, and personal experience of, the Arabian Calendar. This was framed on the same principles as the Jewish, and was governed, like it, by direct observation of the crescent moon. In my previous paper I referred only to modern observations that may easily be verified; but the rule is supported by the verdict of the centuries, and by the astronomers of those very nations amongst whom the calendar was in use.

My brother's investigation was the subject of some criticism by Mr. Maunder in a paper read before the British Astronomical Association last May. It is necessary to remark, however, that my brother and Mr. Maunder had different objects in view. The former was aiming at a working rule for the guidance of chronologers. Mr. Maunder appeared to be more interested in the optical question of the smallest phase under which the moon had ever been seen by the best observer on the clearest evening. Hence, he naturally objected (and in this Colonel Mackinlay somewhat unreasonably follows him) to the citation of instances where, from its altitude, the visibility of the moon could be in no manner of doubt. From a purely optical point of view, of course, such cases are unimportant, and they may even be dismissed as irrelevant to the inquiry. But to the chronologer such instances are very important indeed; they illustrate how late the moon sometimes was in making its appearance, and how many hours might have to elapse before the crescent could be seen. Similarly, Mr. Maunder esteemed negative instances as less important than positive. But again the chronologer must

differ. It is just as important to know how long the old month might be expected to last, as to discuss how soon the new month might begin. But in spite of all differences, as soon as I saw Mr. Maunder's diagram on the screen¹ I felt it would be asking too much of Providence to seek any stronger confirmation of the rediscovered law.

Among the seventy-six observations recorded by Mommsen there are only two nominal exceptions. One of them is a case of extreme southern elongation, amounting to more than twenty degrees ; the other is a morning observation. Now, morning and evening observations differ in many remarkable ways. The evening air has been warmed by many hours of continuous sunshine, and is in a disturbed condition ; the morning air is cold and still. Astronomers always find the morning the best time for lunar observation, and the evening the worst. And if astronomers be deemed to be men of little worth, let Colonel Mackinlay take the testimony of Mr. Graham White, or some other Dædalus of this flying age, to the same effect. The fact is that Schmidt's observations provide no real exception at all, that could in any way shake the conclusion we have formed as to the commencement of Nisan. But though the general accuracy of the rule has been established, even beyond expectation, it is not very wonderful that some exceptions should somewhere be found. Mr. Maunder himself cited nine further instances of the appearance of the thin crescent of the young moon. The attendant circumstances, of course, were favourable for observation ; and that the appearance of the moon was surprising or unexpected is sufficiently proved by the record of the case. In eight of these instances the moon lay immediately below the line designed by my brother, or just within the extremely thin "band" that Colonel Mackinlay would substitute for a line ; but in none of these eight cases was the moon more than three-fifths of a degree below the line, which itself is never less than twelve degrees from the sun. Thus, the exceptions occurred exactly where the line indicated that they might be expected, and their tendency is to

¹ *Journal of the British Astronomical Association*, June, 1911, pp. 346, 355.

confirm the rule rather than refute it. The rule of Maimonides, which allows an approach to within eleven degrees of the sun under favourable circumstances, would actually include these cases.

The ninth case cited by Mr. Maunder is more remarkable. After long waiting, an instance of visibility has been found, when visibility was not to be expected. Colonel Mackinlay is entitled to make the most of it; though not even so can he make so much of it as would justify us in accepting a theory dependent on any supposed visibility of the moon on March 4, A.D. 29. The case in point is that of Mr. Horner's observation of the moon at Tunbridge Wells on February 10, 1910. To cautious critics it might seem precarious to base a chronology on the possible repetition of an instance so completely unique. But we have more to say than that. Not even Mr. Horner's observation, remarkable though it is, will serve Colonel Mackinlay's purpose. Let us compare the two cases:

	1910, Feb. 10.	29, March 4.
Age of the moon 16 hours 13½ hours
Distance from the sun 9·7° 8·2°

Two hours and a half in age is a very material difference in the case of a moon so young. A degree and a half (three moon's-breadths) nearer the sun is a long distance indeed to overstep the limit of all recorded observation. And, further, what Colonel Mackinlay does not tell, Mr. Horner found his moon through a telescope! I hasten to add that, having once found the moon with the telescope, he was subsequently able to see it with the naked eye—pale, thin, and white against the twilight. But that is an experience to which any coastguard could find plenty of parallels every day.¹ The analogy between the two instances breaks down in every particular, save where it adds to the difficulty or impossibility of accepting the Crucifixion-date of 29. The records of the centuries have been searched diligently for

¹ Similarly, the planet Uranus, though within the power of the naked eye, escaped discovery for six thousand years till Herschel's telescope revealed it.

any instance in ancient or modern astronomy that will justify the date, but hitherto they have been searched in vain.

The other questions raised by Colonel Mackinlay are equally beside the point: "The atmosphere of Palestine is much clearer than that of England."¹ As a rule, I suppose it is so. That is to say, an ideal atmosphere for observing is more often obtained in Palestine than in England. But how often can more favourable circumstances have been found than in Tunbridge Wells when Mr. Horner saw the thin crescent of February, 1910? And in any case the comparison should not be with England, but with Athens, with Babylon, and with Arabia. It is from the countries immediately surrounding Palestine that this "rule of the twelve degrees" is taken, and we need have no hesitation whatever in applying it to Judea in the time of Christ. Or again: "In the latitude of Jerusalem darkness comes on after sunset more rapidly than in England, or even in Athens; consequently, the new moon can be seen more easily in Palestine than in the other two countries."² But surely this is a slip, or else Mr. Maunder's assistance must have failed his friend for once. The same cause that hastens the fall of night, will also hasten the descent of the moon from a given altitude to the horizon. The law has been expressed in terms independent of latitude and longitude; and where the sun sinks swiftly, so also does the moon. Nor is there any advantage gained by emphasizing, even with italics, the fact that the Jews "must certainly have known, very approximately, *where* to search for the new moon in the heavens."³ One would almost imagine Colonel Mackinlay intends to accuse Schmidt of *not* knowing where to look. As a matter of fact, in cases likely to be difficult, Schmidt calculated the position of the moon in advance, and thus he knew, not "very approximately," but "exactly" where to search for it; and in doubtful cases he turned his telescope upon the calculated spot. As with Mr. Horner, so also with Schmidt, the advantage lay wholly with the modern astronomer. But not even so can

¹ CHURCHMAN, April, 1911, p. 511.
Ibid., p. 512.

² *Ibid.*, pp. 511, 512.

evidence be found that will justify our acceptance of a Crucifixion-date of 29.

Though somewhat outside the scope of astronomical investigation, I am bound to take up briefly Colonel Mackinlay's challenge with regard to the external historical evidence for the date of the Crucifixion. Evidence, in the strict sense of the word, is hardly to be found. Accurate knowledge seems to have perished with the last of the Apostles. Even in the second century the date was doubtful. The early Christians depended, like ourselves, on the scanty chronological references in the Gospels.

Still, there are some few authorities that we may cite. The earliest is Phlegon, who assigns the darkness and the earthquake (in terms that seem to leave no doubt the Crucifixion is meant) to the fourth year of the two hundred and second Olympiad. As the season was spring, the year indicated would be A.D. 33. Similarly, Eusebius, the first and greatest of Church historians, assigns the ministry of St. John the Baptist to A.D. 29, the Baptism of our Lord to A.D. 30, and the Crucifixion to A.D. 33. These are the very dates suggested by myself in the *CHURCHMAN* last April. On the present occasion, however, since my object is purely astronomical, I must be content to leave a free choice between the Crucifixion-dates of 30 and 33. Now for those other Fathers who led Clinton astray, and in whose wake Mr. Turner and Colonel Mackinlay still follow. The Western Fathers generally give as their date March 25, A.D. 29. This date is unquestionably wrong. For if the Passover fell in March (and not April) in 29, it would be over before the 25th of the month. The full moon was past, the firstfruits had been offered, and the harvesters were busy in the field. Accordingly, chronologers who want this year can do no other than accept half their witnesses' evidence and reject the rest. But in reality the date (March 25) is the key to the position and the cause of the error. It was quite common to date important ecclesiastical festivals on the octave before the kalends of a month. Three of our four quarter days (Christmas, Lady Day, and Mid-

summer) are so dated still, together with other of our principal Holy Days. Similarly, the Crucifixion came to be dated, quite erroneously, on March 25. But if the Latin Fathers were ill-acquainted with the phases of the moon, the Julian Calendar made it an easy matter for them to calculate the days of the week. "Under Pontius Pilate" March 25 fell twice on a Friday—in 29 and again in 35. And hence, I suppose, the erroneous tradition arose. The Greek and Oriental Fathers were hardly affected by it.

I will not at present deal with the question of our Lord's Birth, for I am not without hope that it may still be possible to approach it on a new side, when our knowledge of Eastern astrology enables us to deal to better effect with the Star of Bethlehem. It must be enough to say that the preponderant opinion hitherto has been, and apparently still is, in favour of 4 or 5 B.C. rather than 8. I am certainly inclined to favour 5 B.C. myself. Confining ourselves, however, to the Crucifixion, astronomy leaves us only three Fridays for the fourteenth of Nisan, and excludes the fifteenth of Nisan altogether. We may reject as too early the Friday that fell on April 11, A.D. 27. The two dates between which we have to decide are April 7, A.D. 30, and April 3, A.D. 33. Of the two, my personal preference is for the latter. There is no third choice.

