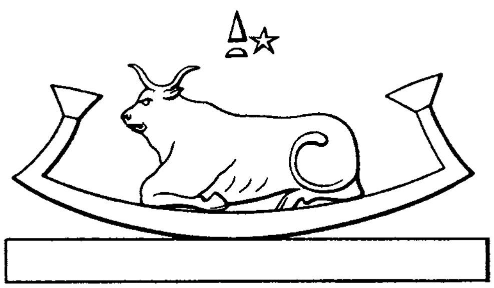
THE ORIENTAL INSTITUTE OF THE UNIVERSITY OF CHICAGO

STUDIES IN ANCIENT ORIENTAL CIVILIZATION · NO. 26

THOMAS GEORGE ALLEN, *EDITOR* · ELIZABETH B. HAUSER, *ASSOCIATE EDITOR*

THE CALENDARS OF ANCIENT EGYPT



BY RICHARD A. PARKER

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PREFACE

Early in the course of my work on the text volume to Medinet Habu III: The Calendar, a project upon which Dr. Harold H. Nelson and I intend to collaborate, it became evident to me that I could not successfully grapple with the problems of Ramses III's temple calendar without a thorough investigation into all the calendarial phenomena of ancient Egypt. Once started, my own predilection for the subject led me farther and farther, so that what was originally intended as a page or two of footnotes has grown to the proportions of the present volume.

Not all of what I shall present in these pages is new. My obligations to those chronological giants, Brugsch, Meyer, and Borchardt, are manifold; and I have ransacked the literature in order to avoid claiming as my own what had long ago been proposed. For some earlier proposals I have more proof to offer and may convince where others failed. Other propositions are mine and must stand on their own merits.

Calendars and chronology are not of themselves difficult subjects, but they are frequently made so by the assumption of their devotees that everyone understands always what they are talking about. I intend to take the opposite extreme and shall assume almost no special knowledge on the part of my readers. I shall not shrink from extended explanation or from repetition whenever understanding may be furthered. In the Introduction I shall present some of the basic astronomical and calendarial concepts with which we shall have to deal in later pages. Practiced chronologers may go on to the first chapter without concern, but I would urge all others to read the Introduction carefully.

In the following pages I hope to demonstrate that the Egyptians had three calendars, two lunar and religious, one civil. I shall begin with a consideration of the lunar day and month, pass on to an analysis of the later lunar calendar, then discuss the probable nature of the early lunar calendar, and, finally, suggest a possible origin for the civil calendar. In three excursuses I shall offer solutions to various problems which arose naturally out of the calendarial material.

The end product of our investigations will be, I hope, to persuade the reader to accept my present conviction that the lunar calendar is an essential key to a proper understanding of Egyptian festivals and thus in some measure of Egyptian religion.

In the preparation of these studies I have had the inestimable advantage of frequent discussion with my colleagues in the Oriental Institute. Professor Henri Frankfort permitted me to present my views for the criticism of his seminar. Professors John A. Wilson and Keith C. Seele and Dr. G. R. Hughes read the manuscript in preliminary form and made many valuable suggestions. Professors Otto Neugebauer of Brown University and William F. Albright of Johns Hopkins University gave penetrating criticism. My debts to Dr. Abd el-Mohsen Bakir of the Cairo Museum and to Professor G. Posener are acknowledged on the appropriate pages. Dr. T. George Allen has given me welcome editorial criticism. The drawings are the expert and painstaking work of Sue Richert. To all of them and to others not named I am deeply grateful.

RICHARD A. PARKER

Brown University
May, 1950

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LIST OF ABBREVIATIONS

AJSL	American Journal of Semitic Languages and Literatures . . . . Chicago, etc., 1884-1941. 58 v.
Ann. Serv.	Egypt. Service des antiquités. Annales. Le Caire, 1900——.
BASOR	American Schools of Oriental Research. Bulletin. South Hadley, Mass., 1919——.
JAOS	American Oriental Society. Journal. Boston, etc., 1849——.
JNES	Journal of Near Eastern Studies. Chicago, 1942——.
LD	Lepsius, Richard. Denkmaeler aus Aegypten und Aethiopien . . . . Berlin, 1849-56; Leipzig, 1897-1913. 19 v.
MH	Chicago. University. Oriental Institute. Epigraphic Survey. Medinet Habu I——. Chicago, 1930——.
OLZ	Orientalistische Literaturzeitung. Berlin, 1898-1908; Leipzig, 1909——.
PSBA	Society of Biblical Archaeology, London. Proceedings. London, 1879-1918. 40 v.
Urk.	Urkunden des aegyptischen altertums . . . . Leipzig, 1903——.
Wb.	Erman, Adolf. Wörterbuch der aegyptischen Sprache, im Auftrage der deutschen Akademien hrsg. von Adolf Erman und Hermann Grapow. Leipzig, 1926-31. 5 v. Same. Die Belegstellen. 1. Heft. Leipzig, 1935. 2. Bd., Heft 1——. Leipzig, 1937——.
ZAS	Zeitschrift für ägyptische Sprache und Altertumskunde . . . . Leipzig, 1863——.

INTRODUCTION

§1. Since the astronomical problems with which we shall deal in this book are almost entirely lunar, I shall describe as simply as I can the more important aspects of lunar motion. Before we turn to that, however, a certain amount of groundwork is necessary.

§2. THE CELESTIAL SPHERE. In Figure 1 we have the earth shown at the center of a much larger sphere, upon which we may assume are located all the stars and planets without regard to their actual varying distances from the earth. We shall call this the celestial sphere. We know that the earth itself is a sphere rotating around an axis with north (N) and south (S) poles. At right angles to this axis is a great circle (WE) whose plane passes through the center of the earth. This circle we call the equator.

§3. By extending to the celestial sphere the axis and the equator of the earth, we have celestial poles (N',S') and a celestial equator (W'E'). It is true that our earth moves around the sun; but the sun is the only star around which the earth revolves, and all the others are so vastly distant that the movement of the earth has no appreciable effect on the location of the celestial poles or the celestial equator.

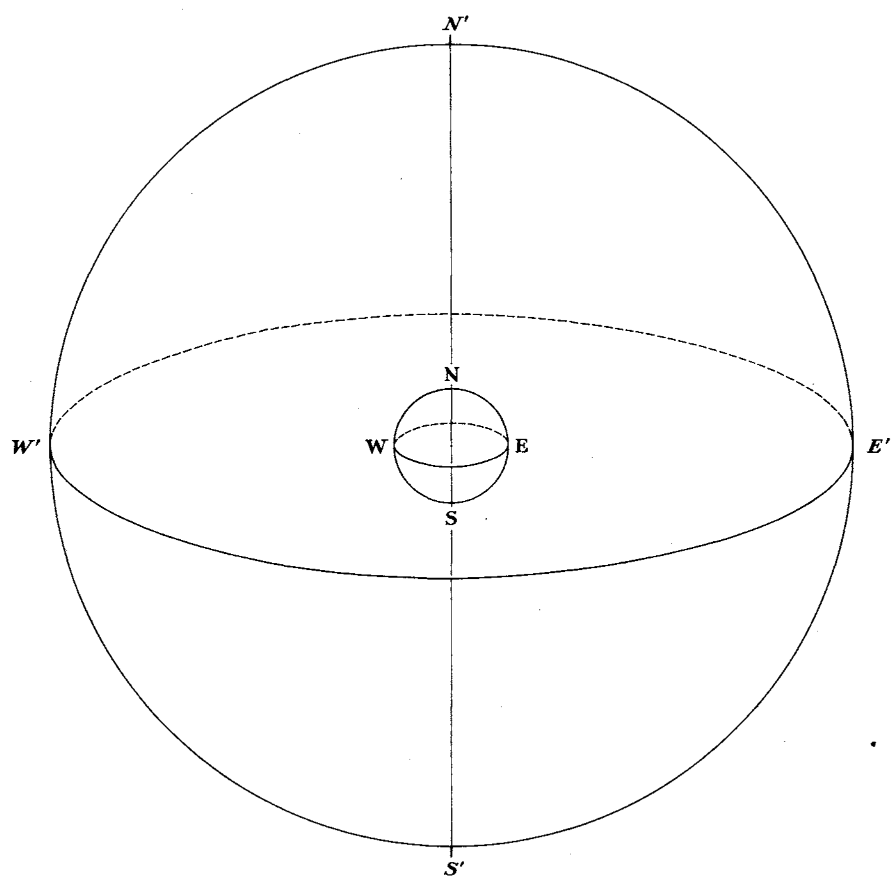


FIG. 1.—The celestial sphere with the earth at its center.

§4. THE ECLIPTIC. Owing to the rotation of the earth on its axis, in the daytime the sun rises in the east and sets in the west. At night the stars, or at least some of them, rise in the east and set in the west. Some stars, to be sure, never rise and set but simply revolve about the pole. Now, if the sun were dimmed sufficiently, we should see it and the stars in the daytime rise and set; but, because the earth goes around the sun, it would be seen, from the earth, against a slightly different background of stars from day to day. Figure 2 is the celestial sphere seen from above, with the sun at the center and the earth in its orbit. When the earth is at a, the sun would be seen against the celestial sphere at a'. One day later the earth would have moved to b, and the sun would be seen at b'. After about 91 days, the earth would have moved to c, one-quarter around its orbit, and the sun would be seen at c'. In a year the earth would have moved entirely around the sun, and the sun in turn would have apparently moved in a complete circle among the stars. This apparent path of the sun is called the ecliptic.

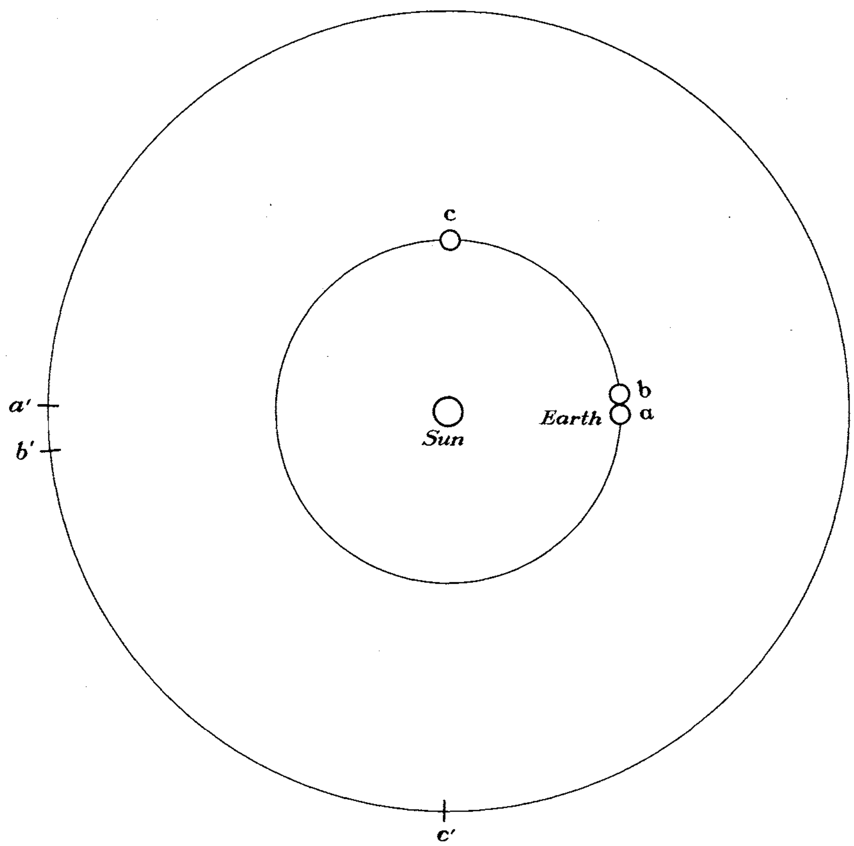


FIG. 2.—The celestial sphere with the sun at its center and the earth in its orbit around the sun, to demonstrate the ecliptic.

§5. THE VERNAL POINT. Both the ecliptic and the equator are great circles on the celestial sphere with the earth at their center. These two circles are shown in Figure 3. Corresponding to the tilt of the earth's axis of 23 1/2°, the plane of the ecliptic makes an angle of 23 1/2° with the plane of the equator. One half of the ecliptic belongs to the Northern Hemisphere, one half to the Southern Hemisphere. The point where the ecliptic, going from south to north of the equator, intersects it is called the vernal point (♈) or the spring equinox. It is from this point that the zodiac and the positions of sun and moon (longitude) on the ecliptic are measured.

§6. THE MOON. The path of the moon around the earth varies but is never farther than 5° 8' from the ecliptic. While the sun apparently goes round the ecliptic but once a year, the moon actually goes round it twelve and a fraction times; and every time it does so we have a lunar month.

§7. LUNAR MONTHS. When the sun and moon are at the same point on the ecliptic (in other words, when the sun, moon, and earth are in a line), we have the moment called conjunction. The moon moves around the ecliptic and back to its starting point in from 27.18 to 27.47, on the average 27 1/3, days, a sidereal month. In that time, however, the sun itself has moved, and it takes the moon about two days more to catch up with it again for conjunction. The time from conjunction to conjunction (or from full moon to full moon) is called a synodic month, and it averages 29.53059 days. Lunar calendars are always based on synodic months.

§8. Another way of explaining these two terms is illustrated in Figure 4. In A the sun, moon, and earth are in line with a star on the celestial sphere, and the moon is at point c in its orbit (here shown as a simple circle). In B the moon has gone completely around the earth and has reached c again, in line with the same star. This is

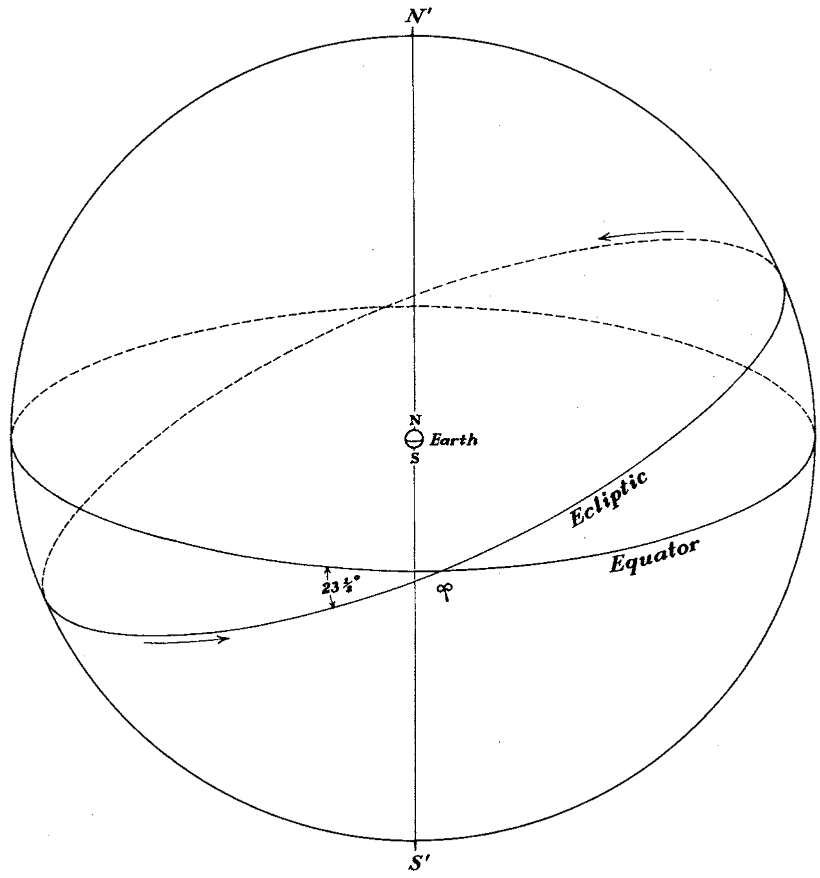


FIG. 3.—The vernal point, where the ecliptic, going from south to north, crosses the equator.

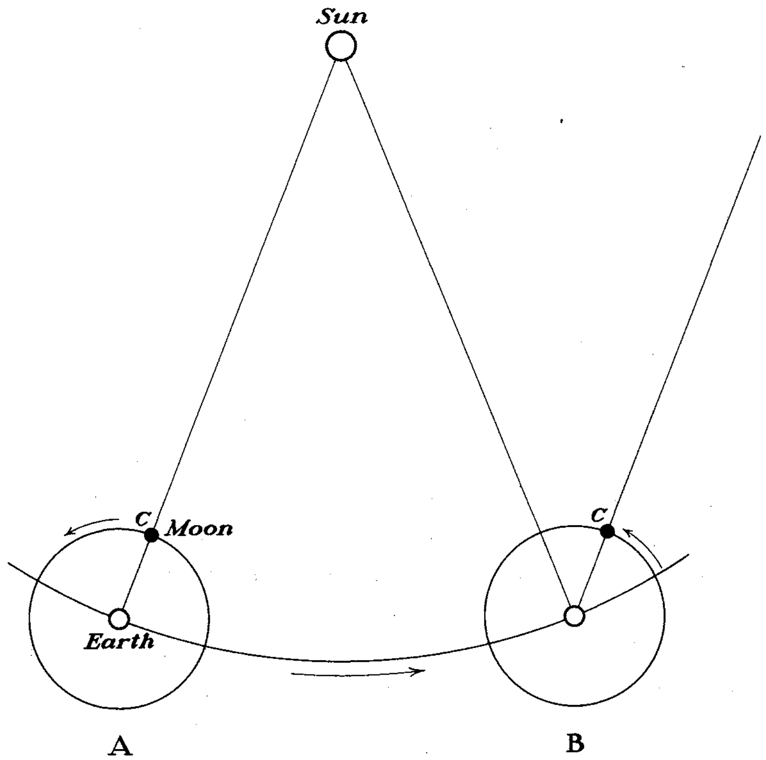


FIG. 4.—The sidereal and the synodic months.

the sidereal month. But, since the earth itself has moved during these days along its orbit, the moon is obliged to travel about two days more before it is again in line with the sun. When it is again in line, a synodic month has elapsed.

§9. THE SYNODIC MONTH. It has been stated that the synodic month averages 29.53059 days. Some months may be longer than that and some shorter. Like the orbit of the earth about the sun, the orbit of the moon is an ellipse. When it is closest to the earth (perigee), it is 221,463 miles away. When it is farthest (apogee), it is distant 252,710 miles. When the earth is farthest from the sun (aphelion) and the moon at conjunction is at perigee, the moon will be traveling faster (since every satellite travels fastest when nearest the primary body) and will have less distance to travel from the point c (where it has completed a sidereal month) to conjunction than when the earth is nearest the sun (perihelion) and the moon is at apogee. In Figure 5, A illustrates the first situation and B the second. The shortest possible synodic month is 29.26 days and the longest 29.80 days.

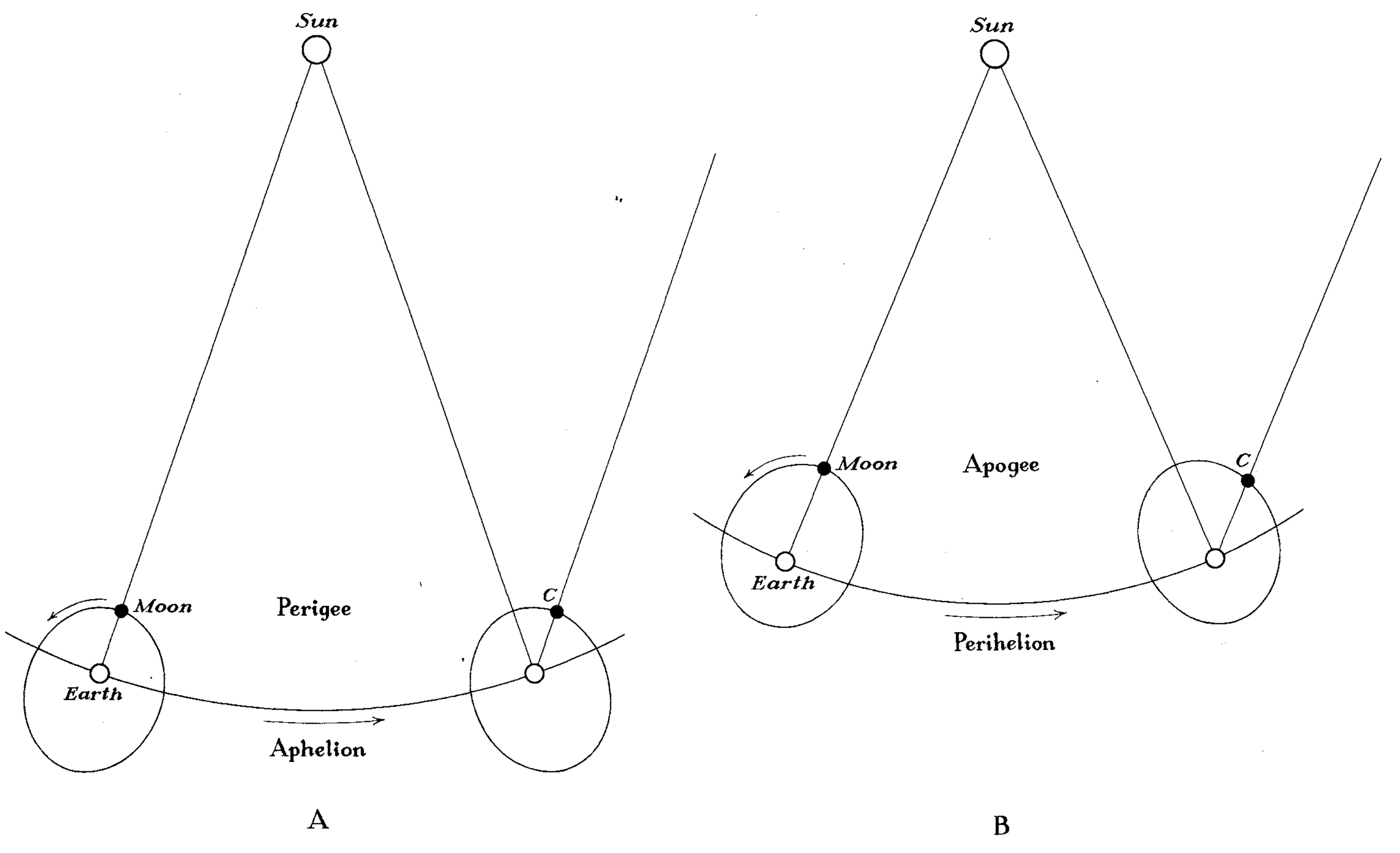


FIG. 5.—The variation in the length of the synodic month.

§10. THE PHASES OF THE MOON. The moon shines by light reflected from the sun. Conjunction (when the sun, moon, and earth are in line) is a purely astronomical event, not visible to man (except, of course, when it causes an eclipse). It may occur at any hour of the day or night. In 24 hours after conjunction the moon will have moved on the ecliptic slightly more than 12° away from the sun. This may be sufficient for it to be visible as a thin crescent in the western sky after sunset. When the moon has moved 90° from the sun, it is at first quarter. At 180° it is directly opposite the sun, and we have full moon. At 270° we have third quarter, with the moon visible only in the latter part of the night. Then it draws closer and closer to the sun, until one morning just before sunrise it is visible, again as a thin crescent, for the last time before conjunction.

§11. NEW CRESCENT VISIBILITY. Since conjunction is invisible, the lunar month began for most primitive people with the reappearance of the moon as a crescent. The time that must elapse after conjunction for visibility to be possible is variable. At Babylon (lat. 32.5°), it varies from a minimum of 16.5 hours to a maximum of about 42.[1] The factors which control this are three: the anomaly of the moon (its distance from the earth), the obliquity of the ecliptic (its angle with the celestial equator), and the latitude of the moon (its distance north or south of the ecliptic). We shall consider each in turn.

§12. Figure 6 illustrates the effect of the anomaly of the moon on crescent visibility. After conjunction, in both diagrams the moon travels the distance to c in 24 hours. At apogee the moon travels less rapidly than at perigee, and this, combined with its greater distance from the earth, results in a smaller angle between sun, earth, and the moon than at perigee. Consequently, at perigee the moon will be relatively farther away from the sun at sunset and more likely to be visible.

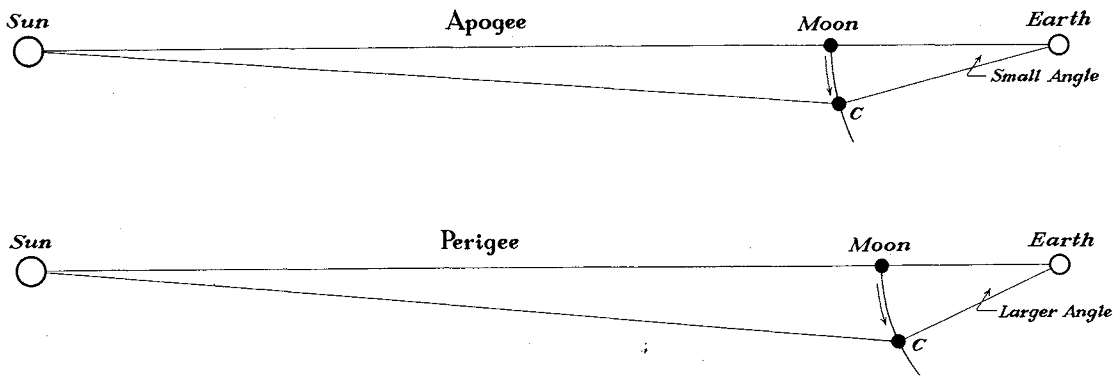


FIG. 6.—The effect of the anomaly of the moon on crescent visibility.

§13. In Figure 7 the effect of the obliquity of the ecliptic is diagrammed. In March, at the vernal equinox, the sun moves to the north of the celestial equator on the ecliptic, which has a higher angle with the horizon by 23 1/2° than the equator has. In diagram A the sun and moon are so close together that no visibility is possible. One day later, in B, the moon has dropped back another 12° (about 50 1/2 minutes) from the sun, and the resulting effective distance (a-b) is great enough for visibility.

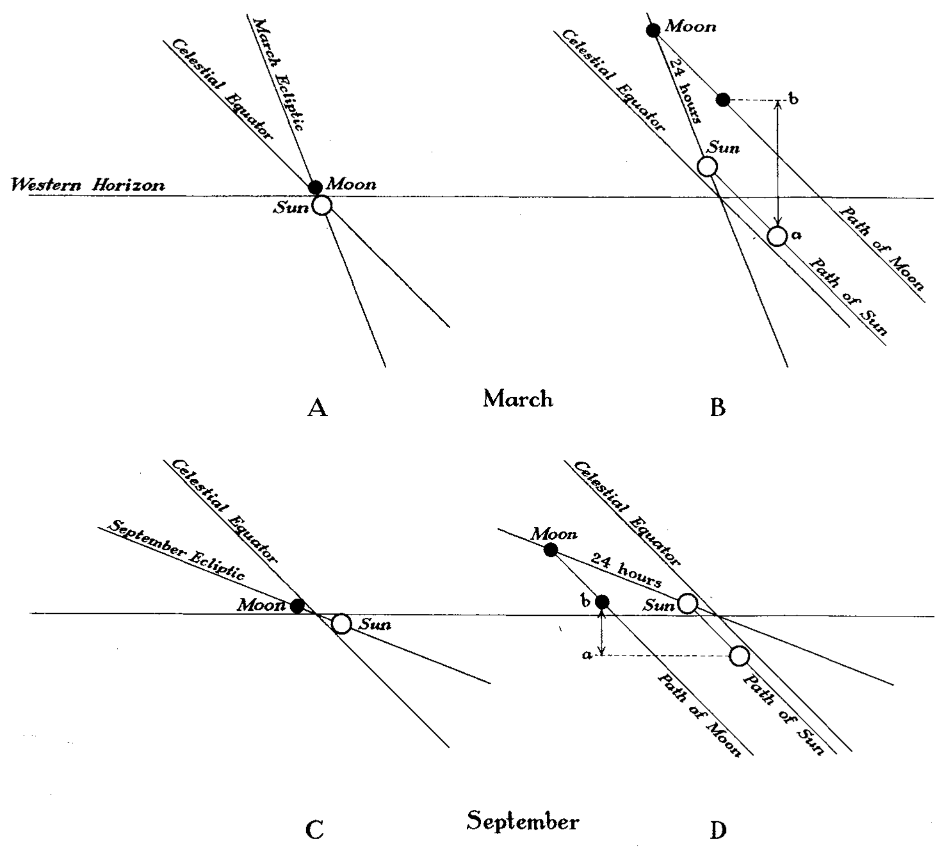


FIG. 7.—The effect of the obliquity of the ecliptic on crescent visibility.

§14. In C we have the September counterpart of A. The sun is now moving to the south of the celestial equator on the ecliptic, which is now 23 1/2° lower toward the horizon than the equator. The moment is just after conjunction, and no visibility is possible. In D , one day later, the moon has dropped back the same distance as in B along the ecliptic, but its effective distance from the sun (a-b) may still be too small to permit visibility.

§15. The effect of the latitude of the moon is pictured in Figure 8. Diagram A is based on Figure 7 B and shows the possibilities of the moon being 5° north or south of the ecliptic on the effective distance between sun and moon in March. B reflects the situation in Figure 7 D, again with the moon both north and south of the ecliptic. Its bearing on the effective distance between sun and moon in September is obviously much greater. Schoch comments: "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."[2]

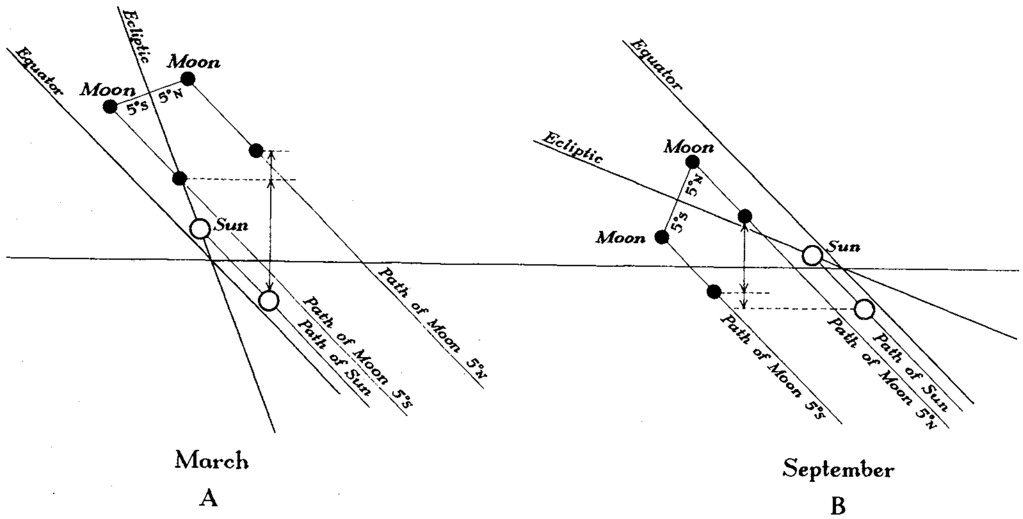


FIG. 8.—The effect of the latitude of the moon on crescent visibility.

§16. One factor, independent of the motion of the moon, which also affects crescent visibility is the latitude of the observer. The farther north one goes, the lower in the sky will appear the celestial equator, and the lower, both in March and in September, will be the angle of the ecliptic with the horizon and the smaller will be the distance a-b. I have given above the minimum and maximum hours required for visibility at Babylon as stated by Schoch. He also gives the figures for a place in latitude 51°N., and they are 20 hours minimum and 63 hours maximum.[3]

§17. OLD CRESCENT VISIBILITY. All the factors which combine to produce the great variability in time required after conjunction for visibility of the new crescent also affect the last visibility of the old crescent. Generally speaking, the time from last possible visibility of the old crescent to conjunction is the same as the time required after conjunction for first visibility of the new crescent. It may be a little more or less, depending upon the trend of the factors affecting visibility.

§18. SEQUENCE OF LUNAR MONTHS. If the length of the synodic month were exactly 29.5 days, and the time required for crescent visibility were a constant, we should have a regular succession of lunar months with first 29 days and next 30, then 29 again, and so forth. Since, however, the length of the synodic month varies and the time required for crescent visibility also varies, it is quite possible to have two 30-day months or two 29-day months in a row. When the synodic month is below average length and the time required for visibility is small, it is possible to have three 29-day months in a row. Conversely, when the synodic month is lengthening beyond the average and the time required for visibility is also lengthening, it is possible to have three, at times four, and very rarely five 30-day months in a row.[4]

§19. FULL MOON. The time required from conjunction to full moon is also variable. In Figure 9 A the moon travels through perigee from conjunction to full moon, and the time is shorter because the distance is less and its speed is faster than in B, where it travels through apogee. The necessary time for full moon varies from 13.73 to 15.80 days after conjunction.

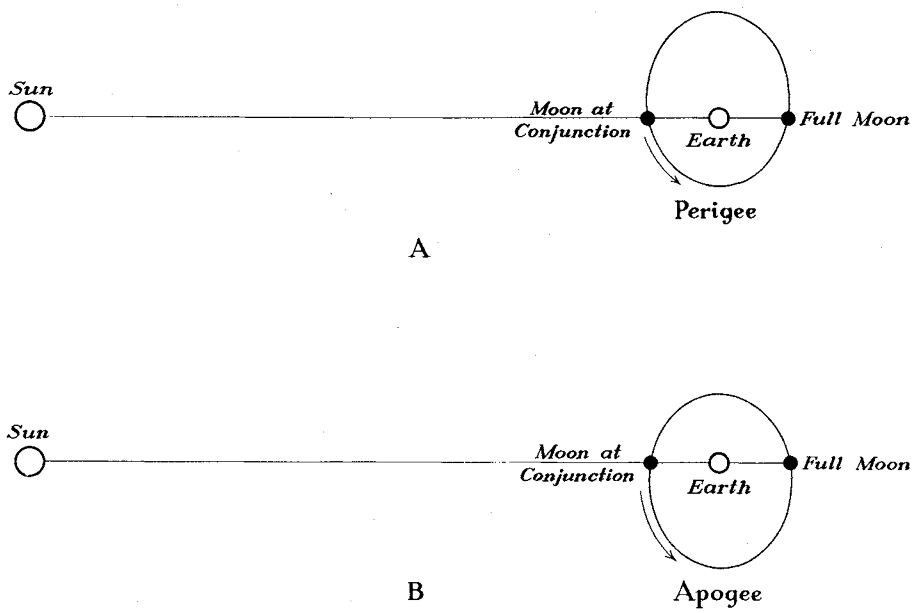


FIG. 9.—The variability of time between conjunction and full moon.

§20. TABLES FOR CALCULATING THE MOON. The best and easiest tables to use in calculating conjunction are those of Carl Schoch in Langdon and Fotheringham, *The Venus Tablets of Ammizaduga* (London, 1928). They are for Babylon, but a correction for difference in longitude is easily made. His Table G may be used for an approximation of the time from conjunction to new crescent or from old crescent to conjunction. Since all Egypt lies south of Babylon, the time required in either case will not be greater than the figure derivable from Table G. Any doubtful case may be checked by the use of tables E 21-26 in P. V. Neugebauer, *Astronomische Chronologie* (Berlin and Leipzig, 1929), both for old and for new crescent. The elements Θ (the longitude of the sun), λ (the longitude of the moon), and β (the latitude of the moon), which are necessary for the calculation, may be conveniently derived from Carl Schoch's *Planetentafeln für Jederman* (Berlin, 1927) or from P. V. Neugebauer's *Tafeln zur astronomischen Chronologie* (Leipzig, 1912-25).

§21. HELIACAL RISING OF SIRIUS. Aside from the moon, we shall be concerned in this book only with the star most important to the Egyptians, Sirius, or Sothis, as the Greeks rendered its Egyptian name. The stars which rise and set have, like the moon, conjunctions with the sun, and, like the moon, they are invisible when near conjunction. This is not, of course, because they shine by reflected light, but because the sun is so much brighter than any star that it simply swallows up the star's light. Unlike the moon, each star has but one conjunction a year, and its period of invisibility is much greater than the moon's. That is because the sun apparently moves among the stars at a rate of about 1° a day (about four minutes) and various other factors, such as distance from the ecliptic, also have a bearing. Sirius is invisible for a period of 70 days. There comes a time, however, when the sun has dropped back from it enough so that it is again visible in the dawn, just before sunrise, above the eastern horizon. This event is called its *heliacal rising*, and the factors that govern it are the *arcus visionis* (β), that is, the height of the star above the horizon which is necessary for visibility, and the latitude of the observer (ϕ). In Egypt, generally speaking, an advance southward by 1° of latitude means a heliacal rising of Sirius earlier by one day. The experimental data we now have for β, though limited, give it a range from 9.4° to 8.6°.[5] For Heliopolis (ϕ = 30.1°) and Memphis (ϕ = 29.9°) these values result in a heliacal rising on July 17-19 (Julian) throughout Egyptian dynastic history.

§22. THE CIVIL CALENDAR. In the following pages when the term *civil calendar* (abbreviated "civ.") is used, it will mean the familiar Egyptian year of 365 days, comprised of three seasons, with four months each, 30 days to each month, with the 5 extra days called *epagomenal* after the twelfth month. Dates in this calendar will be given in the form II *prt* 23 (meaning the second month of the season *prt*, day 23). In the New Kingdom and later the months were sometimes referred to by names (§§226-30 and Table 7). These are:

First Season	Second Season	Third Season
ꜣḫt	prt	šmw
1. Thoth	5. Tybi	9. Pachons
2. Phaophi	6. Mechir	10. Payni
3. Athyr	7. Phamenoth	11. Epiphi
4. Choiak	8. Pharmuthi	12. Mesore

§23. OTHER CALENDARS. The Alexandrian calendar (abbreviated "Al.") is simply the civil calendar arrested in its forward shift by the addition of a sixth epagomenal day every fourth year. Whether this calendar was instituted in 30 or in 26 B.C. is still in dispute;[6] but in its actual working Thoth 1 (I ꜣḫt 1) Al. begins on August 29 (in leap year August 30), and this was the situation obtaining in 26-23 B.C.

§24. In 46 B.C. Julius Caesar introduced the Julian calendar, which is the same as our modern Gregorian calendar except for the fact that no leap years are ever passed over.[7] The Julian calendar, projected backwards, is the one customarily used to express dates in ancient history and for astronomical calculations. When, for the sake of the exact season of the year, it is desired to convert a Julian date into the corresponding Gregorian date, recourse may be had to Table 1.

TABLE 1

CONVERSION OF JULIAN INTO GREGORIAN DATES

From Mar. 1	To Feb. 29	Subtract in Days	From Mar. 1	To Feb. 29	Subtract in Days
3701 B.C.	3501	29	701 B.C.	601	7
3501	3401	28	601	501	6
3401	3301	27	501	301	5
3301	3101	26	301	201	4
3101	3001	25	201	101	3
3001	2901	24	101	A.D. 100	2
2901	2701	23	A.D. 100	200	1
2701	2601	22	200	300	0
2601	2501	21			Add in Days
2501	2301	20	300	500	1
2301	2201	19	500	600	2
2201	2101	18	600	700	3
2101	1901	17	700	900	4
1901	1801	16	900	1000	5
1801	1701	15	1000	1100	6
1701	1501	14	1100	1300	7
1501	1401	13	1300	1400	8
1401	1301	12	1400	1500	9
1301	1101	11	1500	1700	10
1101	1001	10	1700	1800	11
1001	901	9	1800	1900	12
901	701	8	1900	2100	13

CHAPTER I

THE BEGINNING OF THE EGYPTIAN LUNAR MONTH

§25. THE PROBLEM. All that we know of ancient and modern time-reckoning leads to the conclusion that lunar months begin with some observable phase of the moon. "As always," says Nilsson, "the concrete phenomenon is the starting point."[1] Most peoples (both ancient and modern) who use a lunar calendar start the month with the new crescent;[2] a few count from full moon;[3] while two East African tribes, the Masais and the Wadschaggas, begin with the moon's invisibility.[4] All these starting points, as well as one other, conjunction, have been maintained for the Egyptian lunar month by various scholars from as recent a year as 1932. It is the purpose of this chapter to demonstrate that the ancient Egyptians, like the Masais and the Wadschaggas, began their lunar month on the morning of the day when the old crescent of the moon was no longer visible in the eastern sky before sunrise.

§26. EARLIER VIEWS. Prior to 1864, when anyone spoke of an Egyptian lunar month, he undoubtedly meant one beginning with the new crescent. Lepsius, the first chronologer to have available much original source material for a study of the Egyptian calendar, came to the conclusion (in 1849) that "Fragen wir endlich noch nach dem Anfange des Mondjahres, so kann es an sich nicht zweifelhaft sein, dass es mit einem Neumonde begann."[5] Before Champollion all calendar study was dependent on classical sources, often vague and contradictory; and, since both Greeks and Romans had lunar calendars based on visibility, it is nowise strange that in the pages of Ideler, who brilliantly summed up the Egyptian calendar in 1825, no suggestion can be found of an Egyptian lunar month beginning at any other time than new crescent.[6]

§27. In 1864 Brugsch published a text from the propylon of the temple of Khonsu in Karnak (quoted below in §38) which led him to the conclusion that the month started with conjunction, that the crescent appeared on the 2d day and full moon on the 15th.[7] In this opinion he was followed by later scholars such as E. Mahler[8] and Sethe.[9] The obvious and weighty objection to conjunction as the starting point is, of course, that this event is not observable and is not, therefore, one of the concrete phenomena spoken of above. No people, unless indeed it be the Egyptians, ever began the month with conjunction. Sethe recognized the difficulty,[10] but Mahler was the only one who attempted to meet it. He suggested that the Egyptians determined by observation the approximate time of the full moon and from that point, since they were well aware of the average length of the synodic month, they counted about 14 1/2 days and arrived at the time (if not to the hour and the minute, still certainly to the day) of conjunction.[11] This hypothesis of Mahler's completely lacks supporting evidence and can hardly be said to meet the serious criticism one can easily bring against it. We have seen, for example, that the full moon varies from 13.73 to 15.80 days after conjunction (§19). If we add 14.5 to both extremes, we should have synodic months of 28.23 to 30.30 days in length, whereas we know that they vary only from 29.26 to 29.80 days (§9). Mahler's method would at times inevitably lead to months of either 28 or 31 days, unless some adjustment were made, and this he does not suggest. Furthermore, as we shall see, the Egyptians counted the 15th day as that of full moon, without regard to astronomical exactness.

§28. These, and possibly other considerations, induced D. R. Fotheringham,[12] Lehmann-Haupt,[13] Meyer,[14] and more recently Edgerton[15] and Wood[16] to maintain crescent visibility as the logical starting point of the month, though none, except Lehmann-Haupt in slight degree, has argued the problem. Standing quite alone is Macnaughton in proposing that the lunar month began originally with full moon, though he admits the possibility that, in the 18th dynasty and later, it may have begun, like that of the Babylonians, with new crescent.[17] Since the extreme unlikelihood of this proposal's being correct will be brought out in the following pages, it here requires no further consideration.

§29. We come now to the somewhat contradictory, or at least incompletely expressed, view of Ludwig Borchardt. In 1925, reviewing Nilsson, Primitive Time Reckoning, he stated: "Ferner, wenn wir aus den überlieferten Namen der Mondmonatstage nachweisen können, dass die alten Ägypter ihre Mondmonate . . . mit dem ersten Tage, an dem sie den Mond nicht mehr sahen, also mit dem Tage nach dem Altlicht, begonnen . . ., so wird man Ähnliches vergeblich bei anderen alten Kulturvölkern suchen."[18]

§30. This statement is clear enough but is nowhere elaborated. Instead, in the pages of Die Mittel zur zeitlichen Festlegung von Punkten der ägyptischen Geschichte und ihre Anwendung (Kairo, 1935)[19] there are scattered remarks which only confuse the reader. In one place (p. 30, n. 1) he reaffirms the day after "Altlicht," old crescent, to be the month's beginning, but then (p. 6, n. 1; p. 30, n. 1) he mentions "Altlicht" itself as the starting point, and still elsewhere (pp. 7, 24, 25, 36, and 37) he speaks of "wahrer Neumond," conjunction, as though that ought to be the first day of the month. The whole matter is further complicated by his belief that at an early date the Egyptians adopted a conventionalized lunar calendar of alternating 29- and 30-day months, with now and again one of 31 days.[20] The result is, "dass der erste kalendarische Monatstag nicht genau auf den Tag des astronmischen Neumonds zu fallen braucht."[21] His last published remark on the subject speaks of "unseren geringen Kenntnissen vom Aufbau des ägyptischen Mondjahres" and suggests that a certain lunar date he is discussing may be either (1) a "kalendarischer Neumond" or (2) an "Altlicht-Tag," which can be the beginning of a lunar month "nach der alten Art," or (3) the day before "Altlicht," in which case it could denote the end of a lunar month.[22]

§31. It is probably safe to conclude, despite these contradictions, that Borchardt would have the earlier Egyptians begin their lunar month after "Altlicht." So far as his publications indicate, his evidence for this theory is (1) the fact that in the Medinet Habu calendar the recurrent monthly lunar feasts are listed in the order (by the day) 29, 30, 1, 2, 4, 6, 10, and 15[23] and (2) his conviction that the third day of the month was named after and marked by the appearance of the crescent.[24] This last is, as we shall see (§38), in contradiction to the statements of the Egyptians themselves that the crescent came on the second day of the month, and the former, to my mind, represents simply a convenient grouping of feasts by proximity. The one or two feasts which occur immediately before the first day of the month are listed there, rather than after the feast on the 15th, with which they have no temporal connection. It is perfectly true, as I hope to demonstrate, that "Altlicht" fell on either the 29th or the 30th, so that the list does, in Borchardt's words, "eine Reihe von Altlicht bis Vollmond bilden";[25] but the truth of this statement can be apparent only after it has been demonstrated on other grounds that the month began with the day after old crescent.

We now turn to a consideration of the data which, I believe, will conclusively prove this thesis.

§32. THE BEGINNING OF THE DAY. That the day in Egypt began at dawn, and was reckoned from one dawn to the next, has been fully demonstrated.[26] Since the evidence seems conclusive to me, I shall not detail it again but shall go on to the bearing of that fact on the lunar month. It is obvious that, when the month begins, the 1st day of the month also begins. Those peoples who begin their day in the evening do so because they base their month on visibility of the new crescent or on full moon, events which are observable in the evening.[27] If the beginning of the Egyptian day is connected with the lunar month, then we must seek a lunar phenomenon associated with the morning. This can only be the gradual waning of the moon in the eastern sky until it is just visible before sunrise on one morning (old crescent), while on the following morning it is invisible.

§33. Sethe has a different explanation. According to him, morning beginning is the necessary consequence of the regulation of the year. "Da das Normaljahr mit dem Frühaufgang des Sirius begann, der eine Stunde vor Sonnenaufgang sichtbar wurde, so musste auch der Tagesbeginn auf den Morgen fallen."[28] I shall argue later (§§187-211) that no such year as a "Normaljahr" existed, and I do not wish to anticipate that discussion here. But Sethe, in company with many others, believed that a lunar calendar or, at least, the lunar month was used in Egypt before the civil year was inaugurated,[29] and it is universally accepted that as a measure of time the day and the lunar month came before the concept of the year.

§34. If the Egyptians had first of all a lunar calendar, then their day began when their lunar month began. The beginning of their day then either remained the same throughout their history or it moved from evening to morning. No explanation of the origin of the civil calendar yet given would require such a shift. We may reasonably conclude that it never occurred and that the beginning of the day in Egypt is inseparably connected with the lunar month.

§35. I do not wish to push this argument too strongly. If it stood alone, it would be far from conclusive; but it does fit in nicely with the other evidence to be presented, and it can certainly be regarded as confirmatory.

§36. THE NAMES OF THE DAYS OF THE MONTH. Comparative lists of the names given to the days of the lunar month[30] can be found in Brugsch, Thesaurus, pages 46-48.[31] Table 2 is eclectic and does not present all possible variations. A late list from the temple of Edfu appears on Plate V. The interpretations given to certain names I shall endeavor to establish in later pages.

TABLE 2

THE DAYS OF THE LUNAR MONTH

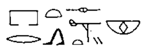
1. psḏtyw; later vars. and psḏntyw.*
2. (tp) ꜣbd,† "new crescent day."
3. mśpr, "⌜arrival⌝ day."
4. prt śm, "day of the going-forth of the śm-priest."
5. ỉḫt ḥr ḫꜣwt, "day of offerings on the altar."
6. śnt, "6th day."
7. dnỉt, "part day, first-quarter day."
8. tp.
9. kꜣp.
10. śỉf.
11. śtt.
12. reading uncertain.
13. mꜣꜣ śty.
14. śỉꜣw.
15. (tp) śmdt,‡ "half-month day, 15th day, day of full moon."
16. mśpr śn-nw, "second ⌜arrival⌝ day."
17. śỉꜣw.
18. ỉꜥḥ, "day of the moon."
19. śdm mdw·f.
20. śtp.
21. ꜥprw.
22. pḥ ⌜spdt⌝.
23. dnỉt, "part day, last-quarter day."
24. knḥw.
25. śtt.
26. prt.

TABLE 2—Continued

27.  wšb.

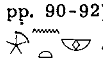
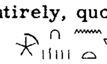
28.  hb-śd Nwt, "day of the jubilee of Nut."

29.  ʿhʿ ....

30.  prt Mn, "day of the going-forth of Min."

* The use of hieroglyphic type to reproduce most of the texts quoted in this study requires a word of caution. Some signs in the late texts are reversed, especially the rnpt sign, and unimportant details both in form and in position are disregarded.

† WB., I, 65, reads ỉbd, but see A. H. Gardiner, Egyptian Grammar (Oxford, 1927), p. 475, N 11.

‡ Langdon, Babylonian Menologies and the Semitic Calendars (London, 1935), p. 91, n. 6, believes that the Egyptian root ś-m-d is an Egyptian form of the root found in Babylonian as šabâtu, "to divide, cut off, come to an end," Arabic sabata. Šapattu or šabattu, the 15th day of the Babylonian month, actually means "the end of the first half of the month" (op. cit., pp. 90-92). Gardiner, Grammar, p. 475, N 13, rejects the reading śmdt entirely, quoting such a writing as . This seems to me merely a conflate form such as we have later in . See my further remarks on this in §42, below.

§37. Some of the names, it is apparent, are phases of the moon, others are numerical, while yet others are concerned with ritual or mythology. Many are untranslatable, at least with any certainty.

§38. The three days concerned most importantly with the phases of the moon are brought out in the following text from the Ptolemaic propylon of the temple of Khonsu in Karnak:[32]

"He (Khonsu, the moon-god) is conceived (bkȝ) on pśdntyw; he is born on ȝbd; he grows old after ⌜śmdt⌝." The ready paraphrase is that he is conceived in the darkness of invisibility on the first day of the month, that he is born as the new crescent on the second day, and that he wanes after the day of full moon, the 15th day.

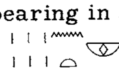
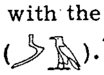
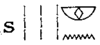
§39. An earlier text from the Middle Kingdom confirms this:[33]

"I know, O souls of Hermopolis, what is small on the 2d day and what is great on the 15th day; it is Thoth." Thoth is, of course, the moon, small on the day of new crescent and great on the day of full moon.

§40. That the 15th day was that of full moon is substantiated by many other texts, some of which have been dealt with by Brugsch.[34] I shall quote only one more text, from the temple of Edfu:[35]

"He created the 15th day to illuminate (śḥd) the land throughout the night."

§41. In the light of these texts, the identification of ȝbd and śmdt as "new crescent day" and "full moon day" can hardly be questioned. The precise meaning of the name of the first day pśd(n)tyw, remains uncertain. Since in the Pyramid Texts it is written without the n, it is possible to see it as "Ennead day," or the like.[36] Borchardt believed that it could have nothing to do with the pśd of either "nine" or "shine," but preferred to see in it a reference to "back," with the suggestion that the Egyptians may have seen the moon, at conjunction, as turning its back, its dark side, to earth.[37] Sethe, on the other hand, saw a possible connection between "nine" and "new-(month)," citing the correspondence, in the Indo-Germanic languages, between the roots for "neun" and "neu."[38]

§42. I can add nothing to the discussion, except a suggestion that the n appearing in a later variation of the name is there through analogy with such writings of the 6th and 15th days as , , which have the element nt added to the numeral.[39] Neither in the Pyramid Texts nor in the Old Kingdom generally is pśd(n)tyw written with the n. It seems to appear first with n as  in the list of feasts on the Middle Kingdom coffin of Ma ().[40] Three times in the Middle Kingdom[41] and at least once later (in Pap. Boulaq 17, v, 2, the Cairo hymn to Amon) the numeral is used for pśd. According to Borchardt's description, the Middle Kingdom examples are written thus ; the later one is . If the pśd of pśdtyw either was, or was thought to be, the numeral "nine," the n might easily have been introduced by analogy.

§43. It is time now to leave philology and examine the purely astronomical basis underlying the choice of names for the days of the lunar month. By this means we shall be able easily to see the significance of the names of certain days which have not yet figured in the discussion.

§44. THE ASTRONOMICAL BASIS FOR THE NAMES OF THE DAYS OF THE MONTH. In the latter part of this chapter I have had occasion to make sixty-five calculations of conjunctions with their accompanying mornings of crescent invisibility and evenings of new crescent visibility. In forty-six cases (70 per cent) the crescent was visible on the evening of the day (ꜣbd) after that on which there was no lunar visibility in the morning (pśdntyw). In the other nineteen cases (30 per cent), new crescent was first visible on the third day of the month, mśpr, which I have termed "⸢arrival⸣ day."[42]

§45. In Figure 10 is diagrammed the astronomical situation at the beginning of the month. Just before dawn on either the 29th or the 30th day, the last crescent is still to be seen. On the following morning it cannot be seen, and the new month begins with pśdntyw. Just after sunset on the following day, ꜣbd, the new crescent is visible in seven months out of ten. In the other three months it is first seen on mśpr.

§46. When new crescent can be seen on ꜣbd, there is a period of 60 hours from old crescent to new. The mean time of conjunction is thus at noon on pśdntyw. If we take 17 hours as the minimum time that must elapse from last visibility to conjunction and from conjunction to new visibility (§§11-17), we have a possible range of time, during which conjunction may occur, of about 26 hours.[43] When the number of hours required for visibility increases to 30, or the hours required plus the number of hours after noon on pśdntyw to time of conjunction total 30 or more, then new crescent is delayed until mśpr. In that event the time from last to new crescent is 84 hours, mean conjunction is at midnight on pśdntyw, and the possible range is as shown.[44] It is instructive to note that most conjunctions fall on pśdntyw (so in fifty-seven out of my sixty-five calculations), a few on the day before (seven out of sixty-five), and still less (one out of sixty-five) on the following day. Thus Brugsch, Mahler, and Sethe were roughly correct in their theory (§27). Their error was in failing to associate pśdntyw with an observable phenomenon.

§47. On the basis of Figure 10 and the time required from conjunction to full moon (13.73-15.80 days; cf. §19), it is possible to diagram the situation for that time of month. Figure 11 shows the possibilities. When new crescent is visible on ꜣbd, then mean full moon is just at the end of śmdt with a possible range before and after of some 72 hours. When the new crescent is delayed until mśpr, then mean full moon is also delayed to the beginning of the night on mśpr śn-nw, "second ⸢arrival⸣ day," to my mind a deliberate and meaningful choice of name. In no case does full moon ever occur earlier than the night of the 14th or later than the night of the 17th;[45] both these days bear the same name, śiꜣw, and, while I am unable to translate this, I cannot believe that it is lacking in significance.

§48. Interesting relationships exist between other days of the lunar month.[46] As we should expect, the day of full moon is exactly between day 7, dnit, "first quarter," and day 23, dnit, "last quarter." The day after the full moon group (Fig. 11) is day 18, iꜥḥ, "day of the moon," possibly to be regarded as the definite beginning of the second part of the month. From crescent to full moon there are 13 days. Thirteen days after day 18, assuming a full month of 30 days, a new month begins. Day 11, seven days before day 18, bears the same name, śtt, as does day 25, seven days after day 18. This last seems to indicate that some importance was attached to day 18, but other than that its meaning is unclear to me.

§49. THE LUNAR CALENDAR OF PAPYRUS CARLSBERG 9. There are a few events in Greco-Roman times dated both to the civil calendar and to the day of the lunar month. These are of inestimable value in checking the results attained above, but they may best be considered after we have first examined the only truly mathematical astronomical Egyptian text yet published, Papyrus Carlsberg 9,[47] whose importance for our purpose can hardly be overstated.

§50. This papyrus was written in or after A.D. 144, and it furnishes a simple scheme, based upon the civil calendar, for determining the beginning of certain lunar months over a 25-year cycle. Underlying this cycle are

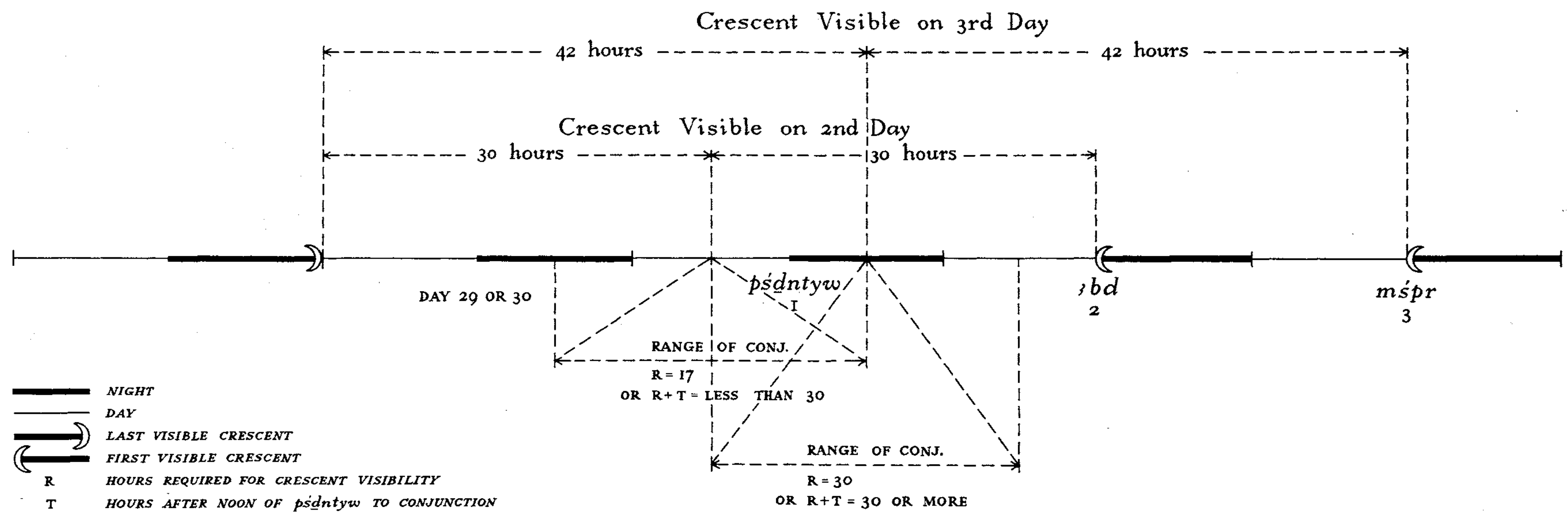


FIG. 10.—The beginning of the lunar month.

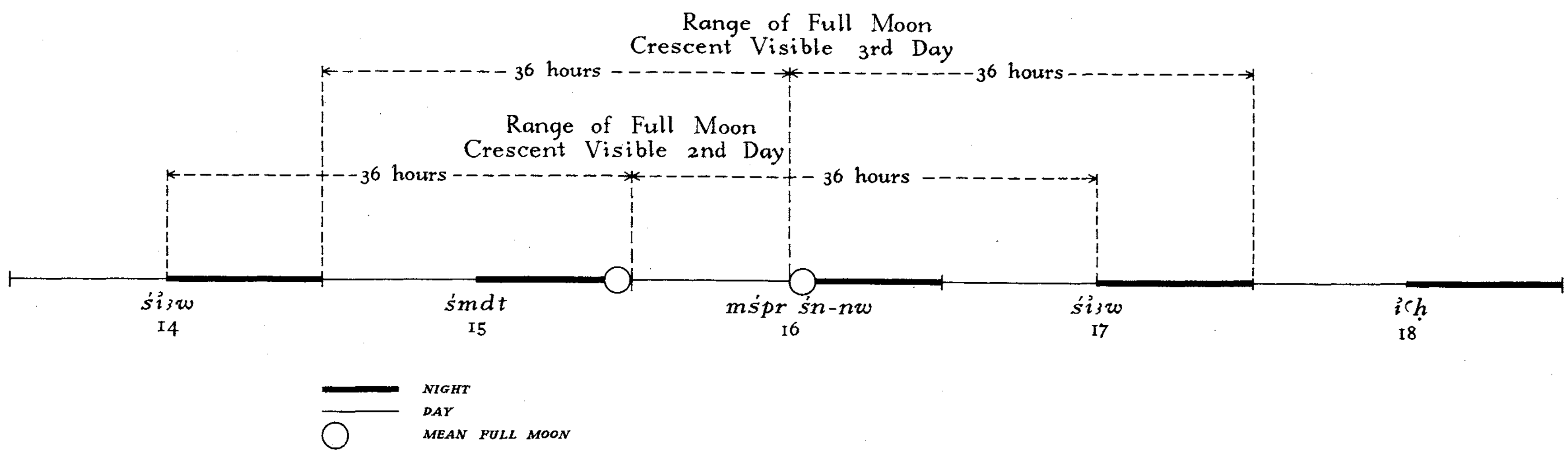


FIG. 11.—The possible range of full moon.

the facts that 25 Egyptian civil years have 9,125 days and that 309 lunar months (divided into 16 years of 12 months and 9 years of 13 months)[48] have 9,124.95231 days. The earliest cycle mentioned in the text began in the sixth year of Tiberius, A.D. 19, and the latest in year 7 of Antoninus, A.D. 144. Actually, the calendar does not indicate when every month began but lists only six dates for every year, those falling in the second and fourth months of each season. It also indicates the years of 13 months ("great" years)[49] according to the following scheme: 1st, 3d, 6th, 9th, 12th, 14th, 17th, 20th, and 23d year of each cycle.

TABLE 3

THE 25-YEAR CYCLE AS GIVEN IN PAP. CARLSBERG 9

	ꜣḪT				PRT				ŠMW			
Months:	I	II	III	IIII	I	II	III	IIII	I	II	III	IIII
Year 1		1		30		29		28		27		26
2		20		19		18		17		16		15
3		9		8		7		6		5		4
4		28		27		26		25		24		23
5		18		17		16		15		14		13
6		7		6		5		4		3		2
7		26		25		24		23		22		21
8		15		14		13		12		11		10
9		4		3		2		1		30		29
10		24		23		22		21		20		19
11		13		12		11		10		9		8
12		2		1		30		29		28		27
13		21		20		19		18		17		16
14		10		9		8		7		6		5
15		30		29		28		27		26		25
16		19		18		17		16		15		14
17		8		7		6		5		4		3
18		27		26		25		24		23		22
19		16		15		14		13		12		11
20		6		5		4		3		2		1
21		25		24		23		22		21		20
22		14		13		12		11		10		9
23		3		2		1		30		29		28
24		22		21		20		19		18		17
25		12		11		10		9		8		7

§51. Table 3 gives the complete cycle as stated in the papyrus. Anyone using this calendar would begin a lunar month, without regard for actual observation, on II ꜣḫt 1 (which for A.D. 19 would be September 18; for A.D. 44, September 11; for A.D. 69, September 5; and so on up to A.D. 144, August 17), on IIII ꜣḫt 30 (for A.D. 19, December 16; for A.D. 144, November 14), on II prt 29 (for A.D. 20, February 13; for A.D. 145, January 12), and so forth.[50] What is significant about the cycle for our purpose is that it gives a continually recurring series of lunar dates, easily and accurately translatable into the Julian calendar for this period.[51] That means it should also be possible, by calculating the lunar phenomena fitting any series of dates, to determine what is the governing principle of the beginning of the month.

§52. The editors of the papyrus saw this, and, after studying the dates for the year A.D. 144, they came to the conclusion that the month began with new crescent visibility.[52] Now if we calculate conjunction, morning of invisibility, and evening of visibility (cf. §20) for the first two years, A.D. 144 and 145, of a cycle, we arrive at the following results:[53]

§53. First Two Years of Cycle Beginning A.D. 144

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Aug. 17, 144	Aug. 16, 6:31 P.M.	Aug. 16	Aug. 17
Nov. 14	Nov. 13, 12:13 A.M.	Nov. 12	Nov. 14
Jan. 12, 145	Jan. 11, 1:01 A.M.	Jan. 10	Jan. 12
Mar. 12	Mar. 11, 7:07 A.M.	Mar. 11	Mar. 12
May 10	May 9, 3:07 P.M.	May 9	May 10
July 8	July 7, 6:55 P.M.	July 7	July 8
Sep. 5	Sep. 4, 6:25 P.M.	Sep. 4	Sep. 6
Nov. 3	Nov. 2, 3:52 P.M.	Nov. 2	Nov. 4
Jan. 1, 146	Dec. 31, 1:15 P.M.	Dec. 31	Jan. 1
Mar. 1	Feb. 28, 12:54 P.M.	Feb. 28	Mar. 1
Apr. 29	Apr. 28, 4:01 P.M.	Apr. 28	Apr. 29
June 27	June 26, 9:35 P.M.	June 26	June 28

§54. In nine out of twelve cases, the lunar month begins on the same day as crescent visibility, and this certainly seems to bear out the editors' conclusion. Does that finding invalidate all our earlier argument? We shall see that it does not. Let us recall that 309 lunar months have 9,124.95231 days while 25 civil years have 9,125 days. Obviously the lunar calendar has a lag of .04769 day every 25 years. In 500 years this would be roughly one day.[54] Let us test this by calculating, as we did above, the first two years of the cycle beginning 1,000 years before A.D. 144, and the same for the cycle of 500 years before.

§55. First Two Years of Cycle Beginning 856 B.C.

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Apr. 24, 856	Apr. 25, 3:29 P.M.	Apr. 25	Apr. 26
July 22	July 23, 9:03 A.M.	July 23	July 24
Sep. 19	Sep. 20, 6:52 A.M.	Sep. 20	Sep. 21
Nov. 17	Nov. 18, 4:05 A.M.	Nov. 18	Nov. 19
Jan. 15, 855	Jan. 16, 2:49 A.M.	Jan. 16	Jan. 17
Mar. 15	Mar. 16, 3:09 A.M.	Mar. 16	Mar. 17
May 13	May 14, 7:05 A.M.	May 14	May 15
July 11	July 12, 2:03 P.M.	July 12	July 14
Sep. 8	Sep. 9, 6:19 P.M.	Sep. 9	Sep. 11
Nov. 6	Nov. 7, 7:30 P.M.	Nov. 7	Nov. 9
Jan. 4, 854	Jan. 5, 5:47 P.M.	Jan. 5	Jan. 6
Mar. 4	Mar. 5, 1:15 P.M.	Mar. 5	Mar. 6

§56. First Two Years of Cycle Beginning 357 B.C.

Dec. 20, 357	Dec. 21, 1:27 A.M.	Dec. 20	Dec. 22
Mar. 19, 356	Mar. 19, 1:34 P.M.	Mar. 19	Mar. 20
May 17	May 17, 3:55 A.M.	May 17	May 18
July 15	July 14, 7:32 P.M.	July 14	July 15
Sep. 12	Sep. 11, 8:36 P.M.	Sep. 11	Sep. 13
Nov. 10	Nov. 10, 8:16 A.M.	Nov. 10	Nov. 12
Jan. 8, 355	Jan. 8, 10:27 P.M.	Jan. 8	Jan. 10
Mar. 8	Mar. 9, 3:36 A.M.	Mar. 8	Mar. 10
May 6	May 6, 8:59 P.M.	May 6	May 7
July 4	July 4, 10:47 A.M.	July 4	July 5
Sep. 1	Sep. 1, 4:51 A.M.	Sep. 1	Sep. 2
Oct. 30	Oct. 30, 8:46 A.M.	Oct. 30	Nov. 1

THE BEGINNING OF THE EGYPTIAN LUNAR MONTH

§57. In the calculated dates for the cycle beginning 856 B.C., the month starts in every case exactly one day before the morning of invisibility and two or three days before the evening of crescent visibility. In the calculated dates for the cycle beginning 357 B.C., ten out of twelve months start on the morning of invisibility, and only one on the evening of visibility.

§58. As a further aid in drawing conclusions from these tables, let us also examine the cycle of 207 B.C., a year well into the Ptolemaic period and one which begins the seventh of the twenty cycles separating 357 B.C. and A.D. 144.

§59. First Two Years of Cycle Beginning 207 B.C.

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Nov. 13, 207	Nov. 13, 2:52 P.M.	Nov. 13	Nov. 14
Feb. 10, 206	Feb. 10, 8:59 A.M.	Feb. 10	Feb. 11
Apr. 10	Apr. 10, 2:00 A.M.	Apr. 10	Apr. 11
June 8	June 7, 4:32 P.M.	June 7	June 8
Aug. 6	Aug. 5, 1:15 P.M.	Aug. 5	Aug. 7
Oct. 4	Oct. 3, 8:29 P.M.	Oct. 3	Oct. 5
Dec. 2	Dec. 2, 10:48 A.M.	Dec. 2	Dec. 3
Jan. 30, 205	Jan. 30, 8:46 P.M.	Jan. 30	Jan. 31
Mar. 29	Mar. 29, 6:33 P.M.	Mar. 29	Mar. 30
May 27	May 27, 8:44 A.M.	May 27	May 28
July 25	July 25, 12:19 A.M.	July 24	July 26
Sep. 22	Sep. 21, 11:13 P.M.	Sep. 21	Sep. 23

§60. In this last cycle, seven months out of twelve begin with the morning of invisibility, one begins with crescent visibility and the other four are in between. It is clear that, the closer in time the cycle approaches A.D. 144, the less frequently will the months start with invisibility and the more frequently with visibility.

§61. Now it seems incontrovertible that the cyclic calendar must be a regularization of a lunar calendar depending originally on observation. It must, therefore, at its introduction, have been based on the concrete phenomenon either of crescent invisibility or of crescent visibility as the starting point of the month. What we have now to determine, if possible, is when, or approximately when, the cyclic calendar was introduced. Nothing fits in 856 B.C., and plainly it could not have been then. If it was around 357 B.C. (plus or minus about fifty years) then its underlying basis was invisibility. If it was around A.D. 144, then its basis was visibility.

§62. We already know, to be sure, that it was in use in A.D. 19, because that cycle is mentioned in the papyrus. Moreover, the editors state, ". . . aber es kann kaum einem Zweifel unterliegen, dass die in ihm enthaltenen Rechenverfahren wesentlich älteren Ursprungs sind, da sie keine Spur einer Berücksichtigung der gleichzeitigen hellenistischen Astronomie zeigen."[55]

§63. A slight bit of evidence in this direction is to be found in the title of one of the books in the Edfu library. This (from the time of Ptolemy VIII Euergetes II, 145-116 B.C.) is named (Edfou, III, 351):  "The knowledge of the movement (nmtt = cycle?) of the two lights (sun and moon)."[56]

§64. The best possible demonstration, however, that the cyclic calendar was in use before A.D. 19 is to be found in the double dates (events dated to both the lunar and civil calendars) of Ptolemaic times. These we shall now examine.

§65. DOUBLE DATES INVOLVING LUNAR DAYS. I shall list the dates in chronological order, but with the latest first and the earliest last, so that we may begin in the period when we know the cyclic calendar was in use and work back into the preceding period.

§66. (1) Thebes. Commodus. Year 30, IIII prt 28 (Al. = II Šmw 21 civ. = April 23, A.D. 190) = 1st lunar day.[57]

§67. This date is found on an ostracon wherein one priest leases to another pꜣy.í ꜣbd n ḥt-nṯr n sꜣ tp n ꜣbd IIII prt ssw 28 r tpy Šmw 27, "my temple-month in the first phyle from IIII prt 28 to I Šmw 27." As we shall see convincingly under lunar date 8, a temple-month was a lunar month, and we may take IIII prt 28 to be pśdntyw. Since we cannot be certain whether I Šmw 27 ends or begins a month, we had better not include it in our present discussion. In the publication the year is given as 12(?), but the figure 30 is perfectly clear.[58] The 30th year of Commodus began July 7, 189, and ended July 6, 190. This would be the 21st year of the cycle beginning in A.D. 169. But in that year a lunar month began not on IIII prt 28 but on IIII prt 22. There remains the possibility that the ostracon date was given not in the civil calendar but in the Alexandrian. In that calendar IIII prt 28 was April 23, which for A.D. 190 is equivalent to II šmw 21 civ. This date fits exactly into cycle year 21, and I have no hesitation in accepting it as correct.

§68. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Apr. 23, A.D. 190	Apr. 22, 8:33 A.M.	Apr. 22	Apr. 23

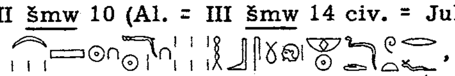
§69. (2) Coptos. Nero. Year 12, IIII prt 23 (Al. = I šmw 15 civ. = April 18, A.D. 66) = 6th lunar day.[59]

§70. On the stela the date of IIII prt 23 is termed pꜣ hrw n mḥ 6 n pꜣ wrš, "the sixth day of the wrš"; and wrš, as will come out clearly in lunar date 8, means the service in the temple, by lunar months, of the various phyles. Psḏntyw must fall on IIII prt 18. For A.D. 66 this should be in cycle year 22, but there is no agreement. In the civil calendar, however, the date would be I šmw 10; and this fits nicely in the correct cycle year between IIII prt 11 and II šmw 10.

§71. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Apr. 13, A.D. 66	Apr. 13, 9:48 A.M.	Apr. 13	Apr. 14

§72. (3) Thebes. Augustus. Year 21, III šmw 10 (Al. = III šmw 14 civ. = July 4, 9 B.C.) = 16th lunar day.[60]

§73. In the hieratic the date appears as , "III šmw 10, being the 16th day, called ḥbś-tp." The demotic has simply ꜣbd III šmw ssw 10 mḥ hrw 16 ḥbś-tp, "III šmw 10, being the 16th day, ḥbś-tp." Möller argues that ḥbś-tp is a corruption of ḥb-śd tpy; and that must be considered a possibility.[61] Moreover, when feasts are of long duration, it is usual to mark the successive days as mḥ hrw 5, mḥ hrw 6, etc.[62] However, if this is really the 16th day of a jubilee, the feast began on either June 19, 9 B.C. Al., or June 15, 9 B.C. civ., and so far as I am aware neither date has any significance in the life of Augustus, either in the present year or in any preceding one, least of all thirty years earlier.

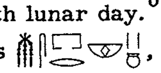
§74. The hieratic version of the date seems to me to speak against this interpretation. If it were to be understood as "III šmw 10, called the 16th day of the first jubilee," one would certainly expect the genitive n before ḥbś-tp. Much more likely is the view that it is some other kind of 16th day, which itself is named ḥbś-tp; and that view becomes almost a certainty when it is recognized that II šmw 25 Al. (16 days prior to III šmw 10) is equivalent to II šmw 29 civ., which is the exact date required by year 23 of the cyclic calendar for the cycle beginning in 32 B.C.

§75. One may raise the question why the 16th day of a lunar month should be called ḥbś-tp, rather than by its usual name of mśpr śn-nw.[63] Borchardt has explained the name, "Feast of covering the head," as a reference to the day after full moon, when waning, or "covering," begins.[64] However this may be, we need have only slight reservation in accepting the date.

§76. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
June 19, 9 B.C.	June 19, 6:02 A.M.	June 19	June 20

§77. (4) Armant. Augustus. Year 1, IIII prt 21 (April 17, 29 B.C.) = 16th lunar day.[65]

§78. There is no uncertainty about this date being lunar, as it is given as , mśpr śn-nw. Psḏntyw is therefore IIII prt 6, and this fits exactly in cycle year 3 of the cycle beginning in 32 B.C.

§79. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Apr. 2, 29 B.C.	Apr. 2, 2:59 P.M.	Apr. 2	Apr. 3

§80. (5) Memphis. Cleopatra VII Philopator. Year 6, III šmw 13 (July 13, 46 B.C.) = 5th lunar day.[66]

§81. The lunar day is given correctly as i͗ḫt ḥr ḫꜣwt. Pśḏntyw is III šmw 9, which fits exactly in cycle year 11 of the cycle beginning 57 B.C.

§82. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
July 9, 46 B.C.	July 8, 5:20 A.M.	July 8	July 9

§83. (6) Edfu. Ptolemy VIII Euergetes II. Year 30, II šmw (Payni) 9 (July 2, 140 B.C.) = 6th day of lunar Payni.[67]

§84. The lunar date is expressed , "the 6th lunar day of ḥb i͗nt." It is clear that ḥb i͗nt, "(month of) the Feast of the Valley," is merely a variant of p-(n)-i͗nt, "the one of the Valley," the original of the name Payni. Pśḏntyw is II šmw 4, which fits exactly in cycle year 17 of the cycle beginning 157 B.C.

§85. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
June 27, 140 B.C.	June 27, 9:08 P.M.	June 27	June 28

§86. (7) Edfu. Ptolemy VIII Euergetes II. Year 28, IIII šmw (Mesore) 18 (September 10, 142 B.C.) = III šmw (Epiphi) 23 lunar.[68].

§87. All three texts cited are necessary to work out the double date. They are given in full below in §§214-16 and may be referred to there. Pśḏntyw is III šmw 26, which fits nicely between II šmw 26 and IIII šmw 25 of cycle year 15 in a cycle beginning 157 B.C.

§88. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Aug. 19, 142 B.C.	Aug. 17, 11:14 P.M.	Aug. 18	Aug. 19

§89. (8) Gebelein. Ptolemy VIII Euergetes II. Year 26,

IIII ꜣḫt	20	(Jan. 15, 144 B.C.)	= 1st lunar day,
I prt	19	(Feb. 13, ")	= " " "
II prt	19	(Mar. 15, ")	= " " "
III prt	19	(Apr. 14, ")	= " " "
IIII prt	18	(May 13, ")	= " " "
I šmw	17	(June 11, ")	= " " "
II šmw	17	(July 11, ")	= " " "
III šmw	17	(Aug. 10, ")	= " " "

§90. These dates are to be found in a temple account (Cairo Demotic Papyrus 30801)[69] Since Spiegelberg's publication of the text cannot be relied upon, I feel obliged to give a complete transliteration and translation of the relevant portion of the document, after which we shall be in a better position to discuss it.

Cairo Dem. Pap. 30801

Transliteration

[7]. . . pꜣ h n nꜣ prw

[8]Ḥr-sꜣ-ꜣst sꜣ Ḥtp-Sbk pꜣ ʿwy ⌜sdt⌝ (n) drt Ḫl-Sbk pꜣ
ḥm-ntr n Ḫns n pꜣ fy ḥnʿ ⌜n⌝ nꜣ ḫlw n nꜣ wʿbw ḥnʿ
pꜣ h [9] n ḥt-ntr n pꜣ wrš n tpy prt ssw 19 r ꜣbd
II prt ssw 18 n sꜣ tp sw 9 1/4

Pꜣ-ḥtr sꜣ Pn-tꜣwy pꜣ ʿwy ⌜sdt⌝ [10] [n pꜣ fy ḥnʿ pꜣ h n] ḥt-ntr
n pꜣ wrš n ꜣbd II prt ssw 19 r ꜣbd III prt ssw 18
n sꜣ 2-nw sw 9

[11][. . . . .] ꜣbd III (or IIII) prt tpy prt sw
50 swn pꜣ [. . .] n ꜣbd IIII ꜣḫt ssw 20 r tpy prt [12] [ssw 18
. . . . . .] Nḫt-Mn sꜣ Ḥp-mn sw 1 swn [pꜣ] ꜥd n pꜣ
ꜥwy ⸢sdt⸣ (n) drt [13] [X sꜣ Y pꜣ] ꜥwy ⸢sdt⸣ sw 5
Ḥr-sꜣ-ꜣst sꜣ Ḥtp-Sbk n pꜣ wrš n ꜣbd III prt ssw 19 r
ꜣbd IIII prt ssw 17 [14] [n sꜣ 3-nw n pꜣ fy ḫ]nꜥ ⸢n⸣
nꜣ ḫlw n nꜣ wꜥbw n pꜣ ḫꜥ Mn ḥnꜥ pꜣ ḥw n pꜣ h n
ḥt-ntr sw 10
Sn-Sbk [15] [sꜣ Nꜣ-nḫt.f n pꜣ wr]š n ꜣbd IIII prt ssw 18 r tpy
šmw ssw 16 n sꜣ 4-nw n pꜣ fy ḥnꜥ pꜣ ḥw pꜣ h [16] [n
ḥt-ntr . .
. .][70] n pꜣ fy ḥnꜥ nꜣ ḫlw n nꜣ wꜥbw ḥnꜥ pꜣ ḥw n pꜣ h
n ḥt-ntr [17] [n pꜣ wrš n tpy šmw ssw 1]7 r ꜣbd II
šmw ssw 16 n sꜣ 5-nw sw 11 1/4
Sn-Sbk sꜣ Nꜣ-nḫt.f n pꜣ wrš [18] [n ꜣbd II šmw ssw 17 r]
ꜣbd III šmw ssw 16 n sꜣ tp n pꜣ fy ḥnꜥ ⸢n⸣ nꜣ ḫlw
n nꜣ wꜥbw ḥnꜥ pꜣ h n ḥt-ntr . . .

Translation

[7] . . . The expense of the grain:

[8] Horsiese, son of Hetpesobk, (of) the ⸢House of Fire⸣, from Khelsobk, the prophet of Khonsu, for the grain-ration and the food of the priests and the expense [9] of the temple for the service from I prt 19 to II prt 18 of the first phyle, wheat 9 1/4 (artabas).

Pꜣ-ḥtr, son of Patu, (of) the ⸢House of Fire⸣, [10] [for the grain-ration and the expense of] the temple for the service from II prt 19 to III prt 18 of the second phyle, wheat 9 (artabas).

[11] [. . . . .] III (or IIII) prt[71] (to) I prt, wheat 50 (artabas). Price of the [. . .] from IIII ꜣḫt 20 to I prt [12] [18 . . . . . .] Nakhtmin, son of Hapimen, wheat 1 (artaba). Price of [the] fat of the ⸢House of Fire⸣, from [13] [X, son of Y, (of) the] ⸢House of Fire⸣, wheat 5 (artabas).

Horsiese, son of Hetpesobk, for the service from III prt 19 to IIII prt 17 [14] [of the third phyle, for the grain-rations] and the food of the priests for the Feast of Min, and the extra expense of the temple, wheat 10 (artabas).

Sensobk, [15] [son of Nekhutef, for the servi]ce from IIII prt 18 to I šmw 16 of the fourth phyle, for the grain-ration and the extra expense [16] [of the temple . .

. . .], for the grain-ration and the food of the priests and the extra expense of the temple [17] [for the service from I šmw 1]7 to II šmw 16 of the fifth phyle, wheat 11 1/4 (artabas).

> Sensobk, son of Nekhutef, for the service[18] [from II šmw 17 to] III šmw 16 of the first phyle, for the grain-ration and the food of the priests and the expense of the temple. . .

§91. The sequence of total days in each wrš, 29, 30, 30, 29, 29, 30, 30, is conclusive proof that we are here dealing with lunar months. Dating this document to the 26th year of Ptolemy VIII Euergetes II, whose name appears nowhere in the text, depends upon the following points:

§92. First, the mention of a fifth phyle places it definitely later than the decree of Canopus (237 B.C.), since that decree reintroduced the fifth phyle;[72]

§93. Second, the paleography of the text places it in the later Ptolemaic period;

§94. Third, on the verso of the papyrus, in a different hand, there is an account of grain deliveries, and in column ii, line 7, appears quite clearly the date, "year 41," which limits the verso to Ptolemy VIII;

§95. Fourth, since it was the unvarying practice of demotic scribes to write first upon that side of a sheet of papyrus which had the horizontal fibers uppermost, the recto of our document must be prior to year 41 of Ptolemy VIII (130-129 B.C.); and

§96. Fifth, the 26th year of Ptolemy VIII (145-144 B.C.) is the first possible year in which the eight lunar dates will fit into the cycle scheme (year 13 of the cycle beginning 157 B.C.). Four of the dates (IIII ꜣḫt 20, II prt 19, IIII prt 18, and II šmw 17) agree perfectly with those in the 13th year of the cycle, and the remaining four fit nicely in between.

§97. It is not impossible, of course, that the dates are those of a complete cycle earlier, but that would mean that 40 rather than 15 years fell between the writing on the recto and the verso, which seems quite unlikely from the rather ephemeral nature of the first text.

§98. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Jan. 15, 144 B.C.	Jan. 15, 8:33 P.M.	Jan. 15	Jan. 16
Feb. 13, 144	Feb. 14, 7:50 A.M.	Feb. 14	Feb. 15
Mar. 15, 144	Mar. 15, 5:13 P.M.	Mar. 15	Mar. 16
Apr. 14, 144	Apr. 14, 1:07 A.M.	Apr. 13	Apr. 15
May 13, 144	May 13, 8:17 A.M.	May 13	May 14
June 11, 144	June 11, 3:39 P.M.	June 11	June 12
July 11, 144	July 11, 12:34 A.M.	July 10	July 12
Aug. 10, 144	Aug. 9, 12:05 P.M.	Aug. 9	Aug. 10

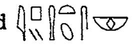
§99. (9) Edfu. Ptolemy IV Philopator. Year 10, III šmw 7 (August 17, 212 B.C.) = 6th lunar day.[73]

§100. This date is exactly 25 years later than lunar date 10, and it marks the close of the first great building period at Edfu. Pśḏntyw is III šmw 2, which fits properly between II šmw 2 and IIII šmw 1 in cycle year 20 of the cycle beginning 232 B.C.

§101. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Aug. 12, 212 B.C.	Aug. 11, 4:47 P.M.	Aug. 11	Aug. 12

§102. (10) Edfu. Ptolemy III Euergetes I. Year 10, III šmw 7 (August 23, 237 B.C.) = 6th lunar day.[74]

§103. Instead of III šmw both texts give the month by its early name, ꜣIp ḥmt.s,  in the first and  in the second, which is a substitute for , ỉpỉp, the original of the civil month name Epiphi (§230). On this particular date the cord was stretched to lay out the foundations of the present temple at Edfu, an indication of the importance of śnt as a building day.[75] Pśḏntyw is III šmw 2, and since this date is exactly 25 years earlier than the preceding one, it falls in the same place in the cycle, year 20, but for a cycle beginning 257 B.C.

§104. Calculation:

1st Day of Lunar Month	Conjunction	Morning of Invisibility	Evening of Visibility
Aug. 18, 237 B.C.	Aug. 18, 1:21 A.M.	Aug. 18	Aug. 19

§105. We have seen that every lunar date of which we have record either is exactly that called for by the cyclic calendar or fits nicely between the given calendar dates, agreeing with either the preceding or the following date. This is best seen in Table 4, where all the dates are entered and identified. Observe that the five entries in the III Šmw column are in each case the same as in the preceding II Šmw column, while the two entries in the I Šmw column are both the same as in the following column. These latter two both begin, by calculation, on the morning of invisibility, while four of the five in III Šmw begin on the day of crescent visibility.

TABLE 4

THE DOUBLE DATES ENTERED IN THE 25-YEAR CYCLE

	ꜣḪT				PRT				ŠMW			
Months:	I	II	III	IIII	I	II	III	IIII	I	II	III	IIII
Year 1		1		30		29		28		27		26
2		20		19		18		17		16		15
3		9		8		7		6[4]		5		4
4		28		27		26		25		24		23
5		18		17		16		15		14		13
6		7		6		5		4		3		2
7		26		25		24		23		22		21
8		15		14		13		12		11		10
9		4		3		2		1		30		29
10		24		23		22		21		20		19
11		13		12		11		10		9	9[5]	8
12		2		1		30		29		28		27
13		21		20[8]	19[8]	19[8]	19[8]	18[8]	17[8]	17[8]	17[8]	16
14		10		9		8		7		6		5
15		30		29		28		27		26	26[7]	25
16		19		18		17		16		15		14
17		8		7		6		5		4[6]		3
18		27		26		25		24		23		22
19		16		15		14		13		12		11
20		6		5		4		3		2	2[9][10]	1
21		25		24		23		22		21[1]		20
22		14		13		12		11	10[2]	10		9
23		3		2		1		30		29[3]		28
24		22		21		20		19		18		17
25		12		11		10		9		8		7

§106. Of the entire seventeen calculations, nine months start on the morning of old crescent invisibility, five on the day of new crescent visibility, two on the day in between, and one on the day before the morning of invisibility. This is precisely the sort of irregularity that one would expect from a cycle scheme, rigidly adhered to, in contrast to a method of strict observation for starting the month. Most instructive are lunar dates 9 and 10. They fall in the same place in the scheme; they both therefore begin on the same date in the civil calendar, but the earlier commences on the day of crescent invisibility and the later (by one cycle of 25 years) on the day of crescent visibility.

§107. In my mind there is not the slightest doubt that the cyclic calendar was in use during the period covered by the lunar dates. As pointed out in §61, we must choose a time for the introduction of the cycle when it would be in good general agreement with its underlying basis. Crescent visibility as a base must be considered ruled out by the demonstrated use of the cycle long before A.D. 144, when best agreement on that method would be obtained. That being so, we are logically driven back to the time around 357 B.C. for the inauguration of the cycle, at least in the form in which we have it,[76] with invisibility of the old crescent as its foundation.

§108. CONCLUSION. All the data we have considered—the beginning of the day, the names of the days of the month and their astronomical basis, the lunar calendar of Pap. Carlsberg 9, and the double dates of the late period—are in complete harmony with one another in demonstrating the proposition made at the beginning of this chapter. The Egyptian lunar month, therefore, did begin on that morning when the old crescent could no longer be seen.

CHAPTER II
THE LATER LUNAR CALENDAR

§109. FOREWORD. In our discussion of the starting point of the Egyptian lunar month in the last chapter we incidentally became acquainted with the cyclic lunar calendar of Pap. Carlsberg 9. In the present chapter we shall investigate the various problems which this calendar poses. It is my hope to demonstrate that we can restore its missing columns with virtual certainty, that it is not a correction or revision of a previous cyclic calendar, and that it is a schematization not of the original lunar calendar of Egypt but rather of what may more correctly be termed the later lunar calendar.

§110. THE COMPLETION OF THE CYCLIC CALENDAR. Pap. Carlsberg 9 gives only six dates for each year of the 25-year cycle. The problem is whether the remaining dates (six or seven) were determined by observation of the old crescent or by rule, and, if by rule, what that might be.

§111. The supposition is that the missing dates were not tied up with observation. The obvious advantage of a cyclic calendar is that it avoids this necessity, and a calendar which would operate half by rule and half by observation could not be regarded as a great improvement. There is, however, a stronger basis than supposition for believing that observation was not used. Of the seventeen calculated lunar dates, nine fall in months for which no date is given in the calendar scheme (cf. Table 3). Of these nine, only three agree with observation. Most striking are dates 9 and 10, which fall in cycle year 20, III šmw 2. The first of these, in 237 B.C., agrees with observation, while the second, exactly 25 years later in 212 B.C., is one day later than observation. Furthermore, if observation figured in half the calendar, it cannot have escaped attention through the centuries that the scheme as a whole was getting farther and farther away from reality (§107). There seems to be no ground on which to doubt, then, that the remaining dates were determined by rules. Can we formulate them?

§112. To assist us we have the nine lunar dates mentioned above and five certain dates in the I ꜣḫt column. This is owing to the fact that, in four cases, 60 days (in one other, 90) lie between the dates in IIII šmw and II ꜣḫt. These occurrences fall in the cycle years 5, 10, 15, 20, and 25. Consideration of them and the data summarized in Table 3 suggests the following rules for determining the unstated dates in the cyclic calendar:

§113. Rule I. The dates in I ꜣḫt are the same as those in II ꜣḫt. This accords with the five known dates in this column and also starts the calendar off on the first day of the year.

§114. Rule II. The dates in III ꜣḫt are the same as those in IIII ꜣḫt. This rule eliminates all but one stretch of three 30-day months, which falls at the end of cycle year 14 and the beginning of cycle year 15.

§115. Rule III. The dates in I prt and III prt are the same as those in II prt. This is based upon lunar dates 8 in cycle year 13.

§116. Rule IV. The dates in I šmw and III šmw are the same as those in II šmw. This is based upon lunar dates 2, 5, 7, 8, 9, and 10.

§117. Rule V. Epagomenal dates are the same as those in IIII šmw. This is based upon the one certain date in cycle year 14, where 90 days fall between IIII šmw 5 and II ꜣḫt 30.

§118. Rule VI. In months where two dates occur because of the year having thirteen months, the first agrees with the previously given columnar date and the second with the following given date. This develops out of Rules II, III, and IV.

§119. The complete calendar scheme is now presented in Table 5. The only column about which I feel any doubt at all is that of III ꜣḫt. It lacks a confirmatory date from any source, and one might propose, on the analogy of the latter part of the calendar, that its dates should agree with those in II ꜣḫt. We should then have, taking cycle year 2 as an example, a consistent pattern of 20, 20, 20, 19, 18, 18, 18, 17, 16, 16, 16, 15. This is plausible and attractive and may, indeed, be correct; but it has the objection that it would result in four stretches of three 30-day months (in cycle years 4-5, 9-10, 19-20, and 24-25) and one of four 30-day months (in cycle years 14-15). This situation is not impossible astronomically (§18), but it is unlikely that it would be introduced into a cyclic scheme. Certainty for this column, however, must await a definite confirmatory date.

TABLE 5

THE COMPLETED 25-YEAR CYCLE

	ꜣḪT				PRT				ŠMW				EPAG.
Months:	I	II	III	IIII	I	II	III	IIII	I	II	III	IIII	
Year 1	1	1	1-30	30	29	29	29	28	27	27	27	26	
2	20	20	19	19	18	18	18	17	16	16	16	15	
3	9	9	8	8	7	7	7	6	5	5	5	4	4
4	28	28	27	27	26	26	26	25	24	24	24	23	
5	18	18	17	17	16	16	16	15	14	14	14	13	
6	7	7	6	6	5	5	5	4	3	3	3	2	2
7	26	26	25	25	24	24	24	23	22	22	22	21	
8	15	15	14	14	13	13	13	12	11	11	11	10	
9	4	4	3	3	2	2	2	1	1-30	30	30	29	
10	24	24	23	23	22	22	22	21	20	20	20	19	
11	13	13	12	12	11	11	11	10	9	9	9	8	
12	2	2	1	1	1-30	30	30	29	28	28	28	27	
13	21	21	20	20	19	19	19	18	17	17	17	16	
14	10	10	9	9	8	8	8	7	6	6	6	5	5
15	30	30	29	29	28	28	28	27	26	26	26	25	
16	19	19	18	18	17	17	17	16	15	15	15	14	
17	8	8	7	7	6	6	6	5	4	4	4	3	3
18	27	27	26	26	25	25	25	24	23	23	23	22	
19	16	16	15	15	14	14	14	13	12	12	12	11	
20	6	6	5	5	4	4	4	3	2	2	2	1	1
21	25	25	24	24	23	23	23	22	21	21	21	20	
22	14	14	13	13	12	12	12	11	10	10	10	9	
23	3	3	2	2	1	1	1-30	30	29	29	29	28	
24	22	22	21	21	20	20	20	19	18	18	18	17	
25	12	12	11	11	10	10	10	9	8	8	8	7	

§120. As a spot check on the agreement of this calendar with observation, I have calculated the derived dates for the first two years of the cycle beginning 357 B.C.

1st Day of Lunar Month	Conjunction	Morning of Invisibility
Nov. 20, 357 B.C.	Nov. 21, 8:33 A.M.	Nov. 20
Jan. 19, 356 B.C.	Jan. 19, 4:05 P.M.	Jan. 19
Feb. 17	Feb. 18, 4:05 A.M.	Feb. 17
Apr. 17	Apr. 17, 9:07 P.M.	Apr. 17
June 16	June 15, 10:53 A.M.	June 15
Aug. 13	Aug. 13, 6:38 A.M.	Aug. 13
Oct. 12	Oct. 11, 1:22 P.M.	Oct. 11
Dec. 9	Dec. 10, 3:55 A.M.	Dec. 9
Feb. 6, 355 B.C.	Feb. 7, 2:44 P.M.	Feb. 7
Apr. 6	Apr. 7, 1:22 P.M.	Apr. 7
June 5	June 5, 3:45 A.M.	June 5
Aug. 2	Aug. 2, 4:31 P.M.	Aug. 2
Oct. 1	Sep. 30, 5:20 P.M.	Sep. 30

§121. Of the twelve given dates for these two cycle years, ten agreed with observation (§56). Of the thirteen derived dates, eight agree with observation. Eighteen agreements out of twenty-five give a percentage of correctness of 72, a high figure, considering the moon's variability and the relative simplicity of the calendar. I should think it quite likely that the rest of the calendar is up to the accuracy of the first two years.

§122. We shall find that this 25-year cyclic calendar is extremely useful for checking lunar data throughout Egyptian history. By means of it one lunar datum can easily be compared with another to determine whether or not they belong together.

§123. THE RULE GOVERNING INTERCALATION AND THE POSITION OF THE INTERCALARY MONTH. The next problem we have to discuss in our treatment of the cyclic lunar calendar is what months were intercalary. We know of course from Pap. Carlsberg 9 the years of the cycle in which there was an intercalated month (§50), but we are not informed where in the year that month falls.

§124. Fortunately, two of the double dates discussed in the last chapter (§§83, 86) name the lunar month as well as the civil month. They are:

(7) Ptolemy VIII Euergetes II. Year 28, IIII šmw (Mesore) 18 = 23d day of lunar Epiphi.[1]

(6) Ptolemy VIII Euergetes II. Year 30, II šmw (Payni) 9 = 6th day of lunar Payni.[1]

§125. Thus we know for certain that in date 7 lunar Epiphi began on the 26th of civil Epiphi and in date 6 lunar Payni began on the 4th of civil Payni. It may be taken for granted that it was the intention of the cycle scheme to have as great a synchronism as possible between the lunar and the corresponding civil months. We have already noted that date 6 belongs to cycle year 17, and we know that this cycle year is a great year, one in which there is an intercalation. Unless one wishes to upset completely the partial concord between lunar and civil months in this year, the only logical intercalary month is the one beginning on the third epagomenal day. It is also apparent that lunar Thoth of year 15 must have begun on civil Thoth 30, since, as we have seen, lunar Epiphi of this cycle year began on civil Epiphi 26. The intercalary month in cycle year 14, then, must be the one beginning on the fifth epagomenal day. Furthermore, since the only months beginning on the epagomenal days are in great years, it is an obvious conclusion that all months beginning then are intercalary, and the underlying principle must be that an intercalation is required to prevent the first of lunar Thoth from falling before the first of civil Thoth. If this were not the principle, we should hardly have lunar Thoth of cycle year 15 beginning on the 30th of civil Thoth, when without the intercalation in the preceding year lunar Thoth would begin on the fifth epagomenal day and would thus almost completely synchronize with civil Thoth. It seems incontestable that the beginning of the lunar year must not precede the beginning of the civil year.

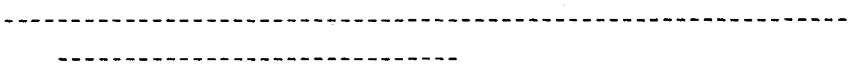
§126. Adopting this principle, then, we must place the remaining four intercalations (of cycle years 1, 9, 12, and 23) in civil Mesore (IIII šmw) 26, 29, 27, and 28, respectively. All intercalation would then be based upon a very simple rule, one which could have been easily applied before the 25-year cycle had been evolved, when intercalation was still empirical. Whenever the first day of lunar Thoth would fall before the first day of civil Thoth, the month is intercalary.

§127. There are two other possibilities, however, which must be dealt with. It might be suggested that no lunar month should begin before its corresponding civil month. If that were true, then in cycle years 1, 9, 12, and 23 we should have to make intercalary either the first or a later month. Assuming the former, note the result in cycle year 9. The intercalary month would begin on civil Thoth 4. Lunar Thoth itself would begin on civil Paophi 4. Not one day of the first eight lunar months would fall in the corresponding civil months in that year, quite contrary to the principle of synchronization between the two to the highest degree possible. Intercalation in the last month of year 9 would result in good synchronization.

§128. The suggestion might then be made that intercalation in these cycle years should be made with the first month in each dated to the 30th day of a civil month. This would avoid beginning any lunar month before its civil month, yet at least one day of each lunar month would fall in its civil namesake. The objection to this idea is that, while it would be theoretically possible once the 25-year cycle had been established, it is inconceivable before that time, when intercalation was empirical and must have been based on a simple and easily applicable rule. There is no reason to suppose that the cycle scheme was anything other than the systematization of long-established practice; that being so, the only simple and practical rule is the one which we formulated above. It is true that this would result at times in lunar months beginning before their corresponding civil months, but this was of no consequence so long as the beginning of the lunar year did not anticipate the beginning of the civil year.

§129. THE LAG BETWEEN LUNAR AND CIVIL MONTHS. The earliest date for the first of a lunar month is day 27 of the preceding civil month. This occurs in year 1, with lunar Mesore (IIII šmw) beginning on civil Epiphi (III šmw) 27. On the other hand, a lunar month may begin as late as the last day of its civil month, as in year 15, when lunar Thoth (I ꜣḫt) begins on civil Thoth 30. Graphically this is represented in Figure 12. The

Range of Lunar Month

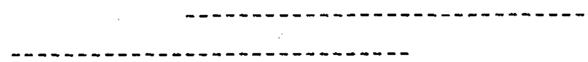


Civil Month

FIG. 12.—Possible relation between lunar and civil months.

mean first lunar day would be day 14 of the civil month. Figure 13 illustrates the mean relation between the lunar and the civil month:

Lunar Month



Civil Month

FIG. 13.—The mean relation between lunar and civil months.

§130. We shall return to this lag between the lunar and civil months when we discuss the phenomena from which Gardiner drew his conclusion that Mesore had once been the first month of the year (§§282-305).[2]

§131. THE FIRST SCHEMATIC CALENDAR. We have still to consider whether the calendar of Pap. Carlsberg 9 is something new or an older scheme corrected and brought up to date. This is a problem of fundamental importance for Egyptian chronology, since upon its solution depends our ability to use any earlier lunar datum with precision.

§132. The outstanding fact of the cyclic calendar is that it begins on I ꜣḫt 1. We have come to the decision that in this form it originated in the fourth century B.C. We have also seen that by A.D. 144 it was late by one day (§54). Had it been desired to correct it at that time, it would have been necessary to lower every date in the cycle by one day. The cycle would then begin not on I ꜣḫt 1 but on I ꜣḫt 30, with following dates just like those in cycle year 15.

§133. Despite the fact that in A.D. 144 the cyclic calendar was clearly no longer in agreement with lunar phenomena, it was not corrected. This is certain, since lunar date 1 falls in A.D. 190 and still fits exactly into the scheme (§67). Obviously, then, there was no provision in the calendar itself which required that periodically it be adjusted. Furthermore, if the present cycle were the result of a correction in the fourth century B.C. of an already existing cycle, instituted, let us say, 500 years earlier, that earlier cycle would have had to begin with I ꜣḫt 2, so that its correction would result in I ꜣḫt 1. This is exceedingly unlikely. While the first day of the year is unquestionably an appropriate day on which to start a calendar, the second, third, and fourth days (as would be the case with still earlier corrected cycles) have nothing to recommend them. These considerations lead inevitably to the conclusion that the calendar of Pap. Carlsberg 9 was original with the fourth century.

§134. The question may still be legitimately asked, however, whether any sort of schematic lunar calendar was in earlier use. We have already noted (§30) that Borchardt was of the belief that the Egyptians early adopted a conventionalized lunar calendar of alternating 29- and 30-day months, with now and again one of 31 days. As a result of this belief he allowed himself a latitude of as many as three days in equating lunar dates with the civil calendar, and frequently he accepted rather poor equations as being "kalendarisch" or "wohl kalendarisch."[3] With such a latitude and with the known repetitive character of lunar movement, it is too easily possible to obtain confirmation of chronological hypotheses based on lunar data.

§135. Borchardt based his schematic lunar year on a temple account of the Middle Kingdom which lists alternate temple-months of phyle-priests.[4] Since we shall go into this document thoroughly in Excursus C, I shall merely state here that his interpretation of the dates therein gave him the following sequence of months: 30, 29, 31, 29, 30, 29, 30, 29, 30, 29, 30, with the 31-day month ending on I ꜣḫt 20. Borchardt concluded that the year alternated 29- and 30-day months, and an extra day was added to the month ending in the first civil month in order to correct it, the implication being clear that the lunar year should start off correctly with an observed month's beginning.

§136. If a 31-day month could be proved (in Excursus C we shall see that it is quite unlikely that the present papyrus does so), then there would be grounds for acceptance of Borchardt's schematic year. But, even so, it may be categorically stated that a calendar which began with observation and then alternated 29- and 30-day months (or 30- and 29-day months) would be bound to average 50 per cent agreement with the correct astronomical beginnings of the months, and the difference between the date of any schematic month and the correct date could be as much as two days on only the rarest of occasions. This is easily demonstrated with actual dates. The first two years of the cycle beginning in 357 B.C. have been calculated in full (§§56, 120). In Table 6 the astronomically correct dates are shown in the central column. The left-hand column consists of schematic dates beginning with a 29-day month, the right-hand column of schematic dates beginning with a 30-day month; thus both possibilities are covered. It will be noticed that it is necessary to correct a 29-day month to 30 days when beginning the second year in the left-hand column. Since both schematic columns agree in twelve out of twenty-five with the true dates, the average of 50 per cent agreement claimed above is justified. Moreover, not one schematic date is off by two days. This in itself would be enough to cast doubt on many of Borchardt's equations.

§137. G. H. Wheeler, who offered another interpretation, based on Borchardt's readings, of the same papyrus, avoided the 31-day month and got instead the sequence of 29, 30, 30, 30, 29, 30, 29, 30, 29, 30, 29.[5] He too believed that he was dealing with a schematic calendar but with the difference that it substituted a 30- for a 29-day month every 32 months; but this postulates a knowledge of the length of the average synodic month which the Egyptians could not possibly have had. He stated further: "It is unlikely that the date for celebrating the new moon would be fixed by a separate astronomical observation every month."[6] But that is exactly what was done by all

TABLE 6

COMPARISON OF SCHEMATIC AND OBSERVATIONAL YEARS

Alternating 29 and 30		Astronomically Correct Dates		Alternating 30 and 29
I ꜣḫt 1	=	I ꜣḫt 1	=	I ꜣḫt 1
I " 30		II " 1	=	II " 1
II " 30		III " 1		II " 30
III " 29		III " 30	=	III " 30
IIII " 29		IIII " 30		IIII " 29
I prt 28		I prt 29	=	I prt 29
II " 28		II " 29		II " 28
III " 27		III " 28	=	III " 28
IIII " 27	=	IIII " 27	=	IIII " 27
I šmw 26		I šmw 27	=	I šmw 27
II " 26	=	II " 26	=	II " 26
III " 25		III " 26	=	III " 26
IIII " 25		IIII " 26		IIII " 25
I ꜣḫt 20	=	I ꜣḫt 20	=	I ꜣḫt 20
II " 20	=	II " 20		II " 19
III " 19		III " 20		III " 19
IIII " 19	=	IIII " 19		IIII " 18
I prt 18		I prt 19		I prt 18
II " 18	=	II " 18		II " 17
III " 17		III " 18		III " 17
IIII " 17	=	IIII " 17		IIII " 16
I šmw 16	=	I šmw 16	=	I šmw 16
II " 16	=	II " 16		II " 15
III " 15	=	III " 15	=	III " 15
IIII " 15	=	IIII " 15		IIII " 14

the other ancient peoples who used a lunar calendar. There is no certain proof that even in the latest times did the Babylonians substitute an arbitrary calendar for observation, and they knew considerably more about astronomy than the Egyptians did. Moreover, the lunar year was essentially a religious and priestly year, since the civil year was available for ordinary purposes, and it is quite legitimate to suppose that conservatism would operate against the early introduction of a schematic calendar.

§138. The dating of Thutmose III's Battle of Megiddo may be offered as evidence of such a calendar. The passage is: .[7] "Year 23, I šmw 21,[8] the day of the feast of pśdntyw exactly."[9] Now does this mean that the first day of the astronomical lunar month coincided with the first day of a schematic lunar month, or does it simply mean that the Battle of Megiddo happened to fall exactly on pśdntyw after that day had been determined by observation? The second interpretation is as plausible as the first, if not more so.

§139. The danger of arguing from the sequence of 29, 30, 30, 30, 29, 30, 29, 30, 29, 30, 29 that this is merely a schematic alternation of 29- and 30-day months, with one 29 corrected to 30, is emphasized by a consideration of the sequence in lunar date 8, which runs 29, 30, 30, 29, 29, 30, 30 (§89). Anyone who knew nothing of the 25-year cycle would almost certainly conclude that this sequence was the result of observation, not of rule. In the latter case we know schematic months are involved. In the former all we really know is that the sequence is one that could be produced by observation. We are completely unjustified, therefore, in assuming that, prior to the introduction of the calendar of Pap. Carlsberg 9, observation as the means of recognizing the month's beginning was certainly abandoned by the Egyptians. Further, we have no right to allow a latitude of two or three days in equating lunar dates. While errors in observation remain possible, we must nevertheless, as the only sound working basis in chronological study, give the greatest weight to that one of two or more possibilities which agrees with astronomical calculation.

§140. THE LATER LUNAR CALENDAR. We have decided that the first schematic calendar was introduced in the fourth century B.C. and that prior to that time there is no evidence that any other method than observation was used to begin the month. We have discovered the rule that regulated intercalation in the 25-year cycle and have seen that it is one which could easily have been operative before the cycle was installed. The essential point to observe is that the lunar calendar was governed by the civil calendar, since, whenever the first day of lunar Thoth would fall before the first day of civil Thoth, the month was intercalary (§126). Since the civil calendar moved forward through the natural year, the lunar calendar attached to it must likewise have moved with it. Moreover, this lunar calendar cannot have existed before the civil calendar was introduced.

§141. Since it is rightly taken for granted that a lunar calendar was in use in Egypt before the civil year was inaugurated (§33), two questions immediately pose themselves. First, what was the nature of the original lunar calendar and, second, when and why was the later lunar calendar introduced? An answer to the second question cannot be hazarded until we have investigated the civil calendar, and that, in turn, must await the answer to the first question, which we shall attempt to formulate in the next chapter.

CHAPTER III

THE ORIGINAL LUNAR CALENDAR

§142. EARLIER THEORIES. The belief in the existence of a lunar calendar in Egypt before the civil calendar was until but recently based almost exclusively on analogy with other primitive peoples[1] and on passages, frequently obscure, in classical writings. As a result of his study of the latter, Gatterer in 1786 had come to the conclusion that the Egyptians had three years: one, the civil year; another, fixed to the rising of Sothis (Sirius), which he termed the "astronomical year"; and a third, a lunar year governed by Sothis. According to him, the Nile began to overflow at the time of the summer solstice or the new moon. This new moon, called Neith, was the first one after the day on which Sothis rose heliacally, and as such it was the first new moon of the year.[2]

§143. Ideler (1825) thought that probably the Egyptians had originally a lunar year, but he rejected Gatterer's theory of one tied to Sothis. Since he also rejected the fixed Sothic year, only the civil year remained in his favor.[3]

§144. Lepsius (1849) accepted, besides the civil year, both the fixed Sothic year and a lunar year which he considered must have come before the others. He saw traces of this early year in the division of the civil year into twelve months and the use of a crescent as the hieroglyph for month. On the basis of the classical writers, he would have the lunar year begin around the summer solstice or the heliacal rising of Sothis.[4] No details were offered on the individual months or on the method of intercalation.[5]

§145. Martin (1864) and Hincks (1865) continued to maintain the existence of a lunar year tied either to the summer solstice or to the heliacal rising of Sothis. The former regarded such a year as necessary to keep certain feasts in their proper places as well as to provide the phases of the moon for astrological speculation. The commencement of this year was kept, by the intercalation of a thirteenth lunar month when necessary, at the last new moon before the heliacal rising of Sothis, or better at the first new moon after the solstice.[6] With this latter starting point agreed Hincks, who also, incidentally, credited the Egyptians with a wandering lunar year of twelve months only, as well as the civil year and the fixed Sothic year.[7]

§146. Brugsch (1891) apparently followed Lepsius in accepting an original lunar year beginning around the summer solstice,[8] although earlier (1883) he mentioned only one which ran concurrently with the civil year (the later lunar calendar).[9] Besides these calendar years, Brugsch maintained also the fixed Sothic year[10] as well as a fixed Canopic year.[11]

§147. Eduard Meyer (1904) recognized that the civil year of the Egyptians was an artificial creation, since neither month nor season nor even year corresponded to any natural period. Before the introduction of this year he believed that lunar months and a lunar year of some sort were used, but he offered no theory of such a lunar year.[12] The fixed Sothic year, accepted by so many other chronologers, he rejected.[13]

§148. Sethe's (1920) discussion of the lunar year was complicated by his inability to see it as a preliminary stage to the year of 365 days. While recognizing that lunar months must have been the earliest measure of time, he concluded that most plausibly the lunar year and the civil year were parallel in development, that the latter was not the daughter of the former, but rather her sister.[14] As the first stage of the civil year he saw a year of 360 days, with twelve months, after the model of a lunar year, of 30 days each.[15] In addition to the fully developed civil year, Sethe reaffirmed the fixed Sothic year, which would provide a necessary sacred calendar for the natural feasts.[16]

§149. Borchardt (1935) was the last chronologer to discuss all forms of the Egyptian year, both civil and lunar. According to him, the first year was lunar, and it began with the next lunar month after the heliacal rising of Sothis. When, because of the yearly shift forward of the lunar calendar by about eleven days, the first month of the year would fall before the rising of Sothis, the month was, instead, intercalary. The name of this intercalary month was wp rnpt. Proof of the existence of such a calendar was to be found in the Ebers calendar and in the names of certain of the lunar months. After this year had been in use for some time, the civil year was inaugurated, with its beginning marked by the heliacal rising of Sothis. Still later, the lunar year concurrent with the civil year was developed. By the end of the New Kingdom, or possibly later, the original lunar calendar fell entirely out of use and was superseded by the later lunar calendar, which was probably present in the Middle

Kingdom and certainly present in the New Kingdom.[17]

§150. **THE PROPOSED ORIGINAL CALENDAR.** So that the reader may follow the trend of my own argument through the pages of discussion ahead, I shall present at this point a statement of what I conceive the original calendar to have been.

§151. Whatever it may have been in prehistory, the first Egyptian calendar of record was lunar, and it was based upon the heliacal rising of the star Sothis. This event was called by the Egyptians wp rnpt, "Opener of the Year." The twelve months of the normal year were divided into three seasons, ꜣht, prt, and šmw, of four months each. The individual months were named after the most important feasts which occurred in them. The first month of the year, the month of the tḫy-feast, began with the first day of invisibility of the moon before sunrise after wp rnpt. This first day of the year was called tpy rnpt. The twelfth month of the year was named wp rnpt after that feast, which always had to fall in it. Because the lunar year was normally but 354 days long, whenever the first month began within 11 days of wp rnpt, it was intercalary, lest at the end of that year the feast wp rnpt fall out of its month. This intercalary month which occurred every three, rarely two, years was dedicated to Thoth, and a feast of this god, Ḏḥwtyt, was celebrated in it. Figure 14 illustrates the assumed regulation of the calendar.

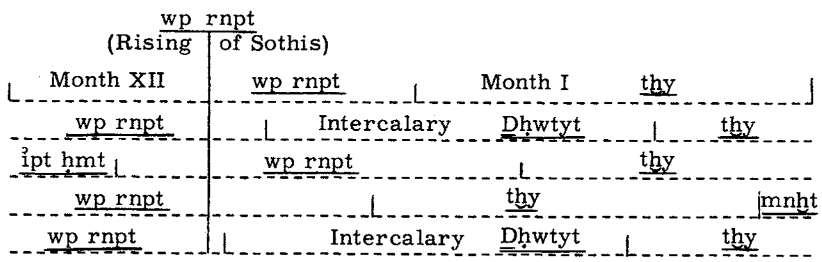


FIG. 14.—The proposed regulation of the lunar calendar.

§152. **THE PRIMITIVITY OF A LUNISTELLAR CALENDAR.** This type of lunar calendar, one whose beginning was determined by a star, is by no means unique among primitive peoples. The following quotation from Nilsson well illustrates this point:

> Immediately after the discovery of America it was already reported of certain tribes on the Mexican coast that they began the year at the setting of the Pleiades and divided it into moon-months. In Loango the months are counted from new moons, but Sirius, the rainy star, offers a means of correcting the reckoning sidereally. With the first new moon which sees Sirius rising in the east their new cycle of twelve months begins, and this must run as well as it can until the new year. When the cycle of months and the year do not fit, which happens about every three years, a thirteenth month must be inserted. This is the evil time, when the wandering spirits are at their worst. The Caffres have twelve moon-months with the usual descriptive names: on this account uncertainty often arises as to which month it really is. The confusion is always rectified by the morning rising of the Pleiades, and the reckoning goes on smoothly for a time, until the months once more get out of place and it becomes necessary to refer again to the stars in order to correct them. In Bali the Pleiades and Orion are observed for the purpose of correcting the calendar of moons by intercalation; thus the month kartika is doubled, or the month asada is prolonged until the Pleiades appear at sunset. Moreover, certain natural phenomena are observed. In New Zealand, where all months were described by stars, the year began with the new moon following on the rising of the winter star puanga (Rigel); the thirteenth month often passed unobserved, i.e. served as an intercalary month. Elsewhere we are told that the displacement of the moon-months in relation to the year was rectified through the observation of the rising of the Pleiades and Orion, and that the most accurate way of calculating the beginning of the year was to observe the first new moon after the morning rising of Rigel.[18]

§153. Most instructive in the above quotation is the reference to Loango, where the lunar calendar is also based on Sirius.[19] Loango is on the west coast of Africa, just south of the equator, and it is not impossible that its calendar either is due to Egyptian influence or is a cultural survival out of the ancient Hamitic substratum of eastern Africa,[20] from which Egypt drew so much and to which we have already pointed in comparing the beginning of the month in Egypt with the beginning of the month among the modern Masais and Wadschaggas (§25).

§154. Why the Egyptians should have chosen Sothis as the starting point for their year will be discussed in the next section. Here all it is desired to establish is the fact that the first Egyptian calendar need not have been the product of a highly developed culture. It had common roots with many other primitive calendars and must be characterized as quite normal and unspectacular.

§155. **SOTHIS AND THE INUNDATION.** How long a period passed before the formulation of the lunar calendar as suggested can only be guessed at. There must have been millennia when primitive man used only lunar months to reckon time; but after the period of food-gathering had begun to end for the earliest Egyptians and the period of food-producing had started, the division of time into larger units called "seasons" cannot have failed to impress itself on them, especially as with the increasing desiccation of the North African plateau more and more people had to retreat for food and water into the valley of the Nile, where the rhythm of the river from low water through inundation and high water back to low water again could not be disregarded. Life in the valley divided itself naturally into three seasons, the first of which was the period of inundation (3ḫt), from the time when the river first began to rise until its level had fallen again enough to expose the surface of the land and permit the sowing of seed. Following would come the second season (prt) that of seeding, tilling, growth, and harvest. Lastly came the period of low water (šmw), after the harvest and before the next inundation. Each one of these seasons, primitive man would come to discover, lasted about four lunar months, and over the centuries the idea would grow that months grouped themselves into seasons, and seasons into a larger unity called "year."

§156. The season of inundation, and with it the year, would begin, we may suppose, with the lunar month which started after the river first began to rise, and the year would then run until the next inundation. But this first rise of the Nile was, and is, quite a variable phenomenon. In a recent 32-year period (1873-1904) the rise began at Assuan as early as April 15 and as late as June 23, with the normal beginning in late May or early June.[21] During this same period the smallest number of days from one beginning to the next was 336 days and the greatest was 415 days. A lunar year controlled by the rise of the river might thus have as few as eleven or as many as fourteen lunar months. When this state of affairs became so distasteful to primitive man that he sought some other basis of control we cannot hope to know, but as we shall see (§172) it must have been at the very latest by the 1st dynasty.

§157. The brightest star of all is Sirius, the Egyptian Sothis. In §21 was explained its heliacal rising—the first day, after its long period of invisibility, when it again blazes forth in the eastern horizon just before sunrise. In 7000 B.C. in the latitude of Assuan, Sothis rose heliacally about May 16 Greg. By 3500 B.C., since the star's rising is delayed a day about every 120 years, it rose about June 12 Greg. One might surmise, then, that it was some time in the fifth or fourth millennium B.C., when the rising of Sothis and the normal beginning of the inundation were quite close together in time, that Sothis came to be recognized as the harbinger of the inundation.[22] It must have been after this recognition that the calendar was formulated. Primitive man, with the lunar month as his unit of time, would soon come to the realization that, while the interval between successive floods was highly variable, the interval between successive risings of Sothis was practically constant. Sothis' rising, then, could be used as a point of departure for a calendar of lunar months with three seasons, a calendar completely agricultural and based on the Nile and governed by Sothis only because Sothis itself had come to be the herald of the Nile. A few decades of trial and error would certainly be sufficient to work out the simple rule of intercalation, so that the event of wp rnpt would be maintained properly in the last month of the year. Once that had been worked out, the prehistoric and protohistoric Egyptians would be in possession of a quite adequate calendar. Its variability would be regarded, at that early time, as a minor factor of little inconvenience, and it always remained in harmony with nature.

§158. THE MOON AND SOTHIS IN TEXTS. There are a few textual references to the moon or Sothis, mainly from the late period, which connect either or both to a form of year. The following selection, arranged chronologically, may be regarded as typical:

§159. (1) Pyramid Texts §965. Osiris is addressed.

"It is Sothis, thy daughter, thy beloved, who has made thy year-offerings in this her name of Year[23] . . ."

§160. (2) Hymn to Amon-Re in the temple of Hibeh. Darius I.[24]

"Amon, the ram, who is in his right eye (= the sun), is in his disk in the sky daily and forever. . . . Amon, the ram, who is in his left eye (= the moon), the moon in the night, the ruler of the stars, who divides day and night, months, and years . . . ."

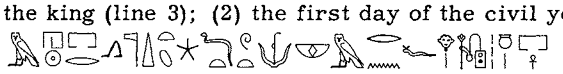
§161. (3) Mariette, Denderah I, 19g = Brugsch, Thesaurus, p. 100. It is said of Isis-Sothis

"Years are reckoned from her shining-forth."

§162. (4) Temple of Khnum at Esna.[25]

"One rejoices in the moon (ỉwn-ḥᶜᶜ) at the beginning of the months; he guides all feasts at the beginning of the seasons."

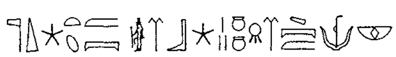
§163. It is clear that these texts are not decisive as to the kind of year involved. In the absence of any other data, one could argue from texts 1 and 3, as has indeed been done,[26] that the year concerned was the fixed or Sothic year, one whose first day always fell on the day of the heliacal rising of Sothis. With this year I shall deal shortly. For the moment it is merely necessary to point out that a lunar year based on the rising of Sothis would suit the passages quite as well.

§164. THE MEANING OF WP RNPT AND ITS EQUIVALENCE TO PRT SPDT. In our consideration of the data bearing on this problem we shall do well to begin with the latest period chronologically. The decree of Canopus affords a good point of departure, as it gives no less than three meanings to wp rnpt: (1) the birthday of the king (line 3); (2) the first day of the civil year (line 22); (3) the heliacal rising of Sothis (line 18):  "on the day of the going-forth of Sothis, called wp rnpt in name in the writings of the House of Life." We may dismiss the first meaning with the briefest discussion. We shall soon in these pages investigate the close relationship between the two events wp rnpt and ms̀wt Rᶜ, "the birth of Re" (§237). Brugsch long ago surmised that what was really meant by wp rnpt in line 3 of the Canopus decree was ms̀wt Rᶜ in the sense of the birth of the earthly Re, the king.[27]

§165. As first day of the civil year, wp rnpt was not uncommon from the Middle Kingdom on. The contracts of Hepzefi clearly support this interpretation,[28] but prior to that period there is no evidence at all to justify it. Furthermore, we shall see that wp rnpt was in existence before the civil year was inaugurated, so that its application to the first day of that year can only have been secondary and through analogy with the lunar calendar.

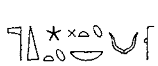
§166. That the primary meaning of wp rnpt was the heliacal rising of Sothis is clear from a number of passages other than the decree of Canopus. I quote a selection of them:

§167. (1) Chassinat, Dendera, III, 35. Hathor is addressed as



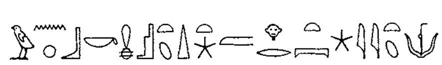
"Sothis in the sky, sovereign of stars, rising in the sky on wp rnpt."

§168. (2) The astronomical ceiling at Dendera (Brugsch, Thesaurus, p. 10). Sothis is depicted as a recumbent cow in a boat.



"Sothis the great, lady of wp rnpt."

§169. (3) The Ramesseum astronomical ceiling (Pl. II = LD, III, 171-170).



"Thou (Ramses II) risest like Isis-Sothis in the sky on the morning of wp rnpt."

§170. (4) The renewal by Thutmose III of Sesostris III's calendar of offerings in the temple of Semneh (LD, III, 55, a, 11. 8-11 = Brugsch, Thesaurus, pp. 399-400 = Urk., IV, 193-96) lists six feasts in what appears to be chronological order: (a) tp trw, "feast of the beginning of the season," which must have fallen on I ȝḫt 1; (b) tp trw, which must have fallen on I prt 1; (c) wp rnpt; (d) ḥb ḫsf ᵓIwntyw, "feast of repelling the Troglodytes," on IIII prt 21; (e) tp trw, which must have fallen on I šmw 1; (f) feast of I šmw 1. Since the festival of wp rnpt fell between

I prt 1 and IIII prt 21, it obviously could not have been the first day of the civil year. We have, however, only to recall that in the seventh year of Sesostris III prt Spdt, "the going-forth of Sothis," took place on IIII prt 16[29] to conclude that wp rnpt here must mean prt Spdt.[30]

§171. (5) In the tomb of Khnumhotep occur two lists of festivals (Beni Hasan, I, 53-54 and Pl. XXIV; ibid., p. 61 and Pl. XXV; both in Brugsch, Thesaurus, pp. 231-34). The second includes wp rnpt. The first omits wp rnpt but includes prt Spdt. While the two lists are not virtual duplicates, it seems clear that the same festival is meant by both wp rnpt and prt Spdt.[31]

§172. (6) The right half of a tablet of the 1st dynasty (Petrie, Royal Tombs, Vol. II, Pls. V, 1, VIa, 2)[32] bears the figure of a recumbent cow (Isis-Sothis)[33] which has the sign for "year" with a stroke between its horns. (Figure 15). Underneath is a sign which is apparently ꜣḫt; and the whole can be plausibly read: "Sothis, the opener of the year; the inundation."

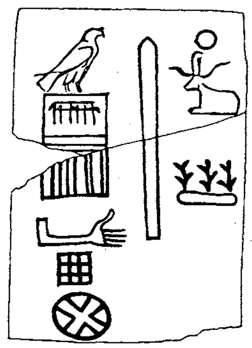


FIG. 15.—Ivory tablet of the first dynasty.

§173. Before considering the implications of the above passages, it remains to be pointed out that prt Spdt is not mentioned, so far as I know, either as a feast or as an astronomical event, before the Middle Kingdom. It does not occur in the lists of feasts in the Old Kingdom mastabas which we shall shortly discuss, nor have I found it on any stelas of the first Intermediate Period.[34] In the Middle Kingdom it does appear in tomb inscriptions (cf. Beni Hasan above) and stelas, though not together with wp rnpt.[35] When, later, it does appear with wp rnpt, we can feel sure that here wp rnpt means the first day of the civil year.[36]

§174. It cannot, I believe, be sheer coincidence that the Middle Kingdom was the time when the term prt Spdt first appeared and when wp rnpt came to mean the first day of the civil year. The explanation is to be found, as I see it, in the transfer of wp rnpt from its original special application. As "Opener of the Year" it would mean the heliacal rising of Sothis, assuming a lunar year based on Sothis. Thus, as a specific day, it did control, or open, the lunar year. When, however, the civil year had been developed, there came a time, the Middle Kingdom by all the evidence, when the first day of that year, the day which literally "opened" it, also came to be called wp rnpt.[37] Here the emphasis was on the day itself, not on any astronomical event which took place on it. Since by then the civil year had supplanted the lunar year in the life of the people, wp rnpt as the rising of Sothis was of interest mainly to the priests and the temples, and another term, prt Spdt, "the going-forth of Sothis," purely descriptive of the event, was adopted to name the feast in the civil calendar.

§175. So far we have dealt in the main with generalities. We have established the reasonableness of a primitive lunar calendar based on the rising of Sothis and also the fact that this rising was termed wp rnpt. In the following pages I shall present the evidence which has led me to the conclusion that the year which was opened by Sothis' rising cannot have been the civil year or the fixed Sothic year but must have been the natural lunar year.

§176. THE LISTS OF FEASTS IN THE MASTABAS OF THE OLD KINGDOM. Beginning in the 4th dynasty the mastabas of the Old Kingdom frequently exhibit a ḥtp-dỉ-nsw formula invoking Anubis (at times Osiris) and requesting prt ḫrw, "invocation offerings," on certain festivals.[38] If a number of these lists are examined, it will be found that the feasts tend to follow a definite order. A convenient source for this investigation is Mariette, Les mastabas de l'ancien empire, pub....par G. Maspero (Paris, 1889), and a summation of the 4th and 5th dynasty lists is presented in the following table.

THE ORIGINAL LUNAR CALENDAR

Order of Feasts

(1) wp rnpt	(5) ḥb Skr	(9) (ꜣbd)* (n) śꜣd
(2) Ḏḥwtyt	(6) ḥb wr	(10) (tp) ꜣbd
(3) tpy rnpt	(7) rkḥ	(11) tp śmdt
(4) wꜣg	(8) prt Mn	(12) ḥb nb rꜥ nb or variant

Mastaba No.	Feasts Listed
4th Dynasty	
C 3	All
C 9	All
C 18	1 - 6
C 21	All
C 22	1 - 6; 10 - 12
5th Dynasty	
D 10	1 - 6; 12
D 12	1 - 4; 6 - 12
D 16	1 - 5
D 19	All
D 23	1 - 9
D 24	1 - 9; 12
D 28	1 - 11
D 28	1 - 11
D 39	All
D 40	All
D 47	1 - 7; 10 - 12
D 48	1 - 9; 12
D 59	1 - 4; 12
D 60	1 - 8
D 62	1 - 6; 8 - 9
D 67	1 - 6; 12

*The parentheses inclose elements which may or may not be present in the name.

§177. The exceptions to the foregoing to be noted in Mariette's work are:

Mastaba No.	Order of Listed Feasts
4th Dynasty	
C 27	10, 11, 1, 2
5th Dynasty	
D 52	4, 2
D 60*	1, 3, 4, 2, 10, 11, 12
D 61	3, 1, 2, 12
D 69	1, 4, 2, 3, 5, 6, 7, 10, 11

D 38 has been omitted in both tables because of lacunae.

*See also preceding table.

§178. The exceptions to be found are certainly insufficient to weaken the overwhelming evidence of a strict order to the calendar of feasts in which the dead expected to take part. This order, it is easily demonstrated, can be nothing other than chronological. Whatever may be the exact meaning of wp rnpt and tpy rnpt, they clearly belong at the head of a list. If we now check feasts 4 to 8 against the later temple calendars[39] (Medinet Habu and the Greco-Roman temples), we find the following dates in the civil year on which they were celebrated:

(4) wꜣg	I ꜣḫt 18
(5) ḥb Skr	IIII ꜣḫt 26
(6) ḥb wr	II prt 4[40]
(7) rkḥ (wr)	II prt 9 (Edfu)
	III prt 1 (Illahun)[41]
(8) prt Mn	I šmw 11 (Med. Habu)

Nos. 9 - 11 were monthly feasts, celebrated at least twelve times a year.[42]

§179. There seems full justification for considering the Old Kingdom lists to be arranged chronologically. Moreover, there are reasons which will come out in the following pages for thinking that all the feasts, with, of course, the exception of wp rnpt, were lunar at that time.[43] The wꜣg-feast can be the movable lunar feast for which there is evidence from the Middle Kingdom (§182); rkḥ as the name of a lunar month cannot be other than lunar (§230); and the lunar character of prt Mn is brought out in the Medinet Habu calendar and later (§§204,240). The monthly feasts of ꜣbd and ś́mdt, and so probably of ś́ꜣd, were lunar. Furthermore, there is no other plausible explanation for the sequence wp rnpt, Ḏḥwtyt, and tpy rnpt than the assumption that the latter two also were lunar.

§180. The proposed original lunar calendar fits the chronological order perfectly, and I know of no other explanation. Wp rnpt was the rising of Sothis, the event which opened the new year but which, in itself, did not form part of it. Tpy rnpt was the first day of the new year, the first day of the month tḫy in which fell the feast of wꜣg; and the remaining feasts followed in chronological order. As for the feast of Ḏḥwtyt, between wp rnpt and tpy rnpt, this can be nothing other than the feast of the intercalary month which would occur at three- (at times two-) year intervals. As a special month it was fittingly dedicated to Thoth, the moon-god.

§181. The one objection that might be brought against the proposed calendar has to do with this feast of Thoth. In the Medinet Habu and later calendars, it is listed on I ꜣḫt 19, following the feast of wꜣg on I ꜣḫt 18 and preceding that of tḫy on I ꜣḫt 20. How is this to be explained? We shall investigate later in more detail how certain feasts of the lunar calendar were fixed in terms of the civil calendar. We shall see in the next section how the feast of wꜣg was fixed to the 18th day of the first month of the civil year, with the result that in the Middle Kingdom there were two such feasts, one fixed and the other movable. This same treatment must have been accorded many other feasts. But the feast of Thoth fell in an intercalary lunar month which had no counterpart in the twelve months of the civil year. What would be more natural than to assign it a place in the first month? In late times we know that this feast had so superseded tḫy in popularity that it gave its name to the month in which it fell.

§182. MIDDLE KINGDOM DATES OF THE WꜣG-FEAST. The Illahun papyri reveal clearly that, in addition to the wꜣg-feast celebrated on the 18th day of the first civil month, there was a movable wꜣg-feast, which in the examples known to Borchardt fell on various days in the tenth month of the civil year.[44] The clearest and most complete example dates the feast to II šmw 17 in year 18 of a king who can be none other than Sesostris III or Amenemhet III.[45]

§183. The assumption is, of course, that this movable feast fell on a certain day in the first month of the lunar year. The possibilities for the two kings may be tabulated as follows:[46]

	Sesostris III Year 18 = 1861	Amenemhet III Year 18 = 1825
wp rnpt = prt Spdt	IIII prt 19	IIII prt 28
1st lunar month after begins	I šmw 4	I šmw 5
2d " " " "	II šmw 4	II šmw 5
wꜣg-feast	II šmw 17	II šmw 17

According to Borchardt, both results would be satisfactory; he would call the first lunar month in each case an intercalary month.[47] But, according to his own definition (§149) "die Anfänge aller Schaltmonate liegen also hier auf oder vor dem Hundssternfrühaufgang." Apparently he did not notice the contradiction.

§184. Our proposed lunar calendar, however, would require an intercalation in the case of Amenemhet III only. Since the next lunar month began only seven days after wp rnpt, without an intercalation the twelfth month of the succeeding year, wp rnpt, would fail to include its eponymous feast. The month beginning II šmw 5 would properly be the first month of the year, tḫy, and the wꜣg-feast would fall within it. No such case can be made out for the

18th year of Sesostris III; there is no plausible explanation of II šmw 17 as the date of a wꜣg-feast in 1861 B.C.

§185. One further check substantiates placing the date under Amenemhet III. The tḫy-feast, which took place in the civil calendar two days after the wꜣg-feast,[48] was probably originally a full-moon feast.[49] It is a natural assumption that in the lunar calendar also it fell two days after the wꜣg-feast. In the case of Amenemhet III this would be II šmw 19, the 15th day of the month and the full-moon day. In the case of Sesostris III, II šmw 19 would be the 16th day of the lunar month.

§186. THE TEMPLE YEAR AT ILLAHUN. We have already had occasion to mention the temple account of the Middle Kingdom which lists alternating months of phyle-priests (§135). The six months enumerated began with II šmw 26, continued with IIII šmw 25, II ꜣḫt 20, IIII ꜣḫt ⌜19⌝, II prt 18, and ended with IIII prt 17. Since a twelve-month period is covered, the suggestion is strong that some sort of lunar year is involved. The six alternating months must then be either months 1, 3, 5, 7, 9, 11 or months 2, 4, 6, 8, 10, 12 of that year. The result of our calculations in Excursus C will be to fix the account to 1813-1812 B.C. At that time wp rnpt = prt Spdt took place on I šmw 1. This day is included within the last month listed, IIII prt 17 to I šmw 16; and this month would, according to the proposed original lunar calendar, be that of wp rnpt, the twelfth month of the year. The year began, then, one month before II šmw 26, on I šmw 27 or 26, correctly the first month of the lunar year following after wp rnpt on I šmw 1. The original lunar calendar would seem, therefore, to have been the basis for keeping account of the temple service in the Middle Kingdom, at least at Illahun; for that calendar does afford an explanation of why an account covering twelve months should begin on II šmw 26.

§187. Since I have been following a chronological order in the presentation of the data bearing on the nature of the original lunar calendar, a most controversial piece of evidence, the Ebers calendar, must now be dealt with. Under this topic a discussion of the fixed year is mandatory and cannot longer be postponed.

§188. THE EBERS CALENDAR AND THE FIXED OR SOTHIC YEAR. Since a photographic facsimile of the calendar is readily available in Borchardt, Mittel (Blatt 1 opposite p. 20), I shall present only a hieroglyphic transcription (Figure 16), which should be adequate for discussion purposes.

§189. This famous calendar, at the beginning of the verso of the medical Papyrus Ebers, has, since its initial publication in 1870 by Brugsch,[50] been the subject of innumerable chronological disquisitions. Prior to Borchardt's theory as set forth in Mittel, pages 19-29, it had come to be accepted that the first two lines of the calendar were to be translated: "Year 9 under the majesty of the King of Upper and Lower Egypt, Ḏśr-kꜣ-rꜥ (Amenhotep I), may he live forever. New Year's day, III šmw 9, the going-forth of Sothis."[51] Borchardt, however, came to quite a different interpretation. His conclusions were: (1) the names which appear in the first column are those of lunar months; (2) the first name, wp rnpt, is that of the intercalary month, and following it come the month names in the same order as we know them in Persian times (although some of the names are changed); (3) the repeated sign in the third column, which follows the designations of months of the civil year, is an abbreviation for pśḏntyw and is consequently to be read "new month day" and not "day 9"; (4) the purport of the first two lines of the calendar is that in the ninth year of Amenhotep I the intercalary lunar month wp rnpt began on a certain "new month day" which fell in the third month of the third season of the civil calendar, and that on this same day happened the rising of Sothis.

§190. A criticism of Borchardt's interpretation has been offered by W. F. Edgerton.[52] He limits himself to a consideration of the hieratic group which Borchardt wished to read as an abbreviation for pśḏntyw, objecting that no exact parallels for such a writing were cited[53] and that, while it is the normal hieratic group for 9, it is also (contra Borchardt) the exact form which was used for "9th day of the month" at that time.[54] His objection is cogent, and Borchardt's interpretation of "day 9" as pśḏntyw must be considered highly unlikely. What, however, of the rest of his theory? May it still be true that the first column lists lunar months?

§191. As a starting point, it is clear that the calendar deals with two kinds of years, the second of which must be the civil year, since it dates the rising of Sothis to III šmw 9 and it is inconceivable that Amenhotep I reigned at such a time that this event could be dated so in any other calendar ever devised by chronologers. Leaving to one side for the moment the identification of the other year, in the first column, we must consider the purpose of the calendar, which is to present a table of correspondence between the months of the first column and the civil year.[55] The necessity for this table is to be found in the contents of the papyrus, since certain recipes therein are restricted in use to certain periods of the year.[56] An obvious conclusion, then, is that the papyrus year is that of the first colum, since if the civil year were intended no correspondence table would be necessary.

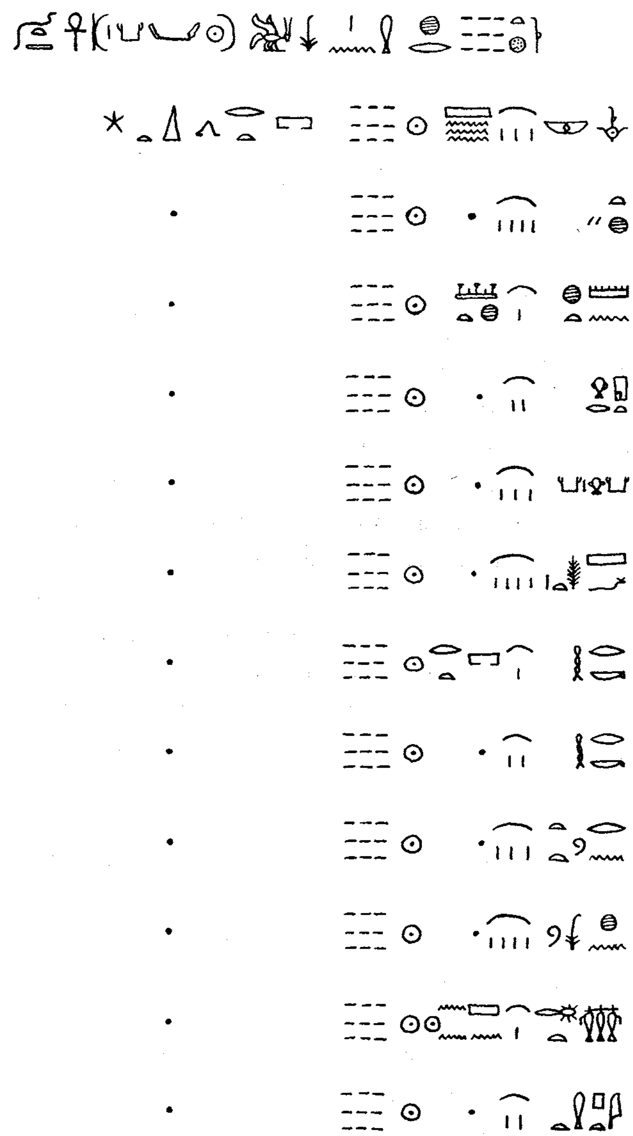
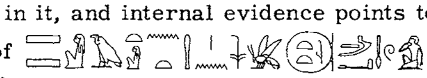
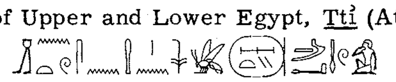


FIG. 16.—The Ebers calendar.

§192. Though the papyrus was found at Thebes, Amon is not mentioned in it, and internal evidence points to quite an early date for its contents.[57] In lxvi, 15-16, is given a recipe of  "Shesh, mother of the majesty of the King of Upper and Lower Egypt, Tti (Atothis), justified"; and in ciii, 1-2, a book found under the feet of Anubis of Sḫm  "was brought to the majesty of the king of Upper and Lower Egypt, Smty (Usaphais), justified." Both are 1st dynasty kings, and it is a fair supposition that part at least of the papyrus contents, to the Egyptian of the 18th dynasty, went back to that remote antiquity.

§193. In turning now to the problem of the first-column year, we are confronted with at the most two possibilities. One is that the calendar is lunar and based on Sothis, and the other is that it is a fixed or Sothic year. The latter conclusion was that of Lepsius and, indeed, of most chronologers down to Sethe and Weill (§§196,211);[58] and the Ebers calendar has been regarded as strong evidence of a fixed year. I shall argue, in the next chapter, that the civil year was not inaugurated until after ca. 2937 B.C., a date later than that to which I tentatively assign the reigns of Atothis and Usaphais.[59] Since it is highly unlikely that a fixed Sothic year could have existed before the civil calendar, it is possible to conclude that when the recipes of the medical papyrus were being first compiled the only calendar known was the original lunar calendar. This, however, may be regarded as an argument of doubtful force, and I could not press it without an extensive investigation into early dynastic chronology which I am not prepared to undertake in this study. The arguments against the existence of a Sothic year must come, then, from other sources.

§194. Long ago Brugsch, who believed in a Sothic year, nevertheless felt compelled to admit that in all the inscriptions known to him, the decree of Canopus excepted, there was neither a word nor a sign which with certainty could be taken to name a 6th epagomenal day.[60] Nor has any such thing come to light since Brugsch's day. Moreover, it is the opinion of H. E. Winlock, in his recent study of calendar development in Egypt,[61] that

> . . . the ancient Egyptians, from the Old Kingdom to the Roman Period, have not left a single trace of such a fixed calendar. Out of the thousands which have survived from dynastic Egypt, not one document gives equivalent dates in the known "wandering" year and the hypothetical "fixed" year. Furthermore, by the time that relations with the outside world were such as to result in unprejudiced foreign evidence on the customs of Egypt, we find the Egyptian both ignorant of, and unreceptive to, the idea.[62]

§195. Proponents of the fixed year would argue that the Ebers calendar invalidates the first part of this quotation, and unfortunately Winlock does not discuss the point; but it is true that the evidence from the Greek period speaks against the fixed year. The decree of Canopus, which was an attempt to arrest the forward movement of the civil year as of 237 B.C. by the introduction of a 6th epagomenal day every fourth year, militates against the existence of a fixed year before that time; and this argument is reinforced by the fact that the decree was of absolutely no effect. The civil year continued on uninterruptedly, and the first undisputed fixed year in Egypt was the Alexandrian, which Augustus began (§23).[63]

§196. Despite the lack of evidence from the late period and the general presumption against a fixed year, its most recent protagonists, Sethe and Weill, have attempted to maintain it as a necessity for seasonal feasts. It is, of course, clear that a lunar year based on Sothis provides a calendar for the natural or agricultural year which is just as adequate as a fixed calendar based on Sothis. I do not believe that Sethe and Weill would have supported the latter, had they been aware of the existence of the former, especially since the arguments they advanced in favor of the fixed year, which we shall now consider in detail, are quite indecisive.

§197. (1) The offerings to the Nile at Silsile, to be made on III šmw 15 and I ꜣḫt 15, apparently at the period of low water and the beginning of the inundation, respectively, were founded in the first year of Ramses II, were confirmed by his son some 66 years later, and were again confirmed by Ramses III after another 40 years.[64]

§198. The first year of Ramses II (ca. 1300 B.C.) was only a few years away from the time when the rising of Sothis had fallen on the first day of the civil year (ca. 1313 B.C.), so that the civil calendar and the natural year were in harmony. A period of 106 years would cause a shift in the civil year of only 26 days, one which hardly required correction in view of the wide variability (as much as 80 days)[65] of the beginning of the inundation.

§199. (2) The festival of the harvest goddess Renutet was celebrated on I šmw 1. If this date were in the civil calendar, the harvest feast would move throughout the year, instead of remaining in the harvest season.[66]

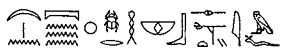
§200. Besides the feast of Renutet named in the Esna calendar on I šmw 1, there was another feast to the same goddess on I šmw 25.[67] The likely conclusion is that there was a movable feast as well as a fixed feast, just as there was a movable and a fixed wꜣg-feast in the Middle Kingdom. The feast fixed to I šmw 1 in the civil calendar would revolve around the natural year; but the movable feast, movable only in terms of a date in the civil calendar, would remain in place as far as the harvest was concerned if it was determined by the original lunar calendar. We shall see later (§§242-49) that the date of the Esna calendar is such as to lend support to such a conclusion.

§201. (3) The Edfu calendar lists on I šmw 1 a feast which was apparently a harvest festival, as in part of the ceremony Harsamtawi trod under foot grains of barley.[68]

§202. Sethe failed to mention that this festival, which was the voyage of Horus to Dendera, began on the first day of the lunar month I šmw. The journey began on pśḏntyw, and on the subsequent day of full moon there was a great feast in the entire land. In the original lunar calendar I šmw would fall in harvest time.

§203. (4) Part of the ceremonies of the feast of Min required that the king cut a sheaf of grain. The Medinet Habu calendar places the feast in I šmw 11.[69]

§204. Again Sethe failed to note that it is a lunar date which is involved. The heading over the reliefs on the feast (MH IV 197 : 1) gives no day date and merely states:



"I šmw, in it occurs the feast of Min." The calendar, however (MH, III, 167 : 1430), reads in full:

"I šmw 11, the day of the procession of Min to the terrace, the psḏntyw-feast being in the morning." Moreover, it is well known that Ramses III's calendar is a copy of Ramses II's, and we have noted in §198 that in the reign of Ramses II the civil calendar and the natural year were in harmony. That being the case, any harvest feast in the ninth month of the civil year would be quite proper, without any lunar calendar being involved; but, as we shall shortly see (§§238-41), the feast of Min was in truth regulated by the original lunar calendar.

§205. (5) The Medinet Habu calendar is a striking example of the fixed year because the rising of Sothis is dated in it to I ꜣḫt 1.[70]

§206. This is an error of Sethe's which he took over from Brugsch. The correct entry (MH, III, 152 : 629) is

"I ꜣḫt, when Sothis goes forth on her day." This could be any day in I ꜣḫt from 1 to 30, from ca. 1313 B.C. to ca. 1193 B.C. in the civil calendar. That range includes the whole reign of Ramses II, whose calendar was the prototype of Ramses III's, and part of the reign of Ramses III himself.

§207. (6) The Karnak water clock of Amenhotep III is based on a year beginning in the summer, which must be the fixed Sothic year.[71]

§208. The calibrations on the interior of the water clock are shown in Figure 17.[72] The theory of the clock is quite simple. It was filled to the brim with water at sunset. When the water, flowing out slowly through an outlet in the bottom of the clock, had dropped in level to the first mark of the appropriate month-scale, the second hour of the night began. The shortest scale is that of II šmw and the longest IIII ꜣḫt. From this one may conclude that I ꜣḫt 1 was near the autumn equinox, about October 5 in the time of Amenhotep III. It is perfectly clear, then, that the same day cannot have marked the rising of Sothis, since that event would take place about July 19. Consequently, the water clock is no example at all of a fixed Sothic year.[73]

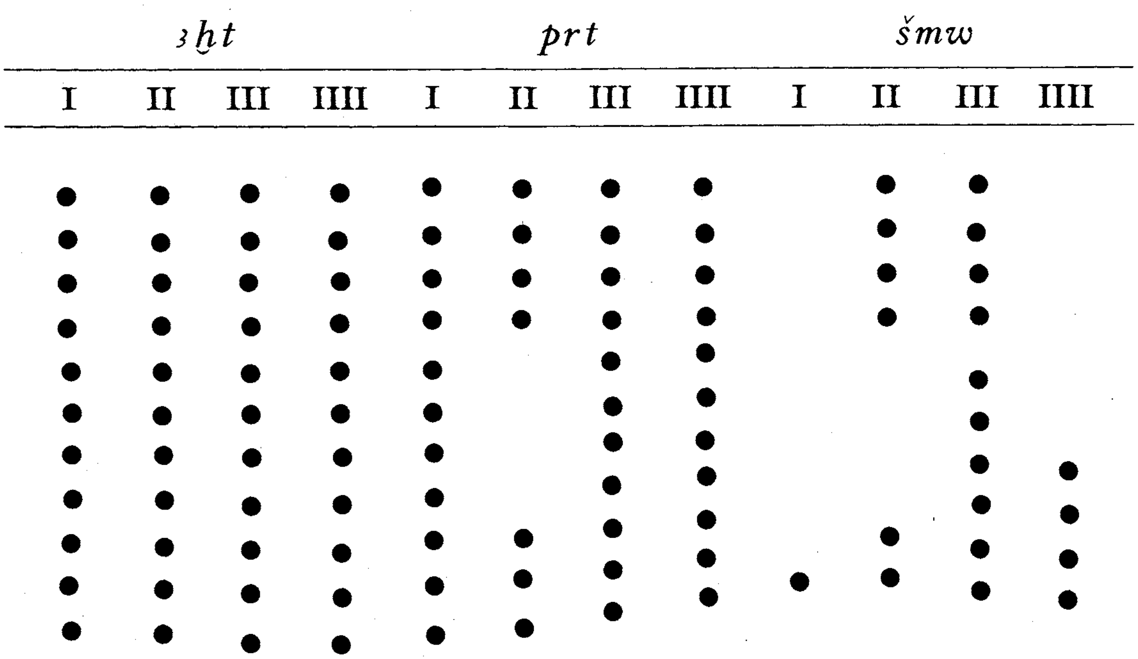


FIG. 17.—The calibrations on the interior of the water clock of Amenhotep III.

§209. (7) Plutarch, using the Alexandrian year, put the feasts of Osiris in the month of Athyr; and a correct equation with the month of Choiak, the proper month for the feasts, can only be made by having that month in a

Sothic year. Then Athyr 17-19 Al. would be equivalent to Choiak 28-30 Sothic.[74]

§210. The festivals of Osiris in the month of Choiak began on the 12th and ended on the 30th with the erection of the djed-pillar. According to Plutarch, Athyr 17 marked the death of Osiris,[75] and this certainly took place before Choiak 28. Moreover, Plutarch speaks of the ceremonies as extending over four days, but begins them on the 17th and concludes them on the 19th.[76] It is rather temerarious, therefore, to insist on the equation Athyr 19 Al. = Choiak 30 Sothic, when the correctness of the first element is in doubt and also when the four days of Plutarch may quite legitimately fall elsewhere in the period Choiak 12-30 than at the very end. Loret, at the close of his study of the Dendera texts on the Osirian feasts,[77] concluded that Plutarch had merely mistaken the month of Athyr for that of Choiak. While this must remain a possibility, what seems the more likely explanation is that the civil year was nearly the same as the "Sothic" year in the latter part of Plutarch's life (ca. A.D. 46 - ca. 120) and that his dates are simply those of the civil year rendered in terms of the Alexandrian calendar. Assuming that his four-day festival actually began on the 16th of Athyr, Athyr 16 Al. would be equivalent to Choiak 12 civ. in A.D. 76. Assuming that his festival actually ended on the 20th of Athyr, Athyr 20 Al. would be the same day as Choiak 30 civ. in A.D. 132. It is probable that his dates reflect a year which fell somewhere between A.D. 76 and the end of his life, and there is no need to postulate a Sothic year to account for them.

§211. To recapitulate, every argument that has been brought forward by Sethe and Weill to justify a fixed year is either based on incorrect information or is susceptible of another explanation. It is impossible to maintain the Ebers calendar as the sole evidence for the fixed year, since it too is susceptible of another explanation, which is that it is a table of concordance between the original lunar calendar and the civil year. There is plenty of clear evidence for the original lunar calendar and none at all for a fixed year; and since the Ebers calendar can have been made up with the former just as well as the latter, one would be foolhardy indeed to consider it proof of a fixed year.

§212. There are still difficulties, however, to be met in properly interpreting the first column. We have seen that Borchardt considered the month wp rnpt to be the intercalary month (though that would mean no listing of a twelfth month), as it headed the list and relegated to second place the month tḫy, which ought to be first. Furthermore, he dismissed as a "Fehlschluss" the conclusion of Gardiner,[78] following Brugsch,[79] that wp rnpt in an Edfu text is a variant name of the last month of the year, usually called Mesore (mśwt Rʿ).[80]

§213. In this last he was clearly wrong. The astronomical ceiling in the tomb of Senmut (§220-23 and Pl. I) gives the name of the last month of the year as wp rnpt, as do also the geographical papyrus of Tanis (Figure 18)[81] and the fragment of a water clock of Necho found recently at Tanis.[82] Moreover, a comparison of all the pertinent Edfu material leads to the same result.

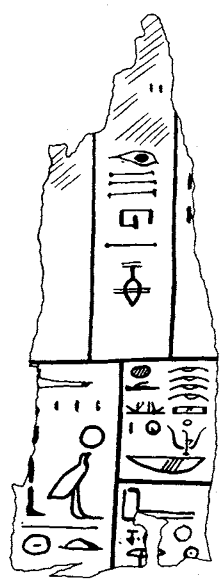
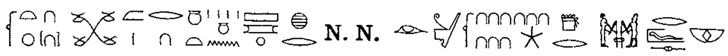


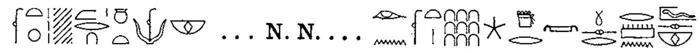
FIG. 18.—The fragment of the geographical papyrus of Tanis which names the last month of the year wp rnpt.

§214. (a) Edfou, VII, 7.



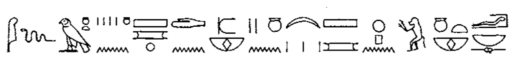
"Year 28, day 18 of the 4th month of šmw (Mesore) under Ptolemy VIII Euergetes II . . ., making 95 years since the foundation to the feast of entering it."

§215. (b) Edfou, IV, 8-9.



"Year [28], day 18 of wp rnpt . . . Ptolemy VIII Euergetes II . . ., making 95 years from the stretching of the cord to the feast of entering it."

§216. (c) Edfou, IV, 2.[83]



"Day 18 of the 4th month of šmw (Mesore), being day 23 of the 3d (lunar) month of šmw (Epiphi), this beautiful day of the feast of entering it."

§217. These three texts unquestionably refer to one and the same event, the completion and dedication of the main part of the temple of Edfu, and the equation between IIII šmw (Mesore) and wp rnpt is undeniable. In view of (c) it is impossible to consider wp rnpt a lunar month here, as Borchardt wished to do. Moreover, since wp rnpt is a variant for Mesore, it cannot be the name of an intercalary month. Why then does it head the Ebers calendar?

§218. The explanation is not complicated. The event which regulated the original lunar calendar was the rising of Sothis, called wp rnpt. The date of this event would, then, correctly go at the head of a calendar governed by it. But this event also gave its name to the last month of the year. In the first column of the Ebers calendar, therefore, the last month of the year appears at the head of the months merely because its eponymous feast determined the following year.[84] The correct interpretation of the second line of the calendar seems to me to be that the date III šmw 9 is common both to the going-forth of Sothis and to the beginning of the lunar month wp rnpt.[85] From this date as a starting-point was projected a schematic lunar calendar of full months of 30 days.[86] The failure of the scribe to reckon the epagomenal days is accordingly not deserving of blame, as it would be were we concerned with a fixed year. The schematic lunar calendar was regarded as exactly that; it was to be merely a guide to the proper identification of the lunar month which included the 9th day of any civil month in its first few days.

§219. On the basis of the original lunar calendar it is thus possible to offer a logical and consistent explanation of the Ebers calendar, with no necessary assumption of scribal error or carelessness.

§220. THE ASTRONOMICAL CEILING IN THE TOMB OF SENMUT. In 1926/27 the expedition of the Metropolitan Museum of Art uncovered an unfinished tomb of the well known 18th dynasty figure, Senmut.[87] By far the most interesting feature of the one decorated room is its ceiling (Pl. I). In the southern half (above in Pl. I) the decans are listed, while in the northern half are depicted the northern constellations in a central field and beside them twelve circles bearing the same names[88] that appear in the first column of the Ebers calendar. The upper row of circles runs from right to left and the lower from left to right. Each circle is divided into twenty-four segments. Under the circles are two opposing rows of deities bearing disks on their heads.

§221. It is my conviction that the circles represent the eponymous monthly feasts of the original lunar calendar, with the twenty-four segments each an hour of the feast day. The tḫy-feast is here correctly in the first place and wp rnpt in the last. A division of the year into the three seasons is indicated by the fact that months 1 - 4 are above and to the right of the central field, months 5 - 8 are to the left, and months 9 - 12 to the lower right. If the seasons were not intended, symmetry would dictate that six circles be on each side.

§222. It cannot be argued that the circles represent the civil months and the civil year. Not only does the Ebers calendar speak against that, but the clearest possible evidence that we are here concerned with a lunar calendar is the fact that the deities below the circles are deities of the days of the lunar month.[89] A comparison of the gods named here with those of the lunar months can easily be made by referring to Plate V or to Brugsch, Thesaurus, pages 46-48, where are summarized the Greco-Roman lists. Behind Isis on the right appear in order the gods of days 4 - 10; an eighth deity, h3kw, is not found in the late period. On the left ỉr m ʿw3 is the god of day 15, tknw of day 13, šd hrw of day 16, nhs of day 30; the remaining three are not in the late lists. Considering that the ceiling is more than a thousand years earlier than the late lists, the fact that four out of fifteen are unidentified is not enough to outweigh the strong presumption that they also are earlier lunar day deities who have been supplanted.

§223. Further support to the theory that the Senmut ceiling has to do with a lunar calendar is its analogy to the Ramesseum astronomical ceiling, to which we now turn. This ceiling, as we shall see, has an arrangement which is a strong indication of such a calendar, above and beyond what Senmut's has to offer.

§224. THE ASTRONOMICAL CEILING OF THE RAMESSEUM. Superficially this well-known ceiling with its balanced arrangement (Pls. II-III) bears slight resemblance to that of Senmut, but closer scrutiny shows that all the elements present in the one are also in the other, though partly in altered form. The Ramesseum ceiling is divided into three horizontal panels, the upper one of which corresponds to that half of the Senmut ceiling which lists the decans. The central band comprises the northern constellations flanked by the two opposing rows of lunar day deities which appear on the Senmut ceiling under the circles, with a few additions not found in the late lists. In the lowest panel, where we might expect the circles, there is the greatest change. Ramses II is shown making offering to various deities who represent the months. Eight out of twelve names are those found on the Senmut circles, so that the identification is certain. It is this listing of monthly deities, combined with the fact that an integral part of the Ramesseum upper panel is a strip divided into thirteen equal sections, in twelve of which are given the months and the seasons, which makes the arrangement so important a clue to the type of year depicted here. The essential elements are abstracted in Figure 19, where dotted lines join the individual month rectangles to the offering scenes of the lowest panel, denoted in each case by the deity concerned. The names added in the four parentheses are the variants from the Senmut ceiling. The most striking feature of the Ramesseum ceiling, now clearly observable in Figure 19, is the central blank rectangle of the top strip directly above and so obviously related to the cynocephalus on the djed-pillar, the well-known symbol of Thoth. What is here so graphically represented is, I am convinced, the intercalary thirteenth month of the original lunar calendar with its eponymous deity, Ḏḥwty, whose feast, Ḏḥwtyt, occurred in it.

§225. The Ramesseum ceiling must, then, be regarded as a schematization of the original lunar calendar; and indeed a more convincing representation is difficult to imagine.

§226. THE NAMES OF THE MONTHS. We have yet to discuss the genesis of the civil year and after that the transference of feasts from the lunar year to the civil. The proper place for such discussion is later. It is, however, necessary at this time to consider the names borne by the months, both lunar and civil, so that a path through the complexities of the subject may be afforded the reader. It was long ago pointed out by Brugsch that the names of months derived from important feasts celebrated in them.[90] I shall argue in this section that the Ebers calendar and the Senmut ceiling, with confirmatory data from the Ramesseum ceiling, give us the list of the monthly festivals of the original lunar calendar, that these names remained virtually unaltered at least through Ptolemaic times, that after the creation of the civil year the lunar festivals found a corresponding place in it, but that in the latter they were in the main superseded as eponymous feasts by others, some of which are the originals of the civil month names found in Aramaic, Greek, and Coptic documents. All this is, then, merely preliminary to an investigation into the lunar month names for their evidence on the nature of the first lunar year.

§227. For the lunar calendar the point of departure must be the astronomical frieze of the outer hypostyle hall of the temple of Edfu (Pls. IV - V). Here are depicted, after the decans[91] and the constellations of the southern and northern skies and the planets, the fourteen deities of the fourteen days of the waxing moon, shown before a staircase with fourteen steps, at the top of which is the wd3t-eye, the symbol of full moon on the 15th day, with Thoth adoring it. Following this are listed the deities of the thirty days of the lunar month, with each day and each deity named, after which (and this is what is important for our purpose) come the personified months of the year with their names. Since these months follow immediately upon the 30 lunar days, it is a quite justifiable conclusion that they in turn are lunar and the year they make is a lunar year. Last of all appear three figures

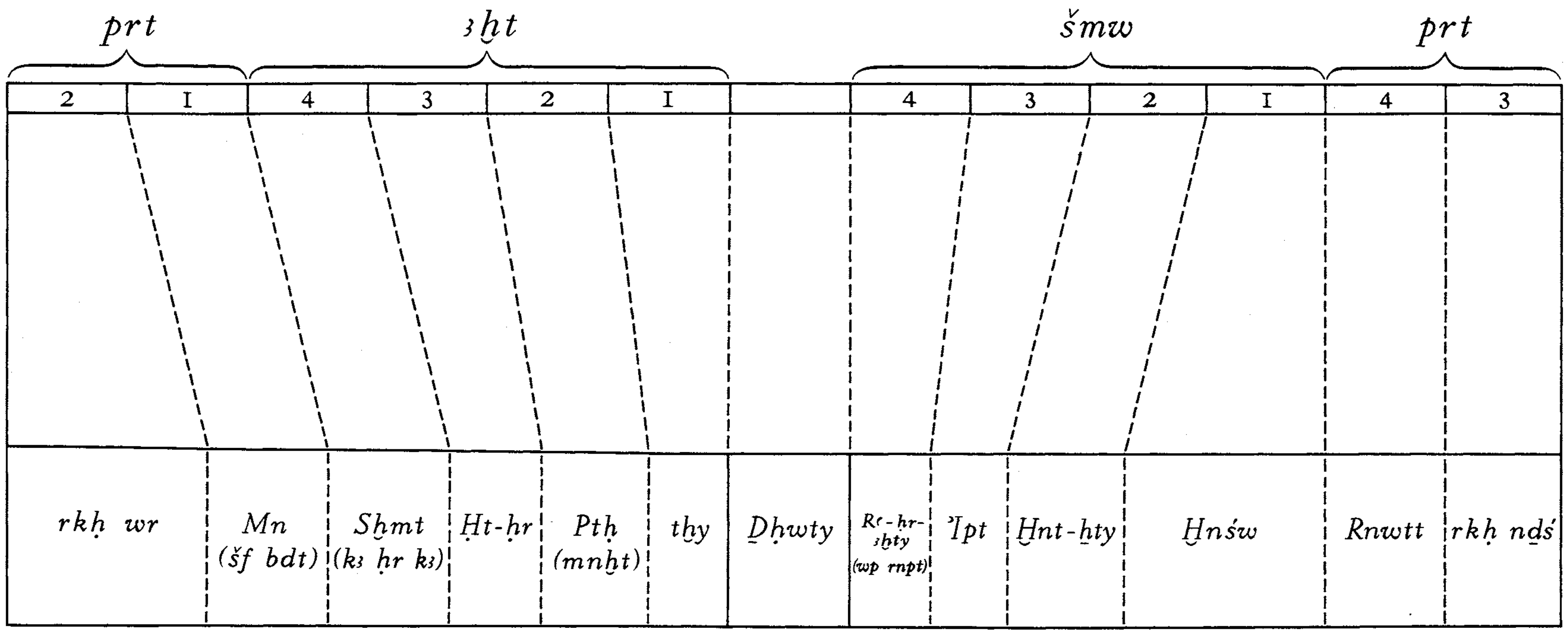


FIG. 19.—The original lunar calendar as depicted in the Ramesseum astronomical ceiling.

for the seasons.

§228. Now if the names of the months of this lunar year be compared with those of the Ebers calendar and the Senmut ceiling, it will be seen that they are virtually identical, except for the last month, which at Edfu is not wp rnpt but Rᶜ-ḥr-ꜣḫty, the same variant as is witnessed by the Ramesseum ceiling. Moreover, the eponymous deities of the Ramesseum ceiling are in general the same as those of the Edfu frieze.[92] We have, then, a well attested and unchanging lunar year, so far as the names of its months are concerned, from the early 18th dynasty down to the Ptolemies. This fact can be emphasized by reference to the names which the months of the civil year bore at the same late time. These have already been listed in §22, but more of an explanation is desirable than was there offered.

§229. In the Persian period of Egyptian history and later the ordinary business documents and temple records continued to record the months in dates after the earlier formula of I-IIII ꜣḫt, prt, and šmw. These, however, as Griffith pointed out,[93] were merely symbols, pronounced in each case by the name: Thoth, Phaophi, etc. This we know from the use of these names in the contemporary Aramaic papyri and tablets and from the Greek forms in the Ptolemaic papyri, as well as from the later Coptic. They were, like those of the lunar calendar, derived from festivals in each month, and their hieroglyphic equivalents have been traced back as far as the 19th and 20th dynasties.[94] This is not to say that at that early time the normal dating by month and season was regarded only as a symbol, as later, since we have such expressions as IIII prt 1 p-n Rnwtt, "IIII prt 1, the one of Renutet (Pharmuthi),"[95] and II šmw m p-n'Int, "II šmw, being the one of (the feast of) the Valley (Payni)."[96] The former is from the first half of the 20th and the latter from the late 19th dynasty. There seems little room for doubt that in the Empire the month and season continued to be read.

§230. In Table 7 are presented for comparative purposes the names of the months of the lunar year and the names of the months of the civil year, as attested in the 18th to 20th dynasty.[97] Study of this table is fruitful and illuminating. It is immediately apparent that the names of four lunar and four civil months are the same, those of Ḥt-ḥr, kꜣ ḥr kꜣ, Rnwtt, and Ḫnśw. This, to my mind, is a clear-cut indication that at some earlier time, nearer the date of origin of the civil calendar, all the months of the civil year had borrowed their popular names from the lunar year. As the centuries passed, however, and the civil year became more and more the important year in

TABLE 7

NAMES OF THE MONTHS

Lunar Calendar Month Names			Civil Calendar Month Names	
Intercalary		Ḏḥwtyt	Early	Late
I	ꜣḫt	tḫy	Ḏḥwty	Thoth
II	"	mnḫt	p-n'Ipt	Phaophi
III	"	Ḥt-ḥr	Ḥt-ḥr	Athyr
IIII	"	kꜣ ḥr kꜣ	kꜣ ḥr kꜣ	Choiak
I	prt	šf bdt	tꜣ ᶜꜣbt pꜣ ḫnw Mwt*	Tybi
II	"	rkḥ wr	p-n mḫr	Mechir
III	"	rkḥ nḏś	p-n'Imnḥtp	Phamenoth
IIII	"	Rnwtt	p-n Rnwtt	Pharmuthi
I	šmw	Ḫnśw	p-n Ḫnsw	Pachons
II	"	Ḫnt-ḥty	p-n ỉnt	Payni
III	"	'Ipt ḥmt	ỉpỉp	Epiphi
IIII	"	wp rnpt Rᶜ-ḥr-ꜣḫty	(mśwt Rᶜ-ḥr-ꜣḫty)† wp rnpt pꜣ šmt n Ḥr‡	Mesore

*The more usual early name; cf. Černý, Ann. Serv., XLIII, 175.

†This is not yet attested as a month name in the 20th dynasty. The reference in Černý is to the feast on I ꜣḫt 1 and not to IIII šmw. See § 236 later.

‡ The probable name for IIII šmw in ostr. Brit. Mus. 5639a, 4.

the life of the people, with new festivals having their places in it instead of in the older lunar year, it would not be at all surprising that certain festival names should have given way to newer and more popular ones. The clearest example of this is perhaps that of p-n ʾImnḥtp, "the one of Amenhotep (the deified Amenhotep I of the 18th dynasty)." This feast could not have come into being until after his death; but by the 20th dynasty it had become so popular that it superseded as a month name its presumable predecessor, rkḥ nḏś. The archaizing inscriptions of the Ptolemaic period, however, at times discarded the current names in favor of the earlier ones taken over from the lunar months. We have already noted in one of the double datings discussed in chapter I (§103) that the civil month was given not as III šmw but by the name ʾIp ḥmt·ś. This can only be the old lunar name which was later replaced by ỉpỉp, Epiphi. In the same building inscriptions the month of I prt is given as šf bdt,[98] and this must have been the predecessor of tꜣ ᶜꜣbt, Tybi. Besides these six names in common, the lunar intercalary feast of Ḏḥwty found a place in the first month of the civil year (§181), along with tḫy, and eventually gave that month its name. The variants for the last month of the year, both lunar and civil, we shall shortly treat of in some detail.

§231. What names were borne by the months of the later lunar calendar, the one which ran concurrently with the civil year, is not beyond conjecture. We have seen that a double date (§84) gave the lunar equivalent as "the 6th lunar day of ḫb ỉnt," and that ḫb ỉnt could be nothing other than a variant of p-(n) ỉnt, Payni, the name of the civil month II šmw. In all probability, then, when the months of the later lunar calendar were referred to by name, those names were the ones borne by the civil months, and not those of the original lunar calendar. This, of course, is exactly what we should expect.

§232. Having cleared the ground, we are now ready to search into the month names of the original lunar calendar for evidence of its structure. If the rising of Sothis did control this calendar, we may expect to find some appropriate indications, natural and seasonal, in the names of the months. In actual fact, four names do afford us such indications. They are (5) šf bdt, (6) rkḥ, (7) rkḥ, and (8) Rnwtt, the four months of the season prt; these are, respectively, the month of "Swelling of the Emmer,"[99] the two months of "Fire," usually differentiated by "Great" and "Small,"[100] and the month of "Harvest," in the person of the harvest goddess.

§233. In 3100 B.C., approximately the date of the union of the Two Lands, Sothis rose heliacally about June 20 greg. The first month of a lunar year regulated according to our thesis would begin within the approximate limits of July 1 - 30. "Swelling of the Emmer" would then fall approximately in November-December, the two "Fire" months in December-February, and "Harvest" in February-March. The exact meaning of šf bdt is not clear, but it undoubtedly had some reference to growth. November-December would be a not inappropriate time, since planting of seed goes on steadily through September and October as the flood water recedes from the land. "Harvest" in February-March would also fit quite well.[101] The two months of "Fire" require more detailed consideration.

§234. At Cairo the mean maximum temperature is 69° in December, 66° in January, 72° in February, 74° in March. The mean minimum for these four months is 50°. At Luxor the mean maximum is 76° in December, 74° in January, 78° in February, and 85° in March, with a mean minimum of 50° for all four months.[102] Clearly, December-February is the time when some degree of artificial heat would be welcome. Now all occurrences of rkḥ in the festival lists of the Old Kingdom described above (§§176-81) exhibit the determinative of the brazier with a flame rising from it ( )—artificial heat. The conclusion, however, that the principal feasts of two months were concerned with such a phenomenon might be considered somewhat rash, did not an exact parallel from Mesopotamia firmly establish the practice.[103] There the month later known as Arahsamna was originally called waraḫ kinūnim, "the month of the brazier or hearth-fire"; and indeed the characteristic ceremonies of Arahsamna, Kislimu, and Tebetu (November-January) were based upon the kinūnu, the hearth fire.[104] The month of waraḫ kinūnim has also been found in the calendar of Mari[105]—a further indication of how natural the use of such a name was to the ancient Near East.

§235. Sethe, who had a theory that originally the year began with the winter solstice and the month mśwt rᶜ, "Birth of Re," a variant name, as we have seen (§213), for the month wp rnpt, considered the rkḥ-months to be those of solar heat in the summer; but, in order to fit in šf bdt and Rnwtt properly before and after them, he had to make them later additions to the month names, after the year had shifted forward.[106] Borchardt rightly objected that there was very little basis for such a theory;[107] and Sethe himself pointed out that there is no evidence at all in Egyptian records to demonstrate the four points of the sun—a clear-cut argument against recognizing the winter solstice in mśwt Rᶜ.[108]

§236. If one thus rejects Sethe's explanation of the name mśwt Rᶜ, he is in duty bound to offer an alternative. This I now propose to do. The following facts are at our disposal. The primary meaning of wp rnpt was the heliacal rising of Sothis. The festival celebrating this event gave its name to the last lunar month of the year. A variant name for the same month derived from the festival of the birth of Re. Both these names and probably one other, pꜣ šmt n Ḥr, "the going-forth of Horus," were taken over as designations of the last civil month. A secondary application of the name wp rnpt was to the first day of the civil year, I ꜣḫt 1. This day was also known as mśwt Rᶜ-ḥr-ꜣḫty at least as early as the 20th dynasty[109] and as mś(wt) ỉtn, "the birth of the sun disk," and mś(wt) Rᶜ in the Ptolemaic period.[110] The two names were frequently combined at Dendera when the feast celebrated on I ꜣḫt 1 was referred to as ḥb Rᶜ m wp rnpt, "the feast of Re as the opener of the year."[111] Gardiner, seeing in wp rnpt a solar feast, held it to commemorate "the moment when the sun-god, in his first act of rising, opened the succession of months and years, as the originator of which he is so often eulogized. But the first rising of Re was also the instant of his 'birth' (Mesore), the occasion of his earliest 'going forth' (pꜣ šmt n Ḥr)."[112]

§237. Gardiner's statement should be applied, I believe, not to the day of the secondary application of wp rnpt but to the day of its primary meaning, the rising of Sothis. It was on such a day, according to the tradition preserved by two late classical writers, that the world came into existence. According to Porphyry (de antro nympharum 24),

> Αἰγυπτίοις δὲ ἀρχὴ ἔτους οὐχ' ὑδροχόος, ὡς Ῥωμαίοις, ἀλλὰ καρκίνος. πρὸς γὰρ τῷ καρκίνῳ ἡ σῶθις, ἣν κυνὸς ἀστέρα Ἕλληνες φασί. νουμηνία δ' αὐτοῖς ἡ σώθεως ἀνατολή, γενέσεως κατάρχουσα τῆς εἰς τὸν κόσμον.

> for the Egyptians the beginning of the year is not Aquarius, as for the Romans, but Cancer. For near Cancer is Sothis, which the Greeks call the dog-star. Their new moon is the rising of Sothis, which is the beginning of generation in the world;

and Solinus (Polyhistor 32. 12-13) states that

> quod tempus sacerdotes natalem mundi indicaverunt, id est inter XIII k. Aug. et XI.

> this time (the rising of Sirius) the priests have decided to be the birthday of the world, that is, the time between the 13th and 11th days before the Kalends of August (July 20-22).

To the ancient Egyptian who used a lunar year based on the rising of Sothis, any other day than that one for the creation of the universe would have been unthinkable, for that event determined the months and the seasons in their proper succession. How could the world have begun on a day in the season of prt, for example? There would have been no inundation, and the seed would not have been sown. But shortly after Sothis rose heliacally for the first time, and the world came into being, the sun-god Re also rose for the first time. That first day of wp rnpt was also, in very truth, the day of mśwt Rᶜ. So easily, then, could the one day have two names and the last month of the lunar year and the civil year have two names. So easily also, when the one term of wp rnpt was taken over and applied to the first day of the civil year, could the second term mśwt Rᶜ have been taken along with it and applied to the same day.

§238. THE FEAST OF MIN IN THE PTOLEMAIC PERIOD. In lines 13 and 14 of Cairo Dem. Pap. 30801 (§90) occurs the significant entry: "Horsiese, son of Hetpesobk, for the service from III prt 19 to IIII prt 17 [of the third phyle, for the grain-rations] and the food of the priests for the feast of Min, and the extra expense of the temple, wheat 10 (artabas)."

At Gebelein, then, in the 26th year of Ptolemy VIII Euergetes II (144 B.C.) or, as a remote possibility (§97), in his first year (169 B.C.), there was a festival of Min which took place on some day or days of the lunar month beginning III prt 19. The calendar of Esna has a procession of Min-Amon on I šmw 1. Whether this date is lunar or civil is uncertain, but not significant, since in A.D. 175-76 when the Esna calendar was compiled (see the following section) the original lunar year and the civil year were again in complete harmony.[113] The Medinet Habu calendar, however, as we have already seen (§204), dates the feast of Min to pśḏntyw of šmw, and, since at this time the civil year and the natural year were almost in harmony, it is a logical deduction that the lunar month whose first day began the feast was likewise I šmw. We have now to see whether the original lunar calendar, which provided a natural calendar for such harvest festivals, can explain the equation III prt 19 (civ.) = I šmw 1 (lunar).

§239. In 145 B.C. wp rnpt took place on July 19 or 20, II šmw 25 or 26 (civ.), year 12 of the cycle (§§49-64) beginning 157 B.C. In this year the first lunar month after II šmw 25 began on II šmw 28. Since this date is within eleven days of wp rnpt, according to theory it must have been the intercalary month Ḏḥwtyt. By continuing with the cycle dates, we arrive at the following table:

Civil Year					Lunar Year		
II	šmw	25	wp rnpt	July 19, 145 B.C.			
II	"	28		July 22	Intercalary		Ḏḥwtyt
III	"	28		Aug. 21	I	ꜣḫt	tḫy
IIII	"	27		Sep. 19	II	"	mnḫt
I	ꜣḫt	21		Oct. 18	III	"	Ḥt-ḥr
II	"	21		Nov. 17	IIII	"	kꜣ ḥr kꜣ
III	"	20		Dec. 16	I	prt	šf bdt
IIII	"	20		Jan. 15, 144 B.C.	II	"	rkḥ wr
I	prt	19		Feb. 13	III	"	rkḥ nḏś
II	"	19		Mar. 15	IIII	"	Rnwtt
III	"	19		Apr. 14	I	šmw	Ḫnśw

§240. We might have placed Q.E.D. after the last line of the tabulation, since the equation comes out exactly. This is, to my mind, not only a convincing proof of the correctness of the proposed theory of the lunar year but also a smashing refutation of the need for a fixed Sothic year postulated by Sethe and Weill. Natural feasts were governed by the natural lunar year from the beginning of Egyptian calendar-making right down to the last days of Egypt under the Greeks and the Romans. Nor is this affirmation vitiated by the statement of the decree of Canopus, according to which it was desired that the feasts which were celebrated in winter should not come to be celebrated in the summer (line 21). That this had nothing to do with the natural year but was simply a desire to retain the status quo of the civil year is apparent from the means taken to attain the end. Since the rising of Sothis took place on II šmw 1, the civil year was at variance with the natural year by a full three months. Instead of correcting the calendar by advancing it three months, which would have been necessary had it been desired to fit the civil year to nature, and thereafter having a sixth epagomenal day every four years, all that was proposed was to have a sixth epagomenal day every four years and freeze the status quo. Such a decree inferentially argues for the existence of a year which actually did control the natural feasts, so that the attempt would be merely to keep to their present seasons the feasts of the civil year which really had no concern with nature.

§241. It was mentioned above that there was a remote possibility that the temple account was to be placed in the first year of Ptolemy VIII, 170 B.C. The tabulation for that year also would result in verification of the equation and of the proposed lunar calendar. Wp rnpt fell on II šmw 18, and again, since the following lunar month began within eleven days, on II šmw 28, it would be intercalary.

Civil Year					Lunar Year		
II	šmw	18	wp rnpt	July 19, 170 B.C.			
II	"	28		July 29	Intercalary		Ḏḥwtyt
III	"	28		Aug. 28	I	ꜣḫt	tḫy
IIII	"	27		Sep. 26	II	"	mnḫt
I	ꜣḫt	21		Oct. 25	III	"	Ḥt-ḥr
II	"	21		Nov. 24	IIII	"	kꜣ ḥr kꜣ
III	"	20		Dec. 23	I	prt	šf bdt
IIII	"	20		Jan. 22, 169 B.C.	II	"	rkḥ wr
I	prt	19		Feb. 20	III	"	rkḥ nḏś
II	"	19		Mar. 21	IIII	"	Rnwtt
III	"	19		Apr. 20	I	šmw	Ḫnśw

§242. THE FEAST OF RENUTET IN THE ESNA CALENDAR. It was stated above (§200) that there were two feasts of Renutet listed in the calendar of the temple of Esna. One fell on the usual date of I šmw 1, the other on I šmw 25. The explanation was suggested that there was both a fixed and a movable feast of Renutet, just as there was a fixed and a movable wꜣg-feast in the Middle Kingdom. If this suggestion be correct, then the movable feast ought to be one celebrated according to the natural lunar calendar. In order to test this, we have first of all to assign a date to the compilation of the Esna calendar.

§243. In this calender[114] there are listed three feasts of wp rnpt: (1) on I ꜣḫt 1 (l. 1); (2) on I ꜣḫt 9: , "the feast of wp rnpt, so called by the ancestors,"[115] (l. 1); (3) on II šmw 26 (l. 15).

§244. The Esna calendar is not dated to any king, but the royal names in the reliefs which flank it suggest that it must fall in the period from Domitian (A.D. 81-96) to Caracalla (A.D. 211-17). The natural assumption is that the wp rnpt of I ꜣḫt 9 is the rising of Sothis. With an arcus visionis of 9°0 and Memphis as the point of observation, Sothis would rise on I ꜣḫt 9 in the years A.D. 173-76, in the reign of Marcus Aurelius. With Esna as the observation point, the years would be 190-93, all but the last being in the reign of Commodus. Both of these kings had a part in the decoration of the hypostyle hall, and the calendar could thus be ascribed to either.

§245. In line 17 of the calendar, however, we have the significant entry: "Day 20 (of IIII šmw). Feast of the 29th lunar day (ḥb ꜥḥꜥ ...)." Why this particular lunar date was incorporated into the calendar we shall never know, but it is of prime importance. We learn from it that, in the year from which calendar dates were drawn, a lunar month began on III šmw 22. At this time the 25-year cycle must still have been in operation. III šmw 22 falls in the seventh cycle year, and this can only be A.D. 175/76.[116] Thus lunar date and Sothic date agree on this year in the reign of Marcus Aurelius as the compilation date of the Esna calendar. It is significant, moreover, that Memphis was still the traditional observation point for Sothis for all Egypt.[117]

§246. To make conclusive the identification of the wp rnpt of the ancients on I ꜣḫt 9 as the rising of Sothis, we must offer some explanation for the wp rnpt of II šmw 26. We have seen that in the decree of Canopus the birthday of the king was called wp rnpt. This would not do for Marcus Aurelius, who was born on April 26. In A.D. 161, the year of his accession, II šmw 26 was May 5 and in A.D. 121, when he was born, it was May 15. It is my belief that what is commemorated here is rather the accession of the emperor to the throne of Egypt.[118] At Rome he acceded on March 7. A period of 59 days (to May 5) seems sufficient for the news to reach the prefect of Egypt, who would then order a holiday and a period of celebration.[119]

§247. Returning now to the lunar date of III šmw 22 and the seventh cycle year, we proceed to tabulate that year just as we did above for the feast of Min, with the following result:

Civil Year					Lunar Year		
I	ꜣḫt	9	wp rnpt	July 19, A.D. 175			
I	"	26		Aug. 5	I	ꜣḫt	tḫy
II	"	26		Sep. 4	II	"	mnḫt
III	"	25		Oct. 3	III	"	Ḥt-ḥr
IIII	"	25		Nov. 2	IIII	"	kꜣ ḥr kꜣ
I	prt	24		Dec. 1	I	prt	šf bdt
II	"	24		Dec. 31	II	"	rkḥ wr
III	"	24		Jan. 30, A.D. 176	III	"	rkḥ nds
IIII	"	23		Feb. 28	IIII	"	Rnwtt
I	šmw	22		Mar. 28	I	šmw	Ḫnsw
I	"	25	ḥb Rnwtt		I	"	4 (prt sm)

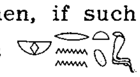
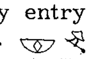
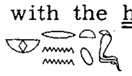
§248. There is nothing at all suggestive about a feast of Renutet occurring on prt sm of the lunar month of Ḫnsw, and we may reject with finality any connection between the date of the feast and the above lunar year. Let us, however, continue the tabulation into the following lunar year.

Civil Year				Lunar Year		
II	šmw	22	Apr. 27, A.D. 176	II	šmw	Ḫnt-ḥty
III	"	22	May 27	III	"	ꜣIpt ḥmt
IIII	"	21	June 25	IIII	"	wp rnpt

I	ȝḫt	9	wp rnpt	July 18					
I	"	15		July 24	Intercalary				Ḏḥwtyt
II	"	15		Aug. 23	I	ȝḫt			tḫy
III	"	14		Sep. 21	II	"			mnḫt
IIII	"	14		Oct. 21	III	"			Ḥt-ḥr
I	prt	13		Nov. 19	IIII	"			kȝ ḥr kȝ
II	"	13		Dec. 19	I	prt			šf bdt
III	"	13		Jan. 18, A.D. 177	II	"			rkḥ wr
IIII	"	12		Feb. 16	III	"			rkḥ ndś
I	šmw	11		Mar. 17	IIII	"			Rnwtt
I	"	25	ḥb Rnwtt		IIII	"	15		(śmdt)

§249. We need continue no further with the tabulation. A feast of Renutet falling on śmdt, the day of full moon, in her own lunar month is so correct and appropriate that its identification cannot be denied. Nor can doubt be cast upon it by the fact that it is in the year after the one from which the dates for the calendar were apparently compiled. We have no reason at all to suppose that the calendar was composed at the very end of the civil year, with all its dates taken from the temple records of the preceding twelve months. It could have been done at any time in the year, and that is what must have happened in this case. Some time after I šmw 25 of A.D. 177, but before IIII šmw 20, a temple scribe compiled a festival calendar for the temple of Esna, using the temple records for the preceding twelve months. He went as far back as, and no doubt somewhat before, IIII šmw 20, because that date had to fall in A.D. 176, being the 29th day of the lunar month beginning III šmw 22. This may perhaps be seen more easily by reference to the above tabulations. One has only to begin with the end of the table and count back twelve months to find that IIII šmw 20, the lunar feast of the 29th day, falls well within the twelve-month range of calendar compilation.

§250. There was a feast of Renutet celebrated at Edfu on I prt 7 which cannot easily be accounted for on the same basis as that of I šmw 25 at Esna.[120] For the equation I prt 7 (civ.) = IIII prt 15 (lunar) to be correct, the Edfu calendar would have to date from some year of the fourth or late third century B.C.;[121] but the foundation of the temple did not take place until 237 B.C.[122] It is certainly true that there was a temple at Edfu prior to the present structure, and it cannot be entirely excluded as a possibility that when the calendar was carved on the walls an earlier version was utilized. But, since this seems rather unlikely, an alternative explanation is to be preferred. Only two possibilities have occurred to me, the first of which is that the feast was not of Renutet, the goddess of the harvest, but of Renutet, the goddess of clothing.[123] A feast to the latter could presumably take place any time in the year. The second possibility envisages a rather daring textual emendation.

§251. The Myth of Horus, in one of its episodes, relates all that happened on a certain day, I prt 7. Thereafter, Thoth decided, I prt 7 should be called ḥb ḥn, "the feast of rowing."[124] This date is referred to again, in company with I ȝht 1 and II prt 21 and 24, as an important festival of Horus.[125] It would be very strange, then, if such an important feast found no mention in the temple calendar; yet the only entry under I prt 7 is  ḥb Rnnt.[126] I suggest, with diffidence, that an original hieratic writing of ,[127] ḥb ḥn, with the ḥn sign written rather badly, was mistaken by another scribe for  and then filled out to . Of the two possibilities, I myself incline toward the latter, even though it does involve an emendation. Otherwise one would still have to account for the omission of the ḥn-feast from the temple calendar.

§252. CONCLUSION. We have in this chapter traced the first lunar calendar throughout the long course of Egyptian history. We have seen that it affords a satisfactory explanation of the most diverse phenomena: the calendar of feasts in the Old Kingdom mastabas, the Middle Kingdom dates of the movable wȝg-feast, the temple year at Illahun, the Ebers calendar, the astronomical ceilings of Senmut and the Ramesseum, the names of the months, and the feasts of Min and Renutet in the latest periods. It has met every test that can be brought against it at this time.

§253. Since the original lunar calendar must then be counted a certainty, we are confronted with the situation that in the later period there were three calendars in use. We have still before us the problems of the origin of the civil calendar and of why and when the later lunar calendar was introduced. To these problems we may now turn.

CHAPTER IV
THE CIVIL CALENDAR

§254. THE PROBLEM BEFORE 1938. The general theory of the civil calendar is so well known that it is unnecessary to deal with it in great detail. As expounded by Eduard Meyer in 1904[1] it involves an early determination by the ancient Egyptians of the length of the solar year as 365 days, a division of this year into three seasons of four months each and five epagomenal days, and the recognition of the heliacal rising of Sothis as marking, at calendar inauguration, the first day of the year. Since, however, the rising of Sothis did not take place every 365 days exactly, but rather every 365 1/4 days, after four years the civil year would begin on the day before the rising of Sothis and, after eight years, two days before that event. In 1,460 Julian years (the Sothic period) the civil calendar would move forward through every day in turn until it had completed the circuit and once again its first day fell on the day of Sothis' rising. One of these coincidences, according to Meyer's reckoning, took place on July 19, 2781 to 2778 B.C.; but, since the civil calendar was demonstrably in use before that date and since it must have been inaugurated on a coincidence day, he went back 1,460 years to 4241 B.C. and claimed July 19 of that year as the first certain date in history. This was indorsed by Breasted and became the cornerstone of Egyptian chronology.[2]

§255. As far as the origin of the civil calendar was concerned, little or no attention was paid to lunar reckoning. We have remarked above (§§147-48) that Meyer believed that some sort of lunar year was in use before the introduction of the civil year but considered the civil year to be a purely artificial creation, since neither month nor season nor even year corresponded to any natural period; while Sethe was of the opinion that the lunar year and the civil year were parallel in development, since the former had no proper place in the "Entwicklungsgeschichte des aeg. Jahres." He suggested rather a year of 360 days as the preliminary stage to the 365-day year. We might, therefore, sum up the commonly accepted theory of the civil year as follows:

1. While lunar reckoning or a lunar calendar existed before the civil calendar, the latter had no connection with it but was an independent creation.
2. The year had been "astronomically" determined as being but 365 days long.
3. The first day of the year when inaugurated was the day of the heliacal rising of Sothis.
4. Despite the fact that the first day of the year began to fall more and more in advance of Sothis' rising, no adjustment or correction was ever made.

§256. THE PROBLEM AFTER 1938. In that year Otto Neugebauer published an important and provocative study of the Egyptian calendar.[3] His paper divides naturally into two sections. In the first he attacks with vigor the conception of the Sothic period as an instrument for determining, as Meyer did, the oldest certain date in history to be July 19, 4241 B.C. He demonstrates that there could not have existed at that time any theoretical astronomy, as writing and mathematics did not yet have any being and the cultural level of the people must have been quite low. He shows that the body of astronomers credited by Borchardt with the revolutionary installation of the 365-day year can have existed only in the latter's imagination. He emphasizes the contradiction between the revolutionary character of a 365-day year based on Sothis and the failure of the proponents of this new calendar to adjust it to Sothis when after but eight years the year began two days before the rising of Sothis. He concludes that while the Egyptians had two conceptions of the year—(1) a period of 365 days; (2) the interval between two risings of Sothis—in the beginning these had nothing to do with each other.

§257. In the second section of his paper Neugebauer presents his own theory of the origin of the 365-day year, entirely apart from Sothis. He shows that an averaging of the intervals between inundations over a period which need not be greater than fifty years would inevitably result in an interval of 365 days. If, then, this "Nile" calendar were adopted in a year when the inundation was normal, because of the great variability of the inundation it would be some centuries before the calendar seasons no longer coincided with the natural seasons. A new phenomenon would then be picked as expressing more clearly than the calendar the incipient inundation. This was the rising of Sothis.

§258. When he first announced his theory, Neugebauer was inclined to place the introduction of the 365-day year in the centuries around 4200 B.C. Recently, however, as the result of a study of his theory by Scharff,[4] he would place it in the centuries around 2800 B.C.[5]

§259. In my opinion weighty objections can be brought against either time of introduction. Neugebauer has himself declared that "the only condition for the creation of the schematic calendar is a sufficiently well organized and developed economic life,"[6] a doubtful claim for the Egypt of ca. 4200 B.C. Moreover, as Winlock points out, "when one Nile year might be only 335 days long and another as much as 415, it is a question whether primitive man would ever, unaided, have arrived at the conception of an average Nile year or would have known how to calculate it, had he thought of it."[7] However, since Neugebauer no longer considers ca. 4200 B.C. as the probable date of introduction, we may limit ourselves to a consideration of a date ca. 2800 B.C.

§260. It is unquestionably true that by this time Egypt possessed a well organized and developed economic life, as well as writing and mathematics. But Egypt also possessed at this time, as has been shown in the previous chapter, a "Nile" lunar calendar based on Sothis. Neugebauer's theory fails to take into account the already existing calendaric situation. Obviously there would be no point to averaging the intervals between inundations in order to arrive at a Nile year, when all the time there was present and in use a lunar Nile Year. But if we reject the average interval between inundations as the ultimate basis for the 365-day year, we must, I believe, hold fast to the other point which Neugebauer has so forcefully demonstrated. The civil calendar of 365 days was not tied to Sothis at its introduction but was tied rather to some yearly occurrence which was variable, so that the gradual shift forward of the civil calendar would not be immediately apparent.

§261. It is this point which forces one to reject the recent theory of the origin of the civil calendar proposed by Winlock. After detailing the steps through which primitive man passed toward a recognition of Sothis as the herald of the inundation, Winlock suggests that around the time of Menes the Egyptians were beginning their year with the reappearance of Sothis. This year no longer consisted of lunar months but rather of 30-day months, divided into the three seasons. Over and above these months were a few extra days every year, usually five but at times six or rarely four because of faulty observation of the heliacal rising of the star. In any event all variability was confined to the extra days. Eventually, around 2773 B.C., probably in the reign of Djoser, observation for beginning the year was dropped, as "the experience of centuries by now had seemed to show that the year should contain 365 days, and this definite figure was adopted for administrative purposes."[8]

§262. However, a century of recording the extra days of the year would give a total not of 500 but rather of 525, a clear indication that the year could not be exactly 365 days long; and eight years after the adoption of the definite year it cannot fail to have struck those responsible for its use that the first day of the year was already two days in advance of the rising of Sothis and that inevitably the calendaric seasons would be at variance with nature. The correction of this situation by an extra epagomenal day every four years is so simple and obvious that failure to make such a correction argues that the situation never existed in reality and that the 365-day year was never tied to Sothis.

§263. There are other objections to Winlock's theory. He would explain tpy rnpt in the mastaba lists as being the New Year's Day invented for the calendar after it had become separated from nature. We have seen, however, that these lists were arranged chronologically, which would not be the case were tpy rnpt a day moving farther and farther forward from the rising of Sothis, wp rnpt. Moreover, his theory puts the epagomenal days after the twelve months; our only Old Kingdom evidence on the point is to the effect that they came before the months.[9] Winlock fails too to take into account the evidence of the existence of a lunar calendar of a well developed type.

§264. THE PROBLEM AT PRESENT. There are, it would now appear, certain fundamentals which cannot be ignored in considering the problem of the origin of the civil calendar. These have all been brought out in the preceding pages, but it will be useful to summarize them.

1. The presence of a well regulated and working lunar calendar must not be ignored.

2. The civil calendar must at its introduction have been tied not to Sothis but rather to some event which was variable in itself, so that the forward shift of the year would not be immediately apparent.

3. The proposed theory of the civil calendar must include an explanation of why the later lunar calendar, tied to the civil calendar, was inaugurated.

THE CIVIL CALENDAR

§265. THE PROPOSED SOLUTION. During the protodynastic period the only calendar in use was the lunar calendar already described. By this time Egypt had become a well organized kingdom, and the economic disadvantages of a lunar year of now twelve months, now thirteen, all of which began by observation, must have impressed themselves upon the government. In an effort to alleviate the situation and to provide a simple and easily workable instrument for the measurement of time, they hit upon the idea of a schematic lunar year or, as it might be termed, an averaged lunar year. There are two ways by which the length of this schematic lunar year might have been determined as being 365 days. On the one hand, since the current calendar was based on Sothis, one might simply have counted, for one or two years, the number of days between successive heliacal risings of the star. On the other hand, the lunar year itself might have been averaged. It would have been little trouble to refer to the various records of one kind or another from which data on the number of days in recent calendar years might be derived. Over a period of 25 lunar years something like the following might have been arrived at:[10]

1. 354	9. 355	17. 384
2. 354	10. 354	18. 355
3. 384	11. 384	19. 383
4. 354	12. 354	20. 354
5. 354	13. 354	21. 355
6. 384	14. 384	22. 383
7. 355	15. 354	23. 355
8. 384	16. 355	24. 354
		25. 384

Now if these figures be averaged in cumulative fashion from year to year, it will be soon apparent that the mean must be 365. In the following table the averages are limited to those years wherein the corrective factor of the intercalary month occurs, and it can be seen that already after eleven years the round number of 365 days must have impressed itself upon the ancient Egyptian with some force.[11]

3. 364	11. 365.09	19. 365.21
6. 364	14. 364.85	22. 365.04
8. 365.37	17. 364.76	25. 364.96

§266. Thus easily, by either method, could the Egyptian of the protodynastic period have arrived at 365 days as the proper length for a schematic lunar year which could be adopted for administrative and economic purposes. After the analogy of the ordinary lunar year the schematic year would be divided into twelve months and three seasons, each month having 30 days for simplicity and regularity.[12] The extra five days of the schematic year were regarded as an abbreviated intercalary month and were placed before the year, just as the intercalary month headed the lunar year whenever it occurred.

§267. Now as the new year was after all only a schematic lunar year, it must have been planned to have it run concurrently with and as far as possible in concord with the old lunar calendar, which was by no means to be abandoned. Just what were the actual circumstances of its introduction we shall probably never know. It is possible, at least, that it was introduced in a year with an intercalary month and that the five epagomenal days were concurrent with the last five days of that month, so that the first day of both the old lunar year and the new schematic year fell on tpy rnpt, the first of tḫy; or it may have been handled without regard for the epagomenal days, with the new year, at its installation, simply having its first day coincide with tpy rnpt.[13]

§268. If we cannot be certain of the circumstances of the introduction, we can at least set a range in time within which it took place. According to the rule for intercalation in the lunar calendar, when the first month after wp rnpt began within eleven days of that event it was intercalary. Tpy rnpt might then be as close to wp rnpt as the twelfth day following or, with a full intercalary month beginning on the eleventh day following, as far away as forty-one days. It is almost a certainty that the first day of the first month of the civil year, as we shall henceforth term the schematic lunar year, also fell within these limits. As this first day had come to be the date of the rising of Sothis in *ca.* 2773 B.C., the civil calendar must have been introduced between *ca.* 2937 and *ca.* 2821 B.C.,[14] with the probability that it was in the direction of the former rather than the latter date.

§269. Now an important feature of the new calendar was that complete agreement between it and the lunar calendar was not expected, as the latter was so variable. Consequently the fact that the new calendar moved forward a day every four years would be unnoticeable. The change would be so imperceptible that even after half a century there would still appear to be quite good general agreement between the civil and lunar years (see Figure 20). And all this time, of course, the civil calendar will have been proving its worth. All secular matters would no doubt be regulated by it, while to the lunar calendar would be left the determination of feasts and the regulation of temple service. The two years were distinct but intrinsically the same, the second, the civil year, being merely an aspect of the first.

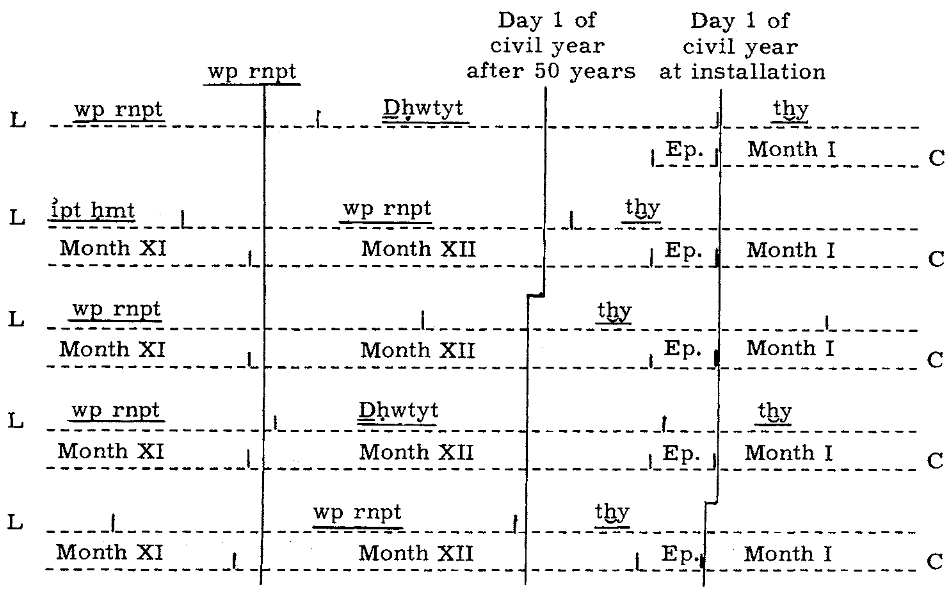


FIG. 20.—Concurrence of lunar and civil years at installation of latter and shift of civil year after fifty years.

§270. After about two centuries, however, it can no longer have escaped attention that there was trouble in this dualistic calendar set-up. No longer did the first lunar month and the first civil month touch, even for a day. How long this situation kept worsening, we cannot guess; but when the decision was made that something would have to be done, it was found that there were but two ways to redress it. The first would be to insert the requisite number of days at the end of the civil year in order to force it back to concurrence with the lunar year as at its introduction. This action we may suppose to have been rejected with horror by officialdom. No doubt by this time the fiscal year was firmly established as 360 days[15] and was not to be added to or diminished. It may very well have been at this time, if we accept a late tradition, that the king swore never to tamper with the year—an oath repeated at coronation by his successors to the end of Egyptian history.[16]

§271. Now it must be remembered that the civil year was, after all, merely a schematic lunar year, one which had no real being when separated from its natural counterpart. Obviously the lunar calendar itself, being controlled by Sothis, could not be moved from its place in order to continue supporting the civil year by furnishing body and substance to its artificiality. It would appear that some brilliant Egyptian solved the difficulty into which the calendars had gotten by the creation of a special lunar year, whose sole purpose would be to provide for the civil year the same sort of dualistic setup which had obtained when the civil year was first inaugurated. The months of this new lunar year were to be so regulated that they would maintain their general agreement with their schematic equivalents. In this fashion the original lunar calendar would continue on independently as before, while the later lunar calendar and the civil calendar, the dual year, would be free to progress forward through the seasons.

§272. Satisfactory as this explanation of the genesis of first the civil year and later the second lunar calendar might be considered, the fact must be granted that it would continue to be merely a hypothesis were not the essentially dual character of the year brought out unmistakably in the monuments.

§273. THE FIFTY-NINE DIVINITIES OF THE DUAL YEAR. There are two series of divinities connected with the year in Egypt, one consisting of the thirty-six decans, the earliest extant lists of which occur on the so-called "diagonal calendars" of the Middle Kingdom, the other consisting of fifty-nine deities, many of whom bear decanal names, the earliest known list of which appears on the base of a statuette of Mut of the 22d dynasty. The explanation of the thirty-six decans is superficially simple, as they were the thirty-six stars or constellations which rose during the twelve hours of the night throughout the thirty-six decades of the year, each month of the civil year being divided into three parts of ten days each; but the list of fifty-nine deities has so far resisted satisfactory analysis.

§274. The fifty-nine have both names and representations. Those of the Greco-Roman period, from the temples of Dendera, Edfu (Pl. IV), and Esna, are conveniently tabulated in Brugsch, Thesaurus, pages 18 - 23. The earliest list, representations only, is found on Cairo statuette 38924.[17] Here and in the menat-fragment which we shall shortly discuss the total number of representations is clearly fifty-nine. In the later lists there were frequent omissions, so that only Dendera, with fifty-seven, approaches the correct total. Here the missing two are the figures of Set, for the third epagomenal day, and a companion deity.

§275. Study of the makeup of the list of the fifty-nine deities reveals a simple scheme. The first forty-eight names and representations separate easily into groups of four. The first figure in each such group is almost always a seated female with the head of a lioness, the second figure is almost always a standing male with the head of a lion, the third figure varies but is predominantly reptilian, while the fourth and last figure is always a serpent, usually standing on its tail. When grouped in fours, the first, third, and fourth prove to have ordinary decanal names, while the second name in each group is an intrusion, in some cases an out-of-place decan, in other cases newly coined.[18]

§276. In other words, the forty-eight names are merely those of the ordinary thirty-six decans expanded by the insertion of one new name in every group of three decans. At the same time it must be pointed out that this was quite clearly not a work of the Ptolemaic period, since at Dendera the normal list of thirty-six decans and the list underlying the first forty-eight names are not exactly the same. This may be seen most easily by referring to Brugsch, Thesaurus, pages 147 - 52, where the list I is abstracted from the forty-eight names and the list L is the normal thirty-six. In twenty-six names there is agreement, in the remaining ten disagreement.[19] Moreover, when representations of the normal thirty-six decans occur they are not at all similar to the other depictions but are instead mainly human figures, with various animal, bird, or human heads, who may be in barks.[20]

§277. The remaining eleven divinities begin with a serpent and then alternate the deities of the five epagomenal days with other serpents or human figures. The statuette Cairo 38924, for example, has the following:

(49) A long serpent, reversed, on a support.
(50) The mummy of Osiris standing.
(51) A serpent erect.
(52) A hawk-headed Horus.
(53) A serpent erect.
(54) Set standing.
(55) Crocodile-headed deity standing and offering two jars.
(56) Isis standing.
(57) Man standing and offering two jars.
(58) Nephthys standing.
(59) Man standing and offering two jars.

§278. The breakup of the fifty-nine deities into twelve groups of four, followed by one of eleven, which we have established by analysis of figures and names, is confirmed strikingly by the preserved lower portion of a glazed clay menat of the late period, now in the Cairo Museum collection (Pl. VI A).[21] There are three rows of deities preserved. In the first row are recognizable the figures of Nos. 33, 34, 35, 36 on one side of a central bar and on the other the lower parts of what must be Nos. 37, 38, 39, and 40. In the second row are found Nos. 41, 42, 43, 44, the bar, and Nos. 45, 46, 47, and 48. In the last row are deities Nos. 49 to 59 inclusive, with some individual variations from the statuette list. Beyond doubt the object had once included all fifty-nine figures, with the first forty-eight arranged in six rows, with two groups of four to each row.

§279. Daressy is the only one to my knowledge who has attempted any explanation of the fifty-nine divinities. He came to the conclusion that they should be divided into two groups of forty-nine and ten.[22] On the assumption that each one of the forty-nine figures represented a week of 7 1/4 days and the remaining ten figures represented 1 day each, he arrived at a total of 365 1/4 days for the year. This explanation was ingenious but palpably incorrect. Not only is a week of 7 1/4 days absurd, but we have seen that the correct division is into groups of forty-eight and eleven. Moreover, the idea that the Egyptians, even by the 22d dynasty, had a comprehension of the length of the year as 365 1/4 days and a desire to portray that fact symbolically must be rejected.

§280. But what, then, were these deities intended to represent? It is my belief that what we have is a depiction of the dual character of the concept "year" as a combination of both the lunar and the civil year. The lunar month divides easily and naturally into four parts: (1) days 1 - 7, from the month's beginning to and including the first quarter; (2) days 8 - 15, from first quarter to and including full moon; (3) days 16 - 22, from full moon to third quarter; (4) days 23 - 29/30, from third quarter to the end of the month.[23] If we assume a presiding deity for each one of these parts, we should have a total of forty-eight for the twelve months of the normal lunar year. Since the remaining eleven deities of the second group include the five deities of the epagomenal days, it is an easy conclusion that each of the eleven represents one day. Eleven epagomenal days are exactly the number required to make up the difference between the normal lunar year of 354 days and the civil year of 365 days. The fifty-nine deities represent, then, the lunar year rounded out to the number of days of the schematic or averaged lunar year, the civil year. Could the essential duality of the year be more graphically portrayed?

§281. CONCLUSION. The origin of the civil calendar suggested herein meets all the requirements stated above (§264). It develops out of the already existing calendar; it is not tied to Sothis, hence its gradual forward movement is not immediately perceptible; and it provides an explanation for the second and later lunar calendar. Moreover, it is now possible to appreciate better the history of the names of the months, which we examined in §§226-37. It is understandable why the names of the original lunar months remained the same, why those of the civil months were firstly the same as those of the lunar months but later tended to become different when the civil year had moved away from its companion, and why the later lunar year took its month names from the civil months, since the two were components of the dual year. Exactly when the second lunar year was introduced remains uncertain, but it was probably not too long after the divergence between the two forms of the year became apparent. A good guess might be to put it in the neighborhood of 2500 B.C. From that date the Egyptians had three calendar years, all of which continued in use to the very end of pagan Egypt.

EXCURSUS A

THE TRANSFER OF FEASTS FROM THE LUNAR TO THE CIVIL CALENDAR

§282. In earlier pages there have been scattered references to the transfer of feasts from the lunar to the civil calendar. We have seen, for example, that there was a fixed w3g-feast and a movable w3g-feast, and a fixed feast of Renutet and a movable feast of Renutet. The fixed w3g-feast always fell on I 3ḫt 18 civ., while the fixed feast of Renutet took place on I šmw 1 civ. The movable feasts, being determined by the original lunar calendar, in which that of w3g fell on I 3ḫt 13 (§185) and that of Renutet on IIII prt 15 (§249), might conceivably have fallen on any day of the civil year. As we shall soon see, there is evidence that the practice of giving an originally lunar feast a fixed place in the civil year was carried out on a considerable scale, and it is in that phenomenon that the explanation lies of Gardiner's theory that the months of the civil year once began with Mesore.[1] To that theory we have briefly referred before. Since it still has vitality, though in a somewhat different form, it will be useful to review it again here and to propose a solution to the problem it purported to solve more in keeping with the calendrical theories presented in this work.

§283. Like Brugsch, Gardiner believed that the names of the months derived from the important feasts celebrated in them. He, however, adduced several examples to show that in earlier times the eponymous feasts of at least four months were celebrated on the first day of the following month. This suggested to him that at one time all the months occupied a position one place lower than in late times and that Mesore had once been the first month of the year. He found confirmation of this in the Ebers calendar, which begins with wp rnpt, another name for the month of Mesore. Gardiner marshaled the following evidence:

1. In two tombs of the 18th dynasty (Ḫc-m-ḥ3t and Nfr-ḥtp) the feast of Renutet fell on I šmw 1, while the month-name Pharmuthi is that of IIII prt.

2. In the third year of Ramses X the festival of Epiphi was celebrated on IIII šmw 1 (or 2), while Epiphi is the name of III šmw.

3. In the thirteenth year of Ramses IX mswt Rc-Ḥr-3ḫty, the feast of the birth of Re-Horakhti, fell on I 3ḫt 1, while Mesore is the name of IIII šmw.

4. At Illahun in the Middle Kingdom and at Medinet Habu under Ramses III the feast of Hathor fell on IIII 3ḫt 1, while Athyr is the name of III 3ḫt.

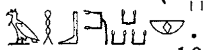
5. The festival of nḥb k3w is the same as that of k3 ḥr k3.[2] The nḥb k3w-feast in both the Middle Kingdom and the New Kingdom was celebrated on I prt 1, while Choiak is the name of IIII 3ḫt.

6. The Ebers calendar confirms the theory that once the year began with Mesore.

§284. Gardiner could offer no explanation of why the shift forward of the months, or of their eponymous feasts, should have taken place. Eduard Meyer, who approved of Gardiner's theory, thought he found an explanation in the shift forward through the centuries of the summer solstice away from the day of the rising of Sothis. In 4241 B.C. the solstice took place but a few days after July 19, on which Sothis rose. From the solstice came the name of mswt Rc, at this time correctly the first month of the year. By ca. 1300 B.C., however, the solstice had moved to a point eighteen days before the rising of Sothis, so that at this time the months were moved forward to keep the solstice in Mesore.[3]

§285. In his Zeitrechnung Sethe subjected the whole question to a careful analysis and showed the great difficulties in the way of an acceptance of Gardiner's and Meyer's theories. He proposed instead that no shift had ever occurred but that a month was named for the feast to which it led up and which actually fell on the first day of the next month. Thus, for example, the feast of Renutet, which according to Gardiner's theory should have shifted forward from I šmw 1 to IIII prt 1, continued to be celebrated on I šmw 1 right down to the Roman period;[4] but this would be quite correct, because the preceding month, which led up to I šmw, was named Pharmuthi.[5]

§286. If we re-examine the theories of Gardiner and Meyer, on the one hand, and of Sethe and Weill, on the other, we soon discover that neither is free from objections. The difficulties that confront Gardiner's six points are these:

1. The feast of Renutet never moves to IIII prt 1 as required by theory.
2. It is now certain that the date of the Epiphi feast was IIII šmw 2.[6]
3. The feast of mswt Rꜥ never moves to IIII šmw 1 as required by theory. In the Ptolemaic period it still fell on I ꜣḫt 1 (§236).
4. In the calendar of Edfu the whole month of III ꜣḫt (Athyr) is termed "The feast of the [Lady] of Dendera."[7] In the same calendar a special festival of Hathor begins on III ꜣḫt 29 and ends on IIII ꜣḫt 1.[8]
5. It is at best quite doubtful that the nḥb kꜣw festival and that of kꜣ ḥr kꜣ are one and the same. Gardiner based his conclusion on a scene in the tomb of Paheri at El Kab.[9] One inscription names the scene as being part of the feast of nḥb kꜣw, while another apparently refers to the feast of kꜣ ḥr kꜣ. But the signs which Gardiner would read as the latter () are given by the Wörterbuch as a variant writing of nḥb kꜣw, which at times appeared as . The only date now known for the feast of kꜣ ḥr kꜣ, with the name certain, is IIII ꜣḫt 1 in the calendar of Esna.[10]
6. The Ebers calendar is most satisfactorily explained as equating the original lunar calendar with the civil year, and the reason for the appearance of wp rnpt at its head is simply that that event controlled the lunar year (§§217-18).

§287. If we now turn to the Sethe-Weill theory, we run into comparable difficulties. The only dates ever given for most of the eponymous feasts fall within the proper months, while only a few fall on the first of the next month. Weill would argue, for example, that the feast of Thoth began on I ꜣḫt 19 and ended on II ꜣḫt 1; but for this latter date there is not the slightest evidence in any temple calendar.[11]

§288. The difficulties that confront both theories suggest that a new approach to the original problem is necessary. It is easily possible to dispose of three of Gardiner's six points, but the remaining three still call for explanation. The Ebers calendar cannot be regarded as proof of either a shifting year or a list of feasts falling on the first day of the month after that to which they give a name. The feast of nḥb kꜣw and that of kꜣ ḥr kꜣ are not demonstrably the same, and the latter falls properly in its month at Esna. The feast of mswt Rꜥ on I ꜣḫt 1 has already been discussed. It is the companion feast to wp rnpt and originally meant the day of the rising of Sothis; but when wp rnpt came to mean also the first day of the civil year, so too did mswt Rꜥ (§237). There remain the three feasts of Hathor, Renutet, and Epiphi, which were all apparently celebrated out of their proper months. How did this come about?

§289. The explanation, I believe, lies in the transfer of feasts from the lunar to the civil calendar. The feast of Renutet in the lunar calendar was a full-moon feast. At the time when it was given a fixed day in the civil year we may suppose that IIII prt 15 lunar was the same day as I šmw 1 civ. or, as seems somewhat more likely, was near the latter date and that the first day of the month was adopted as a more significant and appropriate day. In order for the equation to be exact, the month of tḫy would have to begin on about I ꜣḫt 20 civ. As may be seen by reference to Figure 20, (p. 54), this could take place when the civil year had moved sufficiently forward after its introduction. The same explanation can account for a feast of Hathor on IIII ꜣḫt 1, though here we are ignorant of what lunar day was involved.

§290. The fact of such a transfer is beyond question. We can be certain that there was a feast of Hathor in the third lunar month of the year and a feast of Renutet in the eighth lunar month if for no other reason than the fact that each feast named its month. Why the transfer was made is much less certain. Presumably it was the desire to have a definite and fixed date, known in advance, that could be prepared for with the minimum of last-minute confusion. It may very well have been that the fixed feasts actually supplanted their lunar prototypes while the original lunar year and the civil year were still running concurrently and that it was not until the civil year had moved away from nature and the later lunar calendar had been introduced as its companion that the lunar feasts of the original lunar calendars were revived. From then on one might have two dates for each festival, one fixed to the civil year, the other determined by the lunar year, with varying dates in the civil calendar.

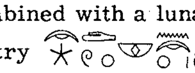
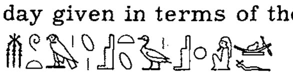
§291. It will be noted that the feast of Epiphi was omitted from the above discussion. That is because ỉpỉp is the name of III šmw not in the original lunar year, where ỉpt ḥmt occurs, but in the later lunar calendar. We have seen that the names of the months of this calendar were the same as those of the civil months (§231).

Presumably, then, there was a lunar feast of ỉpỉp on some unknown day of the lunar month. Reference to the 25-year cycle will show that, if the feast began on almost any day after the sixth lunar day, it would have been possible for it, in some year of the cycle, to have fallen on IIII šmw 2. In other words, Gardiner's second point is best explained as double-dating in terms of the lunar and civil calendars.[12]

§292. It is not to be supposed that there was a complete and wholesale transfer of feasts from the lunar to the civil calendar at one given time. No doubt it was a gradual process over the early years of the dual calendar. It is clear, for example, that the wꜣg-feast was not transferred at the same time as that of Renutet, because the former took place in some year when I ꜣḫt 13 lunar was the same day as I ꜣḫt 18 civ., that is to say when the month of tḫy began on I ꜣḫt 6, while for the latter tḫy would have to begin around I ꜣḫt 20. But over the years it seems likely that there was a more or less complete shift of all the early lunar feasts. It is possible to give one demonstration of this from a calendar of the temple of Edfu.[13]

§293. At the beginning of the calendar there are long lacunae, so that it seems likely that there are some feasts missing in the first month. In the following tabulation I list only the days on which there were feasts, with the number of days' duration of each feast.[14]

I ꜣḫt (Thoth): 1, 12, 13, 18-20, 21.
II " (Phaophi): ?, 5, 6, 8, 19-Athyr 3, 30-Athyr 5.
III " (Athyr): 1-30, 23, 29-Choiak 1.
IIII " (Choiak): 9-26, 28, 29-30.
I prt (Tybi): 1, ?, 5, 7, 9, 15, 19-21, 25, 28-Mechir 3.
II " (Mechir): 4, 9, 21, 21-30, 28-29.
III " (Phamenoth): 1, 15, 24.
IIII " (Pharmuthi): 1, 4, 2 lunar-21 lunar, 28.

§294. It will be observed that the feasts of this calendar occupy by no means all the available days, and at first glance there would seem to be no order underlying any of them. Closer scrutiny, combined with a lunar day given in terms of the civil calendar, show otherwise. In the month of IIII prt is the entry   "On the second lunar day of this month was born Horus, son of Isis and Osiris."[15] A later entry in the calendar under III šmw 4 states: "Horus, son of Isis and Osiris, was conceived . He was born on IIII prt 28."[16] That IIII prt 28 was indeed the second lunar day is confirmed by the calendar of Dendera, which has the entry: "IIII prt, pśḏntyw of this month. At the coming of the third hour, procession by Hathor, Lady of Dendera, with her Ennead. Resting in the Birth House. Day 28, likewise. Total, two days."[17] The calendar of Esna hints at the same equation with the entry in IIII prt: "Performing the ritual of the divine birth of Horus on the second lunar day of this month. IIII prt 28: Feast of Horus, son of Isis."[18]

§295. This was, then, a tradition widespread and of long standing, since it was incorporated in three temple calendars, all of varying dates of composition. Horus was born on the second day of the lunar month, and at the time when this feast was fixed in the civil year it fell on IIII prt 28.

§296. I cannot resist breaking into the flow of my argument with a brief digression on the connection between Horus and the moon, as it opens up new paths which invite exploration. Why was Horus born on the second lunar day? We have seen that on that day the new crescent normally appeared (§45). Moreover, the tutelary deity of the second lunar day is Ḥr nḏ ỉt.f, "Horus, avenger of his father."[19] That suggests some connection with Osiris. A Dendera text is so important and illuminating that it must be quoted in as full a form as its state of preservation permits.[20]

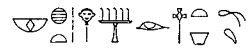
§297. "On this beautiful day the entire land is in joy. All the gods and goddesses rejoice, men are in festival, the sun-folk are in jubilation, mankind goes forth in gladness in the feast of Choiak, the 24th of the month.

§298. "Horus purifies his father, Osiris, with water; he censes his body with [incense] .... He goes forth from the House of Gold, he being an august spirit ....

§299. "They.... the work of Anubis. He receives pure ... from the hands of the śm-priest, divine ... from the hands of Wadjet, oil from the hand of Anubis. The joy-amulet of gold is placed at his throat. He receives šdḥ as the goodly work of Horus, Lord of the Laboratory. His salve is Shesmu's, being pure .... The 104 amulets of every genuine precious stone are tied for him ....

§300. "..... The goddesses adore him on day 24. After he rests in his evening bark, he goes around this august temple in the ninth hour in the night. He rests in his sarcophagus at the south of this lake. Ceremonies are done for him .... The gods are his protection, and all the goddesses are protection around him. He shines forth from his temple at the setting of the sun on day 25. When he has gone around his city in peace, the citizens of Dendera are in festival.............

§301. "...... They (the gods) are in his following. Anubis opens for him the way of good ways. He is like Atum in his setting, when he rests in his beautiful sarcophagus in the necropolis. Hathor, the Mistress of the West, is his protection. He awakes from sleep, and he flies as the phoenix (bnw), and he makes his place in the sky as the moon. He receives offerings with Atum, when he enters Dendera in the night of ỉḫt ḥr ḫꜣwt (the fifth lunar day) to śnt (the sixth lunar day) with the goddesses of Upper and Lower Egypt. He finds his sister Isis as Queen of the Gods of Egypt, there being no command except hers. She places her brother as Ruler, she being (the female) Ruler, and her son Horus as King of the Gods."

§302. Now the calendar of Edfu has the following entry after Choiak 28:  "The feast of ỉḫt ḥr ḫꜣwt (the fifth lunar day). Performing his rites."[21] If Choiak 28 is the fifth lunar day, then Choiak 24 is pśḏntyw. If we refer this to the Dendera text, the underlying symbolism is immediately apparent. The dead Osiris is the vanished moon. His day of embalmment is the day when the moon is never visible. But on the following day, Choiak 25, he shines forth from his temple at sunset, just as the crescent moon normally appears on the second day of the lunar month at sunset. If this be the resurrection of Osiris, which it certainly seems to be, since he wakes from his sleep and takes his place in the sky, then it is small wonder that Horus, son of Osiris, is born on the same lunar day on which his father is reborn.

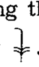
§303. The better known version of the Osiris myth has, to be sure, his embalmment on the 24th; but his burial does not take place until the 30th.[22] It is not my intention to pursue this fascinating topic any further in these pages. It is clear, however, that, while the relation between Osiris and the moon has been known for some time, not all the ramifications of this relationship have as yet been explored. Nor has the connection between Horus and the moon been suspected.[23] But it is time to be done with digression and return to the Edfu calendar.

§304. We have established that IIII prt 28 was a second lunar day, which means that the 27th was pśḏntyw. Now if we work forward from that date, using the unit of either 29 or 30 days, we soon encounter some astonishing coincidences. There is no feast in III prt on either the 27th or the 28th, but in II prt there is one beginning on the 28th which lasts two days. I prt has a six-day festival beginning on the 28th. IIII ꜣḫt has a two-day feast on the 29th. III ꜣḫt has a three-day feast beginning on the 29th. II ꜣḫt has a six-day feast beginning on the 30th. The first month of the year has no significant entry, except that there was a festival of indeterminate length starting on the first day.

§305. Let us now make the assumption that at some unknown time the first day of the lunar year and the first day of the civil year fell on one and the same day, and that this coincidence was taken as the starting point for the transference into the civil calendar of certain lunar feasts which began on pśḏntyw of the following months. Suppose the following entirely possible sequence of 29- and 30-day months occurred: 30, 29, 29, 30, 29, 30, 29, 30 (the last two might conceivably be 30, 29). We should then expect to find feasts on the following days of the civil year: I ꜣḫt 1, II ꜣḫt 1 and 30, III ꜣḫt 29, IIII ꜣḫt 29, I prt 28, II prt 28, III prt 27 or 28, IIII prt 27. There is no evidence in the Edfu calendar for a feast on III prt 27 or 28, and the IIII prt feast actually took place on the 28th, the second lunar day. A lacuna prevents certainty in placing a feast on II ꜣḫt 1, but there was one on some day before the 5th, and the 1st seems most likely. Granting that, we should then have actual feasts for all the proposed dates, and important ones too, since the smallest duration, where the information is available, is two days, and two of them last for six days each.[24] To my mind, the conclusion is forced upon us that at one time the above assumption was fact. That is, the feasts we have traced out in the Edfu calendar have their present dates because they were originally lunar and were fixed in the civil calendar in the course of one year.

EXCURSUS B
THE MEANING OF TPY RNPT

§306. In the present work it is proposed that tpy rnpt meant originally the first day of the original lunar year (§151). Heretofore the generally accepted interpretation has been that it was the specific name of the first day of the first month of prt (I prt 1).[1] This was suggested by Brugsch,[2] approved by Sethe,[3] and reaffirmed by Gardiner.[4] The argument may be summarized briefly as follows: The Sed-festival and the nḫb kꜣw-festival were both celebrated on I prt 1. There are texts which apparently date the celebration of both festivals to tpy rnpt also. Therefore tpy rnpt and I prt 1 are one and the same day.

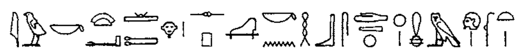
§307. The date of the Sed-festival has been studied by Borchardt.[5] He contended that Ramses II, the only king whose Sed-festivals are associated with the date I prt 1, used that date to proclaim (śr) to the country the coming festival, which then actually took place on the anniversary of his accession,[6] ten months later, in the following regnal year. At the time he wrote his study, Borchardt knew of only two Sed-festivals of Ramses II, the fifth and sixth, which had been so proclaimed. Evidence for the proclamation of the ninth festival in year 54, I prt no day, the tenth in year 57, I prt 17, and the eleventh in year 60, I prt 17, is now at hand.[7] These dates head three separate horizontal single-line inscriptions on the east side of the passage through the first pylon of the temple of Armant. On the opposite side of the passage there are the remains of three similar lines, mentioning I prt 1 for the years 51, 63, and 65 (or 66), respectively.[8] Gardiner has stated, without discussion, that these are the dates of proclamation of the eighth, twelfth, and thirteenth Sed-festivals of Ramses II;[9] and it must be admitted that they may be that and nothing else, although little remains of the inscriptions beyond the dates. What does remain, however, is just enough to cast some suspicion on the proposition. On the first side, where the lines are preserved in full, following the dates comes the formula  etc. On the opposite side, however, the first sign after the dates is clearly . In any event, twice the date of proclamation is the 17th day of I prt. This fact can easily be reconciled with the theory that an announcement was all that was involved, but it is difficult to deal with on the theory that the Sed-festival began on the 1st.

§308. If now, following Borchardt, we assume that the actual celebration began on the anniversary of the king's accession, and thus on the first day of the following regnal year, we should have the eighth to the thirteenth festivals celebrated at three-year intervals beginning in year 52. We already know that the first Sed-festival of Ramses II took place in year 30, the second in year 34, the third in year 37, and the fourth in year 40.[10] The proclamations of the fifth festival in year 42 and of the sixth in year 45, both on I prt 1, would then mean celebrations in years 43 and 46.[11] To fill the gap between year 46 and year 52 there would be the celebration of the seventh festival in year 49, but for this there is as yet no evidence. Festivals occurring with regularity every three years after the first interval of four years are much more likely than is a two-year interval between the fourth and the fifth.

§309. The available evidence for the celebration of the first Sed-festival of Ramses III clearly favors the anniversary of the accession day. Gardiner's collation of Pap. Turin 44: 18-19 gives "year 29, IIII prt 28," as the date on which the vizier To sailed north after he had come to take the gods of the South to the festival.[12] The arrival of the bark of one of these deities, Nekhbet of El Kab, is commemorated in the tomb of Setau, and the legend above the scene includes the phrase sp tpy ḥb śd, "first occurrence of the Sed-festival."[13] Now if the festival were actually to be celebrated on I prt 1, either the southern gods took eight months to reach the Delta capital or they spent some time there before the festival actually began. On the other hand, with the accession anniversary of year 30, I šmw 26, as the feast day, the gods would have had nearly a month to voyage to the North, ample time for the journey, but not so long that they would be absent unduly from their homes.

§310. Persuasive likewise for dating the Sed-festival to the anniversary of the accession day is the fact that the last day of the first festival of Amenhotep III was III šmw 2,[14] exactly eight months after the beginning of his 30th year on III ꜣḫt 2. That the festival lasted exactly eight months is much more probable than that it lasted six months and two days, its duration had it begun on I prt 1. The third festival of Amenhotep III, in any event, began before I prt 1, as we learn from the tomb of Ḫrw.f.[15] The text over the rope in the scene of erecting the ḏd-pillar reads as follows: "Erecting the ḏd-pillar by the king himself at daybreak of the Sed-festivals."[16] The erection of the ḏd, according to the Medinet Habu and later calendars, invariably took place on IIII ꜣḫt 30; this day must, then, have been included in the period of celebration of the festival of Amenhotep III. Sethe's contention that in this passage ḥḏ tꜣ means "day before"[17] cannot be accepted, since the same expression occurs at Soleb in connection with the illumination of the baldachin on IIII prt 26. Previously in the same inscription we are informed that the ceremony of illumination lasted from IIII prt 26 to I šmw 1,[18] and r ḥḏ tꜣ n ḥbw sd can have reference only to the morning of the 26th, not to the day before.

§311. There is, then, no compelling evidence that the celebration of the Sed-festival began on I prt 1, and the probability is that it began on the anniversary of the accession day, thus differing with each king. What evidence can be adduced that it began on tpy rnpt, "the first day of the year"? Brugsch based his conclusion that it did so on the following text of Seti I:[19]



"Thou appearest in thy sedan-chair of the Sed-festival like Re on tp(y) rnpt."

This can easily be a mere comparison of two elements[20] and no statement of date at all. Moreover, is written, not . This may be merely a general reference to the "beginning of the year," not to a specific "first day of the year" (cf. Wb., V, 270 and 280).

§312. In a very fragmentary inscription accompanying an equally fragmentary scene of the Sed-festival in the funerary temple of Pepi II occurs the group .[21] The conclusion that this certainly gives the date of celebration of the Sed-festival of Pepi II may well be doubted; but, granting that it does, it still remains to be determined what day is here expressed by tpy rnpt.

§313. If we now turn to the nḥb kꜣw-festival, we find an accumulation of evidence that it was celebrated on I prt 1.[22] But again the evidence that the day of celebration of this festival was called tpy rnpt is quite unsatisfactory. Brugsch quoted two passages from Dendera as proof.[23] In the first the sun-god Harsamtawi is referred to as , "resplendent of body at the beginning of the year of Nḥb-kꜣ(w)"; in the second the same deity "shines forth from his shrine in his portable bark on his beautiful feast of the beginning of the year, ⌜enduring⌝ in his day of coming that he may see Nḥb-kꜣ(w)." In both instances is written, and in both instances not the feast of nḥb kꜣw but the serpent Nḥb-kꜣw is mentioned after tp rnpt, and it is uncertain whether there is any connection between the demon and the feast of the same name.[24]

§314. Now it is true that the festival of nḥb kꜣw was considered a New Year's feast.[25] It is also true that I prt 1 was, according to the Edfu calendars, the day of the accession of Horus the Beḥdetite and also a feast of wp rnpt.[26] The beginning of such a regnal year might be referred to as tp rnpt,[27] and its first day might be called tpy rnpt.[28] What might be true of the accession day of Horus might also be true of the accession day of any king whose regnal years were counted from his accession day, so that if his Sed-festival were celebrated on the anniversary of that day it might also be said to be celebrated on tpy rnpt. This might be the explanation for the appearance of tpy rnpt on the Pepi II relief; but it might just as well be that he celebrated a Sed-festival on the day properly termed tpy rnpt, "the first day of the lunar year."

§315. We have seen how wp rnpt was in origin the term applied to the rising of Sothis, but that in later usage it came to denote as well the first day of the civil year, the day of accession, and the day of the king's birth. Tpy rnpt, originally applied only to the first day of the lunar year, may similarly in later times have been applied to the first day of any year, such as the civil or the regnal year; but for this there is as yet no conclusive evidence. The interpretation that it ever was limited specifically to I prt 1 should be abandoned.

EXCURSUS C
THE TWELFTH DYNASTY

§316. William F. Edgerton has recently formulated a canon for the 12th dynasty, based upon a reaffirmation of the validity of the date IIII prt 16 for the heliacal rising of Sothis in the seventh year of Sesostris III.[1] His conclusion is that this year is to be expressed as 1870 B.C. ± ca. 6 years, this latitude being the result of a possible range of the arcus visionis (§21) from 9.5° to 8.4° and the possibility that the observations might have been made somewhere between Illahun (lat. 29.2°) and Heliopolis (lat. 30.1°). Edgerton was well aware that there are references to lunar days in the Illahun archives, and concerning these he wrote:

> Several Twelfth Dynasty papyri apparently refer to lunar months in connection with regnal years, months, and days. Future research may perhaps prove that some one of these texts belongs to a particular reign; and if the reign proves to be that of Sesostris III such evidence in combination with the Sothic date may enable us to equate the sixteenth day of the eighth month in his seventh year with a particular day in a particular Julian year B.C.[2]

It is the object of this excursus to assign such a definite dating to the Sothic date and then by extension to the whole 12th dynasty.[3]

§317. All our lunar data from the Middle Kingdom come from the papyri found in the precincts of the mortuary temple of Sesostris II at Illahun. The papyri are as yet unpublished. Borchardt devoted much time to their study, and the dates we have are due to his industry; but it is to be regretted that we have as yet no independent check upon his results. Regarding the lunar dates he has found he said:

> Für unsere Zwecke hier sind diese Erwähnungen nicht alle zu brauchen, da in vielen Fällen Jahr und Kalendertag überhaupt nicht genannt, auch oft nicht oder nur unvollständig erhalten sind. Dazu kommt noch eine andere Unsicherheit, die zuerst auch bei der Bestimmung des bekannten Hundssternfrühaufgangs Kopfzerbrechen gemacht hatte: Die Frage nach dem regierenden Könige. Die Hauptmasse der Papyri stammt zwar aus der Zeit Senwosrets III., aus der Senwosrets II. nur wenige, mehr aus der Amenemhets III. und ganz vereinzelte aus noch späterer Zeit. Der Fund is nun zwar schon seit 1899 in Museumsverwahrung, aber infolge der Ungunst der Umstände trotz einiger Ansätze doch noch lange nicht so bearbeitet, dass man wenigstens bei den meisten seiner Stücke angeben könnte, unter welchem Herrscher sie geschrieben worden sind. Man ist also vorläufig noch darauf angewiesen, für die Zuteilung der Schriftstücke in die Zeit bestimmter Könige, die nur sehr selten im Schriftstück selbst erwähnt sind, zu allerhand, nicht immer sicheren, Aushilfsmitteln, wie Vorkommen bestimmter Tempelbeamten, Vergleichung der Handschrift usw., seine Zuflucht zu nehmen.[4]

There are four certain lunar dates.[5] Three are easily detailed:

A. Berl. Mus., Pap. 10090, recto. Borchardt notes (ibid., p. 45, n. 2): "Tagebuch, mittlere dicke Schrift."
Year 3, III šmw 16 = lunar day 1

B. Berl. Mus., Pap. 10062 A, recto, iii, 6. Borchardt notes (ibid., p. 46, n. 11): "Tempeltagebuch, grosse Schrift (Zeit Amenemhets III)."
Year 29, I šmw 16 = lunar day 9

C. Berl. Mus., Pap. 10006, recto, col. ii. Borchardt notes (op. cit., p. 45, n. 3): "Tagebuch, grosse Schrift."
Year 32, III ꜣḫt 6 = lunar day 1
Year 32, III ꜣḫt 7 = lunar day 2

§318. The last lunar date, D, consists of the first days of the months of a lunar year (§186). The papyrus (Berl. Mus., Pap. 10056, verso) from which the dates are taken is a temple account from Illahun which lists alternate months of phyle-priests. A transcription was given in 1899 by Borchardt,[6] but unfortunately the papyrus itself has not yet been published. Through the kindness of Dr. Gardiner, who sent me a photostatic copy of his photograph of the papyrus, as well as his own transcription of it, it has been possible for me to check all the dates,[7] which are given in this fashion:

ꜣbd II šmw 26 nfryt r ꜣbd III šmw 25
ꜣbd IIII šmw 25 nfryt r hꜣt-sp 31 ꜣbd I ꜣht 19[8]
hꜣt-sp 31 ꜣbd II ꜣḫt 20[9] nfryt r ꜣbd III ꜣḫt 19
ꜣbd IIII ꜣḫt ⌜19 or 18⌝[10] nfryt r ꜣbd I prt 18

3bd II prt 18 nfryt r 3bd III prt 17
3bd IIII prt 17 nfryt r 3bd I šmw 16
"II šmw 26 down to III šmw 25
IIII šmw 25 down to regnal year 31, I 3ḫt 19
Regnal year 31, II 3ḫt 20 down to III 3ḫt 19
IIII 3ḫt ⌜19 or 18⌝ down to I prt 18
II prt 18 down to III prt 17
IIII prt 17 down to I šmw 16."

§319. Borchardt, followed by Eduard Meyer,[11] believed that the intervening months began on the day after the second date of each entry. Since he read I 3ḫt 20 as explained above, he got a month of 31 days from IIII šmw 25 to and including I 3ḫt 20, and a sequence of 30, 29, 31, 29, 30, 29, 30, 29, 30, 29, 30. Since the 31-day month fell at the end of the civil year, it seemed an obvious conclusion to Borchardt that the lunar months simply alternated 29 and 30 days, with an extra day added to the last month to correct it.

§320. This theory had to meet serious objections. The gravest is that a lunar month is given 31 days.[12] There is no evidence in any list of lunar festivals or of days of the lunar month for a 31st day. Any scheme which was based upon the experience of observation would inevitably reject the idea as fantastic. Moreover, as was disclosed by G. H. Wheeler, another interpretation of the text was quite possible and led to a much more acceptable result.[13] The date after nfryt r[14] was common both to the official finishing his term and to his successor. This theory gave the acceptable sequence of 29, 30, 30, 30, 29, 30, 29, 30, 29, 30, 29. Furthermore, I believed that I had found proof of Wheeler's theory in another extract from the archives of the Illahun temple, wherein one phyle reported as follows:[15] "Report of the first phyle of the staff of this temple which is entering the month. What they have said is: 'All thy affairs are whole and prosperous. We have received all the chattels of the temple, all the property of the temple being whole and prosperous, from the fourth phyle of the staff of this temple which is withdrawing from the month. The temple is fortunate in all good.' " This extract seemed to make it perfectly clear that at Illahun in the Middle Kingdom the day on which a new phyle entered on its work, the first day of a lunar month, was also the day on which the old phyle rendered an accounting of its stewardship and withdrew.

§321. Both of these theories, however, were based upon Borchardt's incorrect reading of I 3ḫt 20. Since the correct reading is I 3ḫt 19, it has become necessary to review completely the problem of the dates after nfryt r. It may be presented as follows, with Possibility I giving the intervening months as beginning on the day after the date following nfryt r and Possibility II giving the intervening months as beginning on the same day as the date after nfryt r.

Possibility I: Day after — Lunar month begins	Duration	Possibility II: Same day — Lunar month begins	Duration
II šmw 26		II šmw 26	
	30		29
III " 26		III " 25	
	29		30
IIII " 25		IIII " 25	
	30		29
I 3ḫt 20		I 3ḫt 19	
	30		31
II " 20		II " 20	
	30		29
III " 20		III " 19	
	29		30
IIII " ⌜19⌝		IIII " ⌜19⌝	
	30		29
I prt 19		I prt 18	
	29		30
II " 18		II " 18	
	30		29
III " 18		III " 17	
	29		30
IIII " 17		IIII " 17	
	30		29
I šmw 17		I šmw 16	

§322. We now have confusion compounded. If we begin the lunar months according to Possibility I, we obtain a proper sequence with no month longer than 30 days. But the evidence of the phyle report cited above seems to point to Possibility II as the correct interpretation; and this in turn has one month of 31 days, which is against all likelihood. It is clear that for chronological purposes it is safe to utilize only the initial dates of each pair as being certainly pśdntyw. After definite results have been established, it might then be possible to make an intelligent choice between the other alternate dates. To summarize, we have these dates of pśdntyw, with B reduced from lunar day 9 for ease of calculation:

A Year 3, III šmw 16
B Year 29 (Amenemhet III), I šmw 8
C Year 32, III ꜣḫt 6
D Year 30, II šmw 26
IIII šmw 25
Year 31, II ꜣḫt 20
IIII ꜣḫt ⌜19 or 18⌝
II prt 18
IIII prt 17

§323. The next step is to check the lunar dates against one another to determine, if possible, whether they make up one, two, or more groups. The usual way of checking two lunar dates of pśdntyw is to total the number of days between them, divide by the average number of days in a lunar month, 29.53059 (§§7,9) or for simplicity 29.53, and see if there is any remainder. Using this method, Borchardt had demonstrated that A and C go together,[16] since they are 10,335 days apart and 350 average months total 10,335.7 days, an excess well within the limits of lunar variability. A much easier method, however, is by the use of the completed 25-year cycle (Table 5). We have seen that its dates reflect the movement of the moon with an accuracy approaching 75 per cent (§121), with the inaccuracy in no case greater than one day. Thus one has only to fix one date in the cycle and count years to the other date to check for agreement, and this is easily done, since in the Middle Kingdom civil years and regnal years coincided.[17] III šmw 16 of A fits exactly in cycle year 2. If we call that "year 3" and count to "year 29" of B, we must equate that with cycle year 3. But in this year a month begins not on I šmw 8 but rather on I šmw 5. Obviously A and B do not fit together. Years 30 and 31 of D would correspond to cycle years 4 and 5; but every date of D is then off by two days, so that D likewise does not fit with A. Year 32 of C, however, equals cycle year 6; and in that year a month does begin, exactly as required for agreement with A, on III ꜣḫt 6. A and C do, therefore, fit together, and the use of the cycle gives the result reached above by computation.

§324. Obviously, since A does not fit with B and D, C also cannot fit with them. I šmw 8 of B is to be found in cycle year 25. If that be "year 29," then the following two years of the cycle, 1 and 2, would be "year 30" and "year 31." The dates of D agree exactly with the cycle for "year 31" and are off but a day for "year 30." Clearly, B and D are to be paired.

§325. We have now divided our lunar dates into two groups, one of which comprises A and C, the other B and D. The highest date in the first group is year 32, and in the second year 31. Since the papyri come after the reign of Sesostris II, one group must belong to Sesostris III and the other to Amenemhet III, as the Turin papyrus gives the former 30 + x and the latter 40 + x years. We have noted that Borchardt, no doubt as a result of his study of names or script, assigned B to Amenemhet III. With B must go D, leaving A and C for the reign of Sesostris III.[18] Since he reigned between 30 and 39 years, we have next to check our two groups of dates against each other to see if there is a possible fit which would give Sesostris III a reign within those limits. Placing C, as before, in cycle year 6, we find that assuming a reign of 36 years for Sesostris III we can get a fit with D in cycle years 15 and 16.

§326. Against this possibility should also be set the other, on the assumption that Borchardt was wrong in ascribing B to Amenemhet III, that B and D belong to Sesostris III and A and C to Amenemhet III. Should that be the case, by setting D in cycle years 1 and 2 and assuming a reign of 39 years for Sesostris III we can get a fit within a day for A in cycle year 13.

§327. We have now done all that we can in a deductive approach to our data. There remains the acid test of actual computation. This will be facilitated if we can fix the 25-year cycle into the 19th century B.C. To do this I calculated six lunar dates for the year 1847 and six for 1846. Ten of the twelve calculated dates fitted exactly into cycle years 6 and 7. As a working basis, then, we may set cycle year 1 in 1877, 1852, and 1827 B.C.

§328. We may now test both of our possibilities in terms of actual years. We have accepted Edgerton's finding that year 7 of Sesostris III must be 1870 ± 6 years. According to our first hypothesis A and C are dates of that king. A fits cycle year 2 and should therefore be 1876. If year 3 is 1876, then year 7 would be 1872, a very good fit. According to our second hypothesis B and D are dates of Sesostris III. If we place D in cycle years 1 and 2, we have the years 1852-1851 for years 30-31 of Sesostris, which would place his year 7 in 1875, again within the limits accorded it. Both hypotheses must now be tested by computation. The results are as follows:

Hypothesis I. A and C are Sesostris III
B and D are Amenemhet III
Year 7 of Sesostris III is 1872 B.C.

		Given Date		Calculated Date
A	Year 3 is 1876	III šmw 16	=	III šmw 16
C	Year 32 is 1847	III ꜣḫt 6	=	III ꜣḫt 6
B	Year 29 is 1814	I šmw 8		I šmw 7
D	Year 30 is 1813	II šmw 26	=	II šmw 26
		IIII šmw 25	=	IIII šmw 25
	Year 31 is 1812	II ꜣḫt 20		II ꜣḫt 19
		IIII ꜣḫt ⌜18⌝	=	IIII ꜣḫt 18
		II prt 18		II prt 17
		IIII prt 17	=	IIII prt 17

Hypothesis II. B and D are Sesostris III
A and C are Amenemhet III
Year 7 of Sesostris III is 1875 B.C.

		Given Date		Calculated Date
B	Year 29 is 1853	I šmw 8	=	I šmw 8
D	Year 30 is 1852	II šmw 26		II šmw 27
		IIII šmw 25		IIII šmw 26
	Year 31 is 1851	II ꜣḫt 20		II ꜣḫt 21
		IIII ꜣḫt ⌜19⌝		IIII ꜣḫt 20
		II prt 18	=	II prt 18
		IIII prt 17	=	IIII prt 17
A	Year 3 is 1840	III šmw 16		III šmw 17
C	Year 32 is 1811	III ꜣḫt 6		III ꜣḫt 7

§329. The probability is all in favor of the first hypothesis being correct. Not only is B a date of Amenemhet III, as Borchardt had decided, but the percentage of agreement with the astronomically correct dates is much higher than in the case of the second.[19] Moreover, year 7 of Sesostris in 1872 is nearer to the median of Edgerton's date of 1870 ± 6 years. The available lunar data may be said, then, to have fixed the 12th dynasty to the year down through year 45 of Amenemhet III.[20]

§330. I have pursued this comparison of hypotheses to the end, as it has value in itself and as for long it seemed the only basis for assigning the two groups of lunar dates to the proper kings. Happily, confirmatory evidence of the greatest importance is now available, since G. Posener has succeeded in reading the name of the mty n sꜣ in line 4 of Pap. 10056, our lunar date D, as Mkt sꜣ Nḫtỉ-šnb.[21] This same phyle-leader is mentioned in Kahun papyrus IV 1: 5a-6a,[22] in association with a "year 40" which cannot be other than Amenemhet III's. Thus the occurence of his name in Pap. 10056 places that too in the same reign.[23]

§331. The results obtained from the lunar dates also justify the astronomical correctness of the forecast of the heliacal rising of Sothis, which must have taken place on July 17, 1872 B.C., the Julian equivalent of IIII prt 16. If we now calculate the arcus visionis (β) which would give this result, we have the following:

Heliopolis	(lat. 30.1°)	ranges from	9.4° to 8.7°
Memphis	(lat. 29.9°)	" "	9.5° to 8.8°
Illahun	(lat. 29.2°)	" "	9.7° to 9.0°

The experimental data we now have for β give it a range from 9.4° to 8.6° (§21). The conclusion may thus be offered that the place of observation in the Middle Kingdom was probably not Illahun but may have been either Heliopolis or Memphis.

EXCURSUS C

§332. Before proceeding to an attempt to fix the end of the 12th dynasty and the reign of Amenemhet IV, it will be interesting to decide, if feasible, between the two possibilities given above (§321) for the dates after nfryt r in D. With years 30-31 of Amenemhet III fixed to 1813-1812 B.C., it is easy to check both possibilities against the astronomical dates.

Possibility I Given Date	Calculated Date		Possibility II Given Date
III šmw 26	III šmw 25	=	III šmw 25
I ꜣḫt 20	I ꜣḫt 19	=	I ꜣḫt 19
III ꜣḫt 20	III ꜣḫt 18		III ꜣḫt 19
I prt 19	I prt 18	=	I prt 18
III prt 18	III prt 17	=	III prt 17
I šmw 17	I šmw 16	=	I šmw 16

§333. Here the evidence is overwhelmingly in favor of Possibility II, with five of six given dates agreeing with calculated ones. Possibility II, we recall, is that toward which the evidence of the phyle report pointed, namely, that the last day of one phyle was the beginning of the month for the following phyle. But Possibility II also leads to a month of 31 days, from I ꜣḫt 19 to II ꜣḫt 20. This points again to Borchardt's theory that the lunar calendar of the Middle Kingdom used schematic months and that once a year, at the end of the civil year,[24] observation was used to correct the calendar, with now and again a 31-day month resulting. There are two serious difficulties to this theory, the first of which is that the lunar calendar concerned is not the later one, tied to the civil year, but the original one, governed by Sothis (§186). Consequently any yearly observational correction would almost certainly be made with the beginning of the month tḫy, which at this time would fall around the first month of šmw. The second difficulty is even more serious. The correction resulting in a 31-day month does not agree with the astronomically correct date. Instead, the extra day results in beginning the next month one day after the morning on which the crescent was certainly invisible. It can hardly be argued that poor observational conditions might have caused the extra day. Whether conditions were good or bad, the fact remains that the old crescent could not have been seen and there could be no excuse for giving a 31st day to the month.

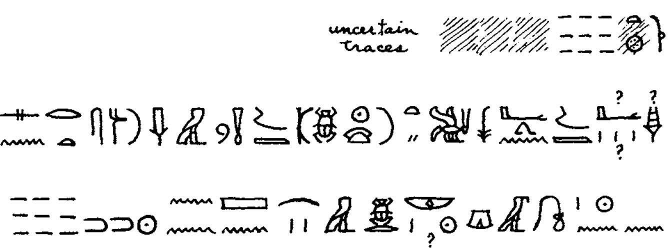
§334. A schematic calendar, corrected yearly, is clearly out of the question. Equally clearly, one of the dates leading to the 31st-day month must be wrong. The first of them, I ꜣḫt 19, agrees exactly with the calculated date. The second, II ꜣḫt 20, is one day later than the calculated date. With little hesitation I suggest an emendation of the latter to II ꜣḫt 19, which agrees with observation and gives a normal month of 30 days.

§335. These last paragraphs do not constitute argument in a circle. Once the 30th and 31st years of Amenemhet III had been fixed by using all the lunar dates of A, B, and C and the certain ones of D, it became feasible to examine the remaining dates of D in the light of probability. To my mind it is almost a certainty that Possibility II is the correct choice, and it is likewise almost a certainty that observation and not a schematic calendar determined the beginnings of the months. That being the case, an emendation to dispose of a 31-day month which cannot occur with observation seems obligatory. Combining the results of our work on lunar date D leads to the following:

Calculated Date				Given Date			Duration
II	šmw	26	=	II	šmw	26	
							29
III	"	25	=	III	"	25	
							30
IIII	"	25	=	IIII	"	25	
							29
I	ꜣḫt	19	=	I	ꜣḫt	19	
							30
II	"	19	=	II	"	<19>	
							30
III	"	18		III	"	19	
							29
IIII	"	18	=	IIII	"	⌜18⌝	
							30
I	prt	18	=	I	prt	18	
							30
II	"	17		II	"	18	
							29
III	"	17	=	III	"	17	
							30
IIII	"	17	=	IIII	"	17	
							29
I	šmw	16	=	I	šmw	16	

Ten out of twelve given dates thus agree with calculated dates—quite a satisfactory result.

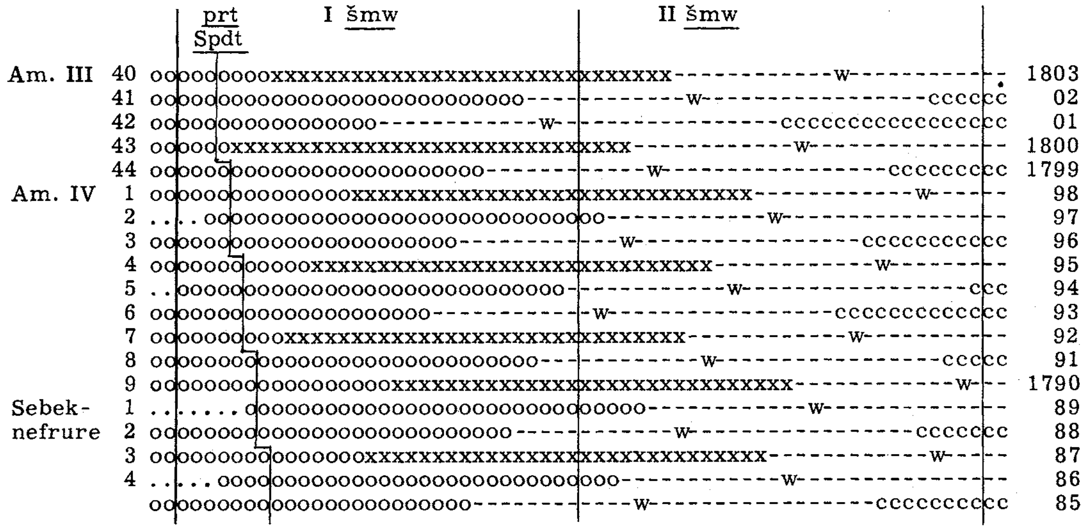
§336. We have seen that the wꜣg-feast dated II šmw 17 in year 18 of Amenemhet III took place on the thirteenth day of the lunar month of tḫy (§§182-85). On the assumption that this was the correct lunar day for the feast of wꜣg, two days before the full-moon feast of tḫy, just as the fixed feast of wꜣg in the civil year preceded the fixed feast of tḫy by two days, it is possible with the help of another dated wꜣg-feast to assign to the year the beginning of the reign of Amenemhet IV and by extension the end of the 12th dynasty. This important date occurs on the recto of an Illahun papyrus fragment in the Cairo Museum, No. 58065, and I have to thank the Museum authorities for permission to publish a photograph of the papyrus on Plate VI B. I give a transcription of the first three lines, which are all with which we need to concern ourselves, the rest being merely amounts of various offerings. Important for our purpose is that in "year 9" of some king offerings are to be made to Sesostris II in his mortuary temple "on the day of the wꜣg-feast, which is to occur on II šmw 29."[25]



§337. The problem, then, is to assign the date II šmw 29 to such a year in the 12th dynasty that it is equivalent to I ꜣḫt 13 in the original lunar calendar. We recall that the rule regulating the original lunar calendar is that the lunar month following wp rnpt was intercalary if it began within eleven days of the rising of Sothis. The maximum number of days that the wꜣg-feast could be distant from the day of rising would be eleven days of the month wp rnpt, thirty days of the intercalary month, Ḏḥwtyt, and thirteen days of tḫy, or a total of fifty-four. Fifty-four days before II šmw 29 is I šmw 6. The rising of Sothis would then have to fall on this date or later for the wꜣg-feast to occur on II šmw 29. We have seen that in 1872 B.C., the seventh year of Sesostris III, prt Spd took place on IIII prt 16. There are twenty days from this date to I šmw 6. Since Sothis rose one day later every four years, it follows that it rose on I šmw 6 some eighty years after 1872, or 1792 B.C. This year is obviously well past the ninth year of both Sesostris III and Amenemhet III (1834 B.C.). The only succeeding ruler who had a ninth year was Amenemhet IV, and by elimination the feast must be his. According to the Turin papyrus, Amenemhet III ruled more than forty, but less than fifty, years. His year 40 would be 1803 B.C. Let us now, beginning with this year, construct a table which will take into account the recession of the rising of Sothis by one day every four years in the civil calendar, and the beginnings of the lunar months immediately subsequent to each rising. Borchardt had calculated that the four years on which Sothis rose on IIII prt 16 were 1875 to 1872 B.C.[26] As a working basis, always subject to check, we may extend these by quadrennia to year 40 of Amenemhet III, which would begin the four years in which Sothis rose on I šmw 4. The 25-year cycle, which we have fixed to the 12th dynasty, may then be utilized to derive the lunar month beginnings, again with every important date checked by calculation. There are, of course, only ten possible years for the wꜣg-feast, from 1794 (forty years for Amenemhet III plus nine for Amenemhet IV) to 1785 (forty-nine years for Amenemhet III and nine for Amenemhet IV) inclusive. Within that range (see Figure 21) there is but one possible year for a feast on II šmw 29. That is 1790 B.C., and the fit is exact.

§338. With year 9 of Amenemhet IV fixed to 1790, then Amenemhet III had a sole reign of forty-four years. Since a year 46, which must be his, is known,[27] his coregency with Amenemhet IV, which is also known,[28] must have been at least two years. The reigns and coregencies of the 12th dynasty may be summarized as follows:

Sovereigns	Sole Reign	Coregency
Amenemhet I	20	10
Sesostris I	42	2
Amenemhet II	32	3
Sesostris II	19	
Sesostris III	36	
Amenemhet III	44	2
Amenemhet IV	9	
Sebeknefrure	4	
Total	206	17



The days of the individual lunar months are shown so:

ỉpt hmt	.....	tḫy	----- (the 13th day by w)
wp rnpt	ooooo	mnḫt	ccccc
Ḏḥwtyt	xxxxx		

FIG. 21.—The last years of the 12th dynasty.

§339. The Turin king-list gives a total of 213 years, 1 month, and 19 days for the dynasty, but we do not know whether the scribe intended to list sole reigns only or to include coregencies. Griffith had long ago remarked that a simple emendation of 213 to 223 (20 being easily corrupted to 10 in hieratic) would give a figure which could include all reigns and coregencies.[29] With this emendation and a coregency of two years for Amenemhet III and IV, we can arrive at exactly 223.

§340. The results of our inquiry into the lunar chronology of the 12th dynasty are summarized in the following table, based on Edgerton's. In the chronology of the second millennium B.C. there is no such thing as absolute certainty, but I submit that there is strong probability that it is correct. For simplicity, the divergency between the Julian and the Egyptian years, which coincided in 1984, 1983, and 1982 B.C., has been ignored. It should be noted, however, that every regnal year after the 10th of Amenemhet I actually began in December or November of the Julian year preceding the one in the table.

TABLE 8

CHRONOLOGY OF THE 12TH DYNASTY

					Julian Year B.C.	Egyptian Year of 12th Dynasty
Amenemhet I,	year 1				1991	1
Amenemhet I,	year 21	=	Sesostris I,	year 1	1971	21
Amenemhet I,	year 30	=	Sesostris I,	year 10	1962	30
Sesostris I,	year 43	=	Amenemhet II,	year 1	1929	63
Sesostris I,	year 44	=	Amenemhet II,	year 2	1928	64
Amenemhet II,	year 33	=	Sesostris II,	year 1	1897	95
Amenemhet II,	year 35	=	Sesostris II,	year 3	1895	97
Sesostris II,	year 19				1879	113
Sesostris III,	year 1				1878	114
Sesostris III,	year 7				1872	120
Sesostris III,	year 36				1843	149
Amenemhet III,	year 1				1842	150
Amenemhet III,	year 45	=	Amenemhet IV,	year 1	1798	194
Amenemhet III,	year 46	=	Amenemhet IV,	year 2	1797	195
Amenemhet IV,	year 9				1790	202
Sebeknefrure,	year 1				1789	203
Sebeknefrure,	year 4 (last year of dynasty)				1786	206

NOTES TO INTRODUCTION

1. Carl Schoch in Langdon and Fotheringham, The Venus Tablets of Ammizaduga (London, 1928), p. 97. The minimum figure is possible only under most favorable circumstances.

2. Ibid., (with reference to his article in Biblica [Rome], January, 1928).

3. Ibid.

4. Cf. Parker and Dubberstein, Babylonian Chronology 626 B.C.-A.D. 45 (Chicago, 1942), p. 23, and Johann Schaumberger, Sternkunde und Sterndienst in Babel, Ergänzungsheft 3 (Münster, 1935), p. 255.

5. Cf. W. F. Edgerton's remarks in "On the Chronology of the Early Eighteenth Dynasty (Amenhotep I to Thutmose III)," AJSL, LIII (1937), 192-93.

6. The latest treatment of the problem is that of Walter F. Snyder, "When Was the Alexandrian Calendar Established?" American Journal of Philology, LXIV (1943), 385-98. He argues plausibly for 30 B.C.

7. The Alexandrian and Julian years are both of the same length, 365 1/4 days, but they vary in the lengths of individual months and in the location of the extra day in leap year.

NOTES TO CHAPTER I

1. Martin P. Nilsson, Primitive Time-Reckoning (Lund, 1920), p. 150.

2. Cf. F. K. Ginzel, Handbuch der mathematischen und technischen Chronologie, I (Leipzig, 1906), 35; Hutton Webster, Rest Days (New York, 1916), pp. 178 ff,; and Nilsson, op. cit., pp. 147 ff.

3. K. Sethe, "Die Zeitrechnung der alten Aegypter im Verhältnis zu der der anderen Völker," Nachrichten von der Königlichen Gesellschaft der Wissenschaften zu Göttingen, Philologisch-historische Klasse, 1919-20, p. 289. I shall refer to this work hereafter as "Sethe, Zeitrechnung," with the pagination of the Nachrichten, which has pp. 287-320 in 1919 and pp. 28-55 and 97-141 in 1920.

4. Nilsson, op. cit., p. 169.

5. Richard Lepsius, Die Chronologie der Aegypter. Einleitung und erster Theil: Kritik der Quellen (Berlin, 1849), p. 157. That Lepsius here meant "new crescent" and not "conjunction" is clear from his use of the same term on p. 158, n. 1, where he speaks of the beginning of the Greek calendar, which certainly started with crescent visibility.

6. Ludwig Ideler, Handbuch der mathematischen und technischen Chronologie, I (Berlin, 1825), pp. 93-194.

7. H. Brugsch, Matériaux pour servir à la reconstruction du calendrier des anciens égyptiens (Leipzig, 1864), pp. 58-60.

8. E. Mahler, "Das mittlere Reich der ägyptischen Geschichte," ZAS, XL (1902), 79, and again in "Sothis und Monddaten der alten Aegypter," Actes du XIV^{e} Congrès international des orientalistes, II, No. 4 (Paris, 1907), pp. 39-41.

9. K. Sethe, "Die Sprüche für das Kennen der Seelen der heiligen Orte," ZAS, LVII (1902), 35, 48, and more recently in Übersetzung und Kommentar zu den altägyptischen Pyramidentexten, IV (Glückstadt, 1935), 16.

10. Zeitrechnung, p. 289.

11. First reference cited in n. 8.

12. D. R. Fotheringham, "Some Considerations regarding Professor Petrie's Egyptian Chronology," PSBA, XVIII (1896), 101.

13. C. F. Lehmann(-Haupt), Zwei Hauptprobleme der altorientalischen Chronologie und ihre Lösung (Leipzig, 1898), pp. 150-51.

14. Eduard Meyer, Aegyptische Chronologie (Berlin, 1904), p. 49.

15. William F. Edgerton, "On the Chronology of the Early Eighteenth Dynasty (Amenhotep I to Thutmose III)," AJSL, LIII (1937), 195.

16. Lynn H. Wood, "The Kahun Papyrus and the Date of the Twelfth Dynasty." BASOR, No. 99 (October, 1945), pp. 6-9.

17. Duncan Macnaughton, A Scheme of Egyptian Chronology (London, 1932), pp. 145 ff.

18. OLZ, XXVIII (1925), 620. In n. 2 Borchardt says that this proposition was given orally in April, 1923, to

a session of German Orientalists in Berlin.

19. Hereafter referred to as "Mittel."

20. Mittel, p. 7.

21. Ibid., p. 36; see also pp. 7 and 25.

22. Ludwig Borchardt, "Drei neue Beispiele von Mondmonatsnamen aus der Zeit der 20. Dyn.," ZAS, LXXIII (1937), 67.

23. H. H. Nelson et al., Medinet Habu III: The Calendar, the "Slaughterhouse," and Minor Records of Ramses III (Chicago, 1934), Pl. 148, ll. 294, 306, 318, 367, 379, 391, and Pl. 150, ll. 440 and 452.

24. Mittel, p. 37 and n. 2.

25. Ibid., p. 30, n. 1.

26. Ideler, op. cit., pp. 101-2; Lepsius, op. cit., pp. 130-31; Sethe, Zeitrechnung, pp. 130-38.

27. Sethe, Zeitrechnung, pp. 119-30. For evidence that the Babylonians never began their day in the morning, as stated by B. Meissner, Babylonien und Assyrien, II (Heidelberg, 1925), 394, and Sethe, Zeitrechnung, p. 121, with reference to Journ. asiat., 1909, p. 341, n. 4, see now S. Langdon, Revue d'Assyriologie, XXVIII (1931), 14-16, accepted by N. Schneider, Die Zeitbestimmung der Wirtschaftsurkunden von Ur III ("Analecta Orientalia," No. 13 [Rome, 1936]), p. 117.

28. Zeitrechnung, p. 130.

29. Ibid., pp. 300-302.

30. I know of only one clear example in which a lunar name has been applied to a civil day. In a building inscription at Edfu the 18th day of IIII šmw is given as iꜥḥ, the name borne by the 18th lunar day; cf. ZAS, X (1872), 14.

31. Heinrich Brugsch, Thesaurus Inscriptionum Aegyptiacarum, Vols. I-VI (Leipzig, 1883-91), referred to hereafter as "Thesaurus."

32. Published in Brugsch, Matériaux . . . calendrier . . . , p. 59, and Recueil de monuments égyptiens, I (Leipzig, 1862), Pl. XXXVIII, 2.

33. Published in Adriaan de Buck, The Egyptian Coffin Texts, II (Chicago, 1938), 322-24. I follow the text of S 2 C. Cf. the parallel text in Sethe, "Die Sprüche für das Kennen der Seelen der heiligen Orte," ZAS, LVII (1922), 10, l. 25, and Sethe's remarks on pp. 35 and 48.

34. Thesaurus, pp. 34 ff.

35. Rochemonteix and Chassinat, Le Temple d'Edfou, I (Paris, 1897), 375. Future references will be given as "Edfou."

36. So Helmuth Jacobsohn, Die dogmatische Stellung des Königs in der Theologie der alten Ägypter (Glückstadt, 1939), p. 23.

37. Mittel, p. 45, n. 1.

38. Kurt Sethe, Von Zahlen und Zahlworten bei den alten Ägyptern (Strassburg, 1916), p. 20.

39. Wb., II, 198, calls this nt a "Bildungselement." According to Sethe, Kommentar . . . Pyramidentexten, III, 318, and IV, 125, it is an ordinal ending after the numeral. (In no writing of either the 6th or the 15th day however, does it ever have the form .) Already in the Pyramid Texts the name of the numeral six, śrś or śỉś, had been reduced to a simple ś (cf. Coptic ⲥⲟⲟⲩ, ⲥⲟ), so that the addition to it of nt permitted a writing like the following which uses the biliteral sign śn, (Pyr. T. 716 a). The earliest occurrence of the numeral as the name of the 15th day seems to be in the 18th dynasty tomb of Chaemhet (No. 57 at Thebes), cited in the Belegstellen to Wb., II, 198, 2, where it appears as . It is doubtful that this is still to be read śmdt; one might suspect something rather like ⌜md-dỉw-nt⌝. It is likely that this writing is responsible for the appearance of nt in the variant , also occurring first in the 18th dynasty (Sethe, Urk., IV, 112). See my earlier remarks under śmdt, §36.

40. J. Garstang, Burial Customs of the Ancient Egyptians (London, 1907), Pl. IX, and Louis Speleers, Recueil des inscriptions égyptiennes des Musées royaux du cinquantenaire à Bruxelles (Bruxelles, 1923), pp. 22-23.

41. Borchardt, Mittel, p. 20 and n. 1, refers to three unpublished examples from the Illahun papyri in Berlin.

42. Arguably an m-formation from the root špr, "arrive, reach"; cf. Wb., II, 144, 6, "sanctuary, asylum (?),"

and 7, "harbor." On the coffin of Ma the writing is . Borchardt, *Mittel*, p. 37, n. 2, sees *mśpr* as an *m*-formation based on *śpr*, "rib," and compares the new crescent to a rib, first visible on the third day of the month. As we see above, however, this is true in only three months out of ten, and further he ignores the importance attached to *ꜣbd* by the Egyptians themselves.

43. If conjunction occurs close to midnight of the last day of the month, it is theoretically possible, given the exceptionally favorable conditions which result in the minimum hours for visibility, that the new crescent may be seen at sunset on *pśḏntyw*. In all my calculations, however, I have not yet encountered an instance of this.

44. I do not know the maximum time required for crescent visibility in Egypt. It should be less than the 42 hours necessary at Babylon (§11), since Egypt is farther south (§16). Should it be more than 30 hours, there is the rare possibility of new crescent being delayed to the fourth day. Again, I have not yet met with such an instance.

45. That is not to say that full moon may occur with equal likelihood anywhere in this range. Only rarely will it take place at either of the extremes. In the great majority of cases astronomical full moon will happen either in the night of *śmḏt* or the daytime of *mśpr śn-nw*.

46. Mahler, *op. cit.*, pp. 39-41.

47. O. Neugebauer and A. Volten, "Untersuchungen zur antiken Astronomie IV. Ein demotischer astronomischer Papyrus (Pap. Carlsberg 9)," *Quellen und Studien zur Geschichte der Mathematik*, Abt. B, Band 4 (Berlin, 1938), pp. 383-406.

48. Since the civil year has 365 days, while 12 lunar months total on the average but 354 days, it is necessary that every second or third lunar year have 13 months, so that the civil and lunar years will remain in general concurrent.

49. This, as was recognized by the editors of the papyrus, is the simple explanation of the feasts of the great and the small years in the Beni Hasan calendar. Cf. Percy E. Newberry, *Beni Hasan*, Vol. I (London, 1893), Pls. XXIV-XXV and pp. 54 and 61.

50. How the intermediate dates were determined will be discussed in the following chapter.

51. Eduard Mahler, *Chronologische Vergleichungs-Tabellen*, I (Wien, 1889), 15-38, includes tables for the conversion of Egyptian dates into the Julian calendar from 747 B.C. to A.D. 451.

52. Neugebauer-Volten, *op. cit.*, p. 402.

53. Memphis has been arbitrarily chosen for calculation purposes.

54. Ptolemy (*ca.* A.D. 100-178) was well aware of the fact that the moon nearly repeats itself in 25 civil years. His lunar tables (*Mathematike Syntaxis* [*Almagest*] VI.3 [p. 466, ed. Heiberg = tr. Manitius, I, 343]) begin in 747 B.C. with conjunction on Thoth 24^d 44' 17''. By 346 B.C. the beginning of his 25-year cycle of conjunction has dropped to Thoth 23^d 59' 44'' and 550 years later to Thoth 22^d 58' 28''. (The symbols ' and '' indicate 60ths and 3600ths of a day.)

55. *Op. cit.*, p. 383.

56. On the whole question of the antiquity of Egyptian astronomy cf. Neugebauer, "Egyptian Planetary Texts," *Transactions of the American Philosophical Society*, XXXII, Part II (New ser., January, 1942), 235-43. His conclusion regarding the texts published therein is that their date of origin is in the first period of the Hellenistic age.

57. Gardiner, Thompson, and Milne, *Theban Ostraca* (London, 1913), p. 51 (D 31). I owe the correct reading of the year number to Dr. G. R. Hughes.

58. Thompson had no doubt forgotten that Commodus reckoned his years from the accession of his father, March 7, 161. Cf. H. Gauthier, *Le Livre des rois d'Égypte* (Le Caire, 1907-17), V, 166, n. 2.

59. W. Spiegelberg, "Eine neue Bauinschrift des Parthenios," *ZAS*, LXVI (1930), 42-43. The transliteration of the document is correct as far as the date is concerned, but in his translation and commentary Spiegelberg has unwittingly changed IIII *prt* to III *prt*. Cf. also Borchardt, *Mittel*, p. 39.

60. Papyrus Rhind I, i, 10-11. Georg Möller, *Die beiden Totenpapyrus Rhind* (Leipzig, 1913), p. 14. Cf. Borchardt, *Mittel*, p. 23, n. 2, and pp. 39-40.

61. *Op. cit.*, p. 75, n. 14.

NOTES

62. So in the Medinet Habu Calendar for the feast of Opet, Pl. 156, ll. 837 ff.

63. The 27th day of the lunar month has as variant to its usual name the less common one of twn ʿbwy, Wb., V. 359, 12.

64. Mittel, p. 23, n. 2.

65. Mond and Myers, The Bucheum, III (London, 1934) Pl. XLIII, 13, G1; Borchardt, Mittel, p. 40.

66. Brugsch, Thesaurus, p. 924; Gauthier, op. cit., IV, 411; Borchardt, Mittel, p. 40.

67. Edfou, VII, 8; Brugsch, Thesaurus, pp. 256 f.:59 f.; Borchardt, Mittel, pp. 23 and 42.

68. Edfou, VII, 7;IV, 8-9;IV, 2; Brugsch, Thesaurus, pp. 255:46, 266:16, and 271 VI; Borchardt, Mittel, pp. 23 and 42.

69. W. Speigelberg, Die demotischen Denkmäler, II: Die demotischen Papyrus, Vol. I, Text; Vol. II, Plates ("Catalogue général . . . du Caire," Vols. XXXIX-XL [Strassburg, 1908], pp. 172-74, Pl. LXIV).

70. The space seems too small for both an amount of grain and a name.

71. Emend to ꜣḫt?

72. There had been a fifth phyle in the Old Kingdom, which must later have been discontinued; cf. Sethe, ZAS, LIV (1918), 3, n. 5, and Duell et al., The Mastaba of Mereruka (Chicago, 1938), Vol. II, Pl. 199.

73. Edfou, VII, 6;IV, 7;II, 26;II, 27;I, 327; Brugsch, Thesaurus, pp. 254: 33,266: 6,269 III, 270 IV, and 271 V; Borchardt, Mittel, p. 41.

74. Edfou, VII, 5 and IV, 7; Brugsch, Thesaurus, pp. 254: 27 and 266 : 1; Borchardt, Mittel, p. 41.

75. The first part of the temple was completed on a śnt (lunar date 9); it was finished as a whole on a second dnỉt (lunar date 7); new construction was begun on a śnt (lunar date 6).

76. In the following chapter we shall discuss whether this cycle represents something new or is a correction of an already existing cycle.

NOTES TO CHAPTER II

1. On the use of these names for the lunar months cf. §231.
2. "Mesore as First Month of the Egyptian Year," ZAS, XLIII (1906), 136-44.
3. Cf., e.g., Mittel, pp. 50 ff.
4. Illahun Papyrus, Berl. Mus., P. 10056, verso, ZAS, XXXVII (1899), 92 ff.; Mittel, pp. 7, 29 ff.
5. "The Chronology of the Twelfth Dynasty," JEA, IX (1923), 199, quoted and approved by Edgerton, JNES, I (1942), 310.
6. Loc. cit.
7. Urk., IV, 657.
8. Faulkner, in "The Battle of Megiddo," JEA, XXVIII (1942), 4, 11, argues with force and logic that the day should be emended to 20.
9. Faulkner renders, "the exact day of the festival of the New Moon."

NOTES TO CHAPTER III

1. An excellent study is the chapter, "Lunar Calendars and the Week," in Hutton Webster, Rest Days (New York, 1916), pp. 173 ff.
2. J. C. Gatterer, "De Theogonia Aegyptiorum," Commentationes Societatis Regiae Scientiarum Gottingensis Historicae et Philologicae Classis, VII (Gottingae, 1786), 34, 49, 52.
3. Handbuch der mathematischen und technischen Chronologie, I (Berlin, 1825), 174-77, 190.
4. These two events coincided almost exactly in 3000 B.C.
5. Chronologie, pp. 149-58, 220.
6. Thomas Henri Martin, "Mémoire sur le rapport des lunaisons avec le calendrier des Égyptiens sur la période d'Apis et sur la période de 36,525 ans," Académie des inscriptions et belles-lettres: Mémoires presentés par divers savants (Paris, 1860-64), serie 1, tome 6, partie 2, pp. 441-72.
7. Edward Hincks, "On the Various Years and Months in Use among the Egyptians," Transactions of the Royal Irish Academy, Polite Literature, XXIV (1865), 59-60.

8. Die Aegyptologie, p. 353.

9. Thesaurus, pp. 234, 476. Brugsch (op. cit., p. 245) seems to suggest a lunar year of twelve months only.

10. Thesaurus, p. 245 et passim; Die Aegyptologie, p. 353.

11. Thesaurus, p. 250 et passim. Brugsch was well aware that the civil year continued uninterruptedly after the attempted reform by Ptolemy III Euergetes I in 238 B.C., but he thought there was evidence that the reform itself continued as a separate year. This theory has met with no acceptance, and I leave it as not worth the space to refute in detail (cf. Meyer, Chronologie, p. 31, n. 1).

12. Chronologie, pp. 4 ff.

13. Ibid., pp. 31 ff.

14. Zeitrechnung, pp. 300-302.

15. Ibid., pp. 302 ff.

16. Ibid., pp. 311 ff.

17. Mittel, pp. 5 ff., 24 (cf. also OLZ, XXVIII [1925], 620, and ZAS, LXX [1934], 98-99). In the very same context Borchardt qualified his clear statement that the original lunar year began with the first month after the rising of Sothis by placing its beginning "around" the rising of Sothis, or "around" the longest day of the year.

18. Primitive Time-Reckoning (Lund, 1920), pp. 247-48.

19. As primary source cf. E. Pechuël-Loesche, Die Loango-Expedition, III:2 (Stuttgart, 1907), p. 138.

20. On this see H. Frankfort, "Modern Survivors from Punt," Studies Presented to F. Ll. Griffith (Oxford, 1932), pp. 445-53; C. G. Seligman, "Egyptian Influence in Negro Africa," Studies Presented to F. Ll. Griffith, pp. 457-62; C. G. Seligman, Egypt and Negro Africa (London, 1934).

21. Sir W. Willcocks, The Nile in 1904 (London, 1904), Appendix K, Table 41, as quoted in Otto Neugebauer's article, "Die Bedeutungslosigkeit der 'Sothisperiode' für die älteste ägyptische Chronologie," Acta Orientalia, XVII (1939), 185, Fig. 2, and 190, Fig. 4.

22. For Memphis the rising of Sothis is about five days later and the beginning of the inundation about ten days later than at Assuan. Where in the valley the calendar first developed, it is obviously impossible to say.

23. Sethe in his Kommentar to this passage prefers the translation "who renews herself," but I follow Junker in Giza, III (Wien, 1938), 111-13, and Giza, IV (Wien, 1940), 27, where he demonstrates the meaning of rnpwt, "year-offerings."

24. Brugsch, Reise nach der Grossen Oase el Khargeh (Leipzig, 1878), Pl. XVI, 29 and 33-34 = Thesaurus, pp. 510-11.

25. Brugsch, Thesaurus, p. 390.

26. Most recently from text 1 by Junker, Giza, IV, 27.

27. "Ein neues Sothis-Datum," ZAS, VIII (1870), 110.

28. F. Ll. Griffith, The Inscriptions of Siût and Dêr Rîfeh (London, 1889), Tomb I, l. 278.

29. William F. Edgerton, "Chronology of the Twelfth Dynasty," JNES, I (1942), 307-14, is the latest discussion.

30. The Semneh inscription must then have been drafted sometime prior to the 30th year of Sesostris III.

31. This is also the conclusion of Brugsch, Thesaurus, p. 234. Earlier, in Matériaux . . . calendrier . . ., p. 29, he had come to the opinion that wp rnpt = prt Spdt on the basis that the two were never listed together in festival lists.

32. Cf. also Sethe, Beiträge zur ältesten Geschichte Ägyptens (Leipzig, 1905), p. 63; Zeitrechnung, p. 294; and especially, H. E. Winlock, "The Origin of the Ancient Egyptian Calendar," Proceedings of the American Philosophical Society, LXXXIII (1940), 457 and n. 31.

33. Pyramid Texts §632 shows clearly that Sothis was identified with Isis early in Egyptian history, and the association of Isis with the cow (through identification with Hathor) is well known.

34. In the stelas published by Dows Dunham in Naga-ed-Dêr Stelae of the First Intermediate Period (London, 1937) there are only three that list feasts: 37, 85, 87. Wp rnpt is included on 37 and 87. Prt Spdt does not occur.

35. E. g., in Lange and Schäfer, Grab- und Denksteine des Mittleren Reichs im Museum von Kairo, Vol. I (Berlin, 1902), there are seven lists of feasts. Wp rnpt is listed on 20005 only, while prt Spdt is found on 20326, 20338, and 20390.

NOTES

36. E.g., Urk., IV, 538; cf. also 823-24.

37. In col. i, l. 2, of the recto of the new Cairo calendar of lucky and unlucky days, Pap. 86637, of Ramesside date, occurs the significant entry ꜣbd 1 ꜣḫt śśw 1 wp rnpt śn-nw, "I ꜣḫt 1, the second wp rnpt." In the light of our theory the situation is crystal-clear. The rising of Sothis would be *wp rnpt tpy, and the application of wp rnpt to the first day of the civil year would be secondary and correctly designated śn-nw. I am greatly indebted to Dr. Abd el-Mohsen Bakir of the Egyptian Museum, who will publish the papyrus, both for calling the passage to my attention and for permitting me to refer to it.

38. Cf. Junker, Giza, II, 59 ff.

39. Brugsch, Thesaurus, pp. 362 ff., or Drei Fest-Kalender (Leipzig, 1877) may be conveniently referred to.

40. This is, no doubt, , "the very, very great feast," of Edfou, V, 351 : 11. Cf. ḥb wr in 4th dynasty again, Brugsch, Thesaurus, p. 235.

41. Cf. Borchardt, Mittel, p. 56.

42. Newberry, Beni Hasan, I, 53, and Pl. XXIV.

43. We shall discuss later the transfer of feasts from the lunar to the civil calendar. Such a transfer would still keep the feasts in the same general order of succession.

44. Mittel, p. 34 and nn. 3 and 5.

45. Berl. Mus., Pap. 10016, published by Scharff in ZAS, LIX (1924), 24 ff. He assigned it with some reservation to Sesostris III, his reason being that the ỉmy-rꜣ ḥtp-nṯr Sobeknakh̆t is mentioned in the letter and an official of the same name and title was the recipient of another letter, apparently to be dated to the 18th year of Sesostris III (op. cit., p. 23 and n.). But neither the name nor the title was uncommon. Möller, Hieratische Paläographie, Vol. I (Leipzig, 1909), Pl. V, assigns the papyrus to Amenemhet III.

46. The dates for year 18 of each king are based on the results attained in Excursus C, q.v.

47. Mittel, p. 35.

48. Ibid., p. 34, n. 3.

49. According to Brugsch, Thesaurus, p. 393, it had a duration of fifteen days (the last half of the month); but no source is given. Borchardt (Mittel, p. 34) quotes Brugsch and adds "in Edfu." According to the Dendera calendar (Thesaurus, p. 365 : 10), the ṯḫy-feast lasted five days; but Brugsch (op. cit., p. 286) states that it began there on Thoth 20 and ended on Phaophi 5. Ṯḫy was the eponymous feast of the first month of the lunar calendar, and at least one other such feast, that of Renutet, was celebrated on the day of full moon (§249). Evidence on the other eponymous feasts is not forthcoming.

50. "Ein neues Sothis-Datum," ZAS, VIII (1870), 108-11.

51. Raymond Weill, Bases, méthodes et résultats de la chronologie égyptienne (Paris, 1926), pp. 113 ff.; Sethe, Zeitrechnung, p. 314; and others.

52. "On the Chronology of the Early Eighteenth Dynasty (Amenhotep I to Thutmose III)," AJSL, LIII (1937), 188-97.

53. Borchardt offered only three unpublished cases from the Illahun papyri where pśḏ written with the figure 9 is followed twice by the feast sign and n and once by a lacuna (Mittel, p. 20, n. 1).

54. Borchardt was no doubt misled by an old error of Brugsch; cf. Drei Fest-Kalender, p. viii, n. 1.

55. Recognized long ago by Lepsius, "Geschichtlichkeit der ältesten Nachrichten," ZAS, XIII (1875), 150.

56. Col. xviii, 2, šmw; lxi, 4-5, III - IIII prt; lxi, 15, I - II prt; lxxxvi, 8, šmw.

57. Lepsius, op. cit., p. 154.

58. Eduard Meyer, who rejected the fixed year, had to confess that the Ebers calendar was a riddle to him (Chronologie, p. 48).

59. On the basis of the Turin king list and a reconstruction of the royal annals (Palermo stone, etc.) I would date Menes to ca. 3110 B.C. I hope later to publish my results, but much remains to be done.

60. Thesaurus, p. 247.

61. "The Origin of the Ancient Egyptian Calendar," Proceedings of the American Philosophical Society, LXXXIII (1940), pp. 447-64.

62. Ibid., p. 451.

NOTES

63. Loc. cit.

64. Sethe, Zeitrechnung, p. 311; Weill, Bases, pp. 129-30.

65. Otto Neugebauer, "Die Bedeutungslosigkeit der 'Sothisperiode' für die älteste ägyptische Chronologie," Acta Orientalia, XVII (1938), 185.

66. Sethe, loc. cit. and n. 1; Weill, loc cit.

67. Brugsch, Thesaurus, p. 382 : 14. According to the Edfu calendar (Edfou, V, 351, 10), there was a feast to Renutet celebrated there on I prt 7. For a discussion of this see below (§250).

68. Sethe, op. cit, p. 312; Edfou, V, 353, 15-16. This may have been in reality the feast of Min; cf. Drioton, "Les fêtes de Bouto," Bulletin de l'Institut d'Égypte, XXV (1943), 7.

69. Sethe, loc. cit.

70. Sethe, op. cit., p. 313; Weill, op. cit., p. 128.

71. Sethe, loc. cit.

72. Based on the figure in Illustrated London News, May 10, 1930, p. 846.

73. Neither is it the sole example of an astronomical year beginning in the first part of October and based on the culmination of Sothis (Borchardt, "Altägyptische Zeitmessung," in Ernst von Bassermann-Jordan, Die Geschichte der Zeitmessung und der Uhren, I, B [Berlin, 1920], p. 21). As Borchardt stated, the scales of the water clock do not fit the reign of Amenhotep III (ca. 1400 B.C.) but reflect the calendarial situation of the civil year from ca. 1630 to ca. 1510 B.C. Now it was just around the middle of the sixteenth century B.C., in the reign of Amenhotep I, that the astronomer Amenemhet first invented the water clock (op. cit., pp. 60-63). His ratio between the longest scale and the shortest scale, 14 fingers to 12 fingers, fits the Karnak clock exactly. It seems to me quite safe to conclude that the scale on the Karnak clock, fitting as it does the period of the inventor, is simply another manifestation of Egyptian conservatism, similar, for example, to the decanal calendar ceilings of Seti I and Ramses IV, which are basically the same though separated by about a century and a half. The correct months for the time of Amenhotep III may have been painted on the rim of the clock, or a conversion calendar may have been employed.

74. Weill, op. cit., pp. 138-54.

75. De Iside et Osiride 13 c, 42 a.

76. Ibid. 39 bc.

77. "Les fêtes d'Osiris au mois de Khoiak," Recueil de Travaux, III (1882), 43-57; IV (1883), 21-33; V (1884), 85-103.

78. ZAS, XLIII (1906), 142.

79. ZAS, VIII (1870), 109.

80. Mittel, p. 22. The year concerned in the text is not the lunar but the civil. Since, however, as we shall discuss in detail later (§230), the names of the lunar months were transferred to the months of the civil year, without shift in relative position, it is simpler on this page to understand "year" as applying either to the lunar or civil calendar or to both.

81. Griffith-Petrie, Two Hieroglyphic Papyri from Tanis (London, 1889), Pl. IX, 2.

82. Pierre Montet, "Inscriptions de basse époque trouvées à Tanis," Kêmi, VIII (1946), 35-39 and Pls. I and II. Of the month fields are preserved only those of III šmw, with the figure of Ipet, the hippopotamus goddess, and of IIII šmw, with the figure of Re-Harakhti as a falcon and the feast-name, wp rnpt.

83. Cf. Brugsch in ZAS, X (1872), 15. Borchardt quoted this passage (Mittel, p. 23) but failed to connect it with the others.

84. This meets one of Gardiner's main arguments for his theory that Mesore was once the first month of the year (ZAS, XLIII [1906], 141). Elsewhere (Excursus A) we shall discuss his theory in more detail.

85. Edgerton (AJSL, LIII, 193) gives the probable years for the rising of Sothis on III šmw 9 in the ninth year of Amenhotep I as 1544 to 1537 B.C. In 1542, well within this range, a lunar month began, by calculation, one day before III šmw 9. Since the difference is but one day, it is possible to suppose an error in observation, and the interpretation given above need not be summarily rejected. Of possibly greater import, however, might be the fact that this settlement of the Ebers date does not accord with Borchardt's theory of the accession of the

pharaoh at full moon. To be sure the accession date of Amenhotep I is not known for certain (Borchardt, Mittel, p. 28; Gardiner, JEA, XXXI, 25); but of all the dates offered not one can be brought close to a full moon, if the ninth year be 1542. At a future time I propose to examine critically this theory, which has been the object of suspicion by some Egyptologists but has been stoutly defended by Borchardt.

86. Cf. the excellent discussion of the use of the schematic lunar calendar in Babylonia by O. Neugebauer, "The Origin of the Egyptian Calendar," JNES, I (1942), 400 ff.

87. H. E. Winlock, Excavations at Deir el Baḥri 1911-1931 (New York, 1942), pp. 137-40 and Pls. 60-67.

88. There are minor variations in orthography. The third month has the phrase pt ḥnᶜ śbꜣ.ś, "heaven with its stars," before the name of Ḥt-ḥr; and the tenth month has prty, the meaning of which is not clear to me, after Ḫnt-ḥty.

89. Cf. Brugsch, Thesaurus, p. 53, where he discusses the Ramesseum ceiling, to which Senmut's is ancestral.

90. Thesaurus, pp. 471-73; Die Aegyptologie (Leipzig, 1891), pp. 359-64.

91. The decanal deities here depicted are a selection of thirty-six out of the fifty-nine divinities of the dual year, and consequently have a lunar aspect; cf. §§273-75.

92. The main differences are in the fourth to the seventh month and in the eleventh month, but they are not substantial.

93. Catalogue of the Demotic Papyri in the John Rylands Library, Manchester, III (Manchester, 1909), 185.

94. See now J. Černý, "The Origin of the Name of the Month Tybi," Ann. Serv., XLIII (1943), 173-81.

95. Ostr. Deir el-Medineh No. 35:14 (published Černý, Catalogue des ostraca hiératiques non littéraires de Deir el-Médineh).

96. Ostr. Cairo Cat. 25598, 1 (published Černý, Ostraca hiératiques, in Cat. gén.).

97. The lunar names are based on Pls. I - III and Fig. 16. Černý's article, referred to above, should be consulted for the names of the civil months. The most important sources are the calendar on the verso of the new Cairo duplicate of the Calendar of Lucky and Unlucky Days of Sallier IV, and Brit. Mus. ostr. 5639a, both Ramesside.

98. Edfou, VII, 7; IV, 8; Brugsch, Thesaurus, pp. 255:40 and 266:12.

99. Sethe, Zeitrechnung, p. 39. On the translation "emmer" cf. W. W. Struve, Mathematischer Papyrus des staatlichen Museums der schönen Künste in Moskau (Berlin, 1930), pp. 62-63.

100. Beni Hasan, Vol. I, Pl. XXIV, and the Ramesseum ceiling. Pairs of months, distinguished as "big" and "little" etc., are a widespread phenomenon; their existence is due to a longer season being involved than can easily be included in one lunation. Cf. Nilsson, Primitive Time Reckoning, pp. 224-25.

101. Cf. the table in Wilkinson, The Manners and Customs of the Ancient Egyptians, ed. Birch, II, 398-99.

102. Baedeker, Egypt (1929), p. xxiii. Records maintained by the Epigraphic Survey do not bear out this last figure. In 1946-47, for example, the mean minima were December 45°, January 41°, February 44°, and March 53°.

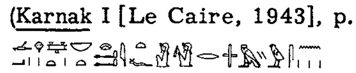
103. This was kindly brought to my attention by Professor W. F. Albright.

104. Langdon, Babylonian Menologies, pp. 133-35.

105. Georges Dossin, "Les archives économiques du palais de Mari," Syria, XX (1939), 105.

106. Zeitrechnung, pp. 37-42.

107. Mittel, p. 6, nn. 8 and 9.

108. Op. cit., pp. 51-55. This statement will require modification, at least in part, if an interesting theory of A. Varille's on the meaning of a passage in the Petrie stela concerning the obelisks which once stood before the temple of Amon Re Montu, just north of the great temple of Karnak, proves to be correct. According to Varille (Karnak I [Le Caire, 1943], p. 15 and n. 1), the passage in question, which tells of the erection of the obelisks  "one on each road between which my father (Re) rises," has to do with the solstices. He promises to discuss the point in detail later.

109. Botti-Peet, Il Giornale della Necropoli di Tebe (Torino, 1928), Pl. 5, 2. Cf. also Gardiner, ZAS, XLIII (1906), 138, 142.

110. At Dendera the references are numerous in the texts on the eastern stairway, whose reliefs depict the

procession to the roof on the occasion of Hathor's New Year festival. Cf. particularly Mariette, Denderah IV, Pl. 3, above Figs. 4 and 5; Pl. 20, Fig. 44; and Pl. 24 b, bottom. On I ꜣḫt 1 in the calendar of Edfu (Edfou, V, 348, 5) was celebrated "the feast of Harsamtawi, lord of Ḫꜣ-dy, in his beautiful feast of the birth of the sun disk."

111. Brugsch, Thesaurus, p. 365, 1; Duemichen, Altaegyptische Kalenderinschriften (Leipzig, 1866), Pl. 105, left, and Pl. 112, 32-33.

112. Op. cit., p. 142.

113. As is well known, in A.D. 139 Sothis rose on I ꜣḫt 1 (Censorinus De die natali 21, 9-12).

114. Brugsch, Thesaurus, pp. 380 ff.; LD IV, 78a.

115. Reading ḥb wp rnpt ḏd tpyw-ᶜ, with ḏd as passive participle.

116. The latest cycle mentioned in the Carlsberg Papyrus began in A.D. 144; the following one would, of course, begin in 169.

117. In A.D, 565 Olympiodorus wrote that the observation at Memphis determined the Sothic date for the whole land. Cf. Sethe, Zeitrechnung, p. 309.

118. In the Edfu calendar (Edfou, V, 351, 10) after the rites of the death and burial of Osiris comes this entry on I prt 1: "Feast of wp rnpt. Feast of Horus, [son of Osiris] and Isis. Accession of Horus of Beḥdet, the son of Re, beloved of mankind. Performing all ceremonies like I ꜣḫt 1." Thus in the Ptolemaic period wp rnpt could signify the opening of the reign of a king.

119. Cf. J. G. Milne, A History of Egypt under Roman Rule (3d ed.; London, 1924), p. 58. The news of the accession of Pertinax to the throne in A.D. 193 took 65 days to travel from Rome to Alexandria. On its arrival the prefect ordered a 15-day festival. Fifty-two days after the murder of Pertinax an official document was dated with his name in Egypt. Cf., also, F. Hohmann, Zur Chronologie der Papyrusurkunden (Berlin, 1911), pp. 50 ff., who lists P. Tebt. 481, still dated to Antoninus Pius on April 25, A.D. 161.

120. Edfou, V, 351, 10.

121. Specifically from one of the years 398, 373, 348, 323, or 298 B.C.

122. Cf. §102.

123. Wb., I, 437, 10.

124. Edfou, VI, 121, 9; cf. H. W. Fairman, "The Myth of Horus at Edfu," JEA, XXI (1935), 32.

125. Edfou, VI, 123, 2, and Fairman, op. cit., p. 33.

126. Edfou, V, 351, 5.

127. As in Edfou, V, 351, 6.

NOTES TO CHAPTER IV.

1. Chronologie, pp. 3-44.

2. The Sothic year was not exactly 365 1/4 days but was so close to that figure that to all intents and purposes the Sothic year and the Julian year were one and the same in length throughout Egyptian dynastic history. Those interested in more exact figures should consult Borchardt, Mittel, pp. 10 ff., and the literature cited therein. There they would discover that Borchardt rejected the cyclical calculation of the Sothic period and correctly insisted that astronomical calculation must be used. His calculated "first certain date" was July 16, 4226 B.C.

3. "Die Bedeutungslosigkeit der 'Sothisperiode' für die älteste ägyptische Chronologie," Acta Orientalia, XVII (1938), 169-95. He reaffirms his position in "The Origin of the Egyptian Calendar," JNES, I (1942), 396-403.

4. A. Scharff, "Die Bedeutungslosigkeit des sogennanten ältesten Datums der Weltgeschichte," Historische Zeitschrift, CLXI (1940), 3-32. He accepts Neugebauer's theory but decides on the basis of present evidence that the 365-day year need not have been inaugurated prior to ca. 2800 B.C. Scharff had earlier come to the conclusion that the calendar could not have been instituted in 4241 B.C. but began rather a whole Sothic period later, in 2781 (2776 was his figure); cf. Grundzüge der Ägyptischen Vorgeschichte (Leipzig, 1927), pp. 54 ff.

5. JNES, I (1942), 401, n. 17.

6. Loc. cit.

7. "The Origin of the Ancient Egyptian Calendar," Proceedings of the American Philosophical Society,

LXXXIII (1940), 450. Neugebauer has replied to this criticism (JNES, I, 397, n. 3) but not, I feel, convincingly. Averaging could hardly be as simple a process as he makes it out to be. A continuing operation from year to year of addition and division would be necessary.

8. Op. cit., p. 462.

9. Urk., I, 25.

10. The figures given are the actual lengths of lunar years according to the Babylonian calendar of 310 to 286 B.C.; cf. Parker and Dubberstein, Babylonian Chronology from 626 B.C. to A.D. 45 (Chicago, 1942; 2d ed., 1946), pp. 35-36. The empirical intercalation of the Egyptian calendar will have agreed with or very closely approximated the Babylonian cycle, and the figures may be used with confidence.

11. Naturally the Egyptian did not use the decimal system for his averaging. One might imagine some such simple process as this: Since 354 is the smallest number, use that as a base and total the days in excess of that figure for the first 11 years. The total is 122. Divide 122 by 11, and the result is 11 with 1/11 remainder. 354 plus 11 equals 365.

12. On the origin of the 30-day month cf. Neugebauer, JNES, I, p. 400.

13. A later parallel, as we have seen (§§110-122), is the 25-year cycle, the first day of which begins both a civil and a lunar month.

14. Since the rising of Sothis moves in the civil calendar one day every four years, 2937 results from 164 (41 times 4) added to 2773, and 2821 from 48 (12 times 4) added to 2773.

15. In the Middle Kingdom, at any rate, the year was so reckoned (Sethe, Zeitrechnung, p. 303). The five epagomenal days were above and beyond the year.

16. A tradition recorded by P. Nigidius Figulus in the first century B.C.; cf. Sethe, Zeitrechnung, p. 310, and Winlock, op. cit., p. 463.

17. Georges Daressy, Statues de divinités (2 vols.; Le Caire, 1905-06), pp. 231-34, Pl. XLVI.

18. Plate IV (Edfu) shows thirty-six of the forty-eight deities, omitting in each group the intrusive one. Brugsch's numbering is wrong. The erased figure at the beginning should be numbered 1, and so on.

19. Generally speaking, the decanal lists of the Greco-Roman period reflect an earlier tradition than those which immediately precede that period. Cf., e.g., Brugsch, Thesaurus, pp. 137-43, where the earlier lists may be found, ending with that on the sarcophagus of Nectanebo. These lists in turn vary considerably from those of the Middle Kingdom diagonal calendars, of which Brugsch was ignorant. The writer and Professor Otto Neugebauer have in view a publication of all Egyptian astronomical texts, wherein the problem of the decans will be studied in extenso.

20. Brugsch, Thesaurus, pp. 151-52.

21. Journal of entry, No. 41751. The preserved portion is 87 mm. wide and 70 mm. high. Cf. Georges Daressy, "La Semaine des Égyptiens," Ann. Serv., X (1910), 181-82.

22. "La Semaine des Égyptiens," op. cit., pp. 21-23 and 180-82. The stela from Tell Basta which he discussed in his first article has seven registers of deities, the last of which presumably included Nos. 50-59 (see Ahmed Bey Kamal, "Notes prises au cours des inspections," Ann. Serv., IX [1909], 191-92 and plate); and a hollow cylinder of glazed clay, now in the Cairo Museum, which he discussed in his second article, has but Nos. 50-59 around it. The serpent, No. 51, omitted between Osiris and Horus was added after No. 59 by the ancient craftsman.

23. The "weeks" would consist of 7, 8, 7, and 7 or 8 days, respectively. There can be little doubt that the week of 7 days was a schematic fourth of the lunar month.

NOTES TO EXCURSUS A

1. Alan H. Gardiner, "Mesore as First Month of the Egyptian Year," ZAS, XLIII (1906), 136-44.

2. Suggested tentatively in ibid., p. 139, and strongly in The Tomb of Amenemhet (London, 1915), p. 97, n. 4. The identification has the approval of Sethe, Zeitrechnung, p. 31, n. 2, and Weill, Bases . . . de la chronologie égyptienne, p. 117.

3. E. Meyer, Nachträge zur aegyptischen Chronologie (Berlin, 1908), pp. 3-18.

NOTES

4. In the calendar of Esna (Brugsch, Thesaurus, p. 382, 12).

5. Zeitrechnung, pp. 30-37. Weill (op. cit., pp. 112-26) accepted all Sethe's conclusions and elaborated on them.

6. Cf. Botti and Peet, Il Giornale della Necropoli di Tebe (Torino, 1928), p. 53, n. 7, and Pl. 59, l. 19.

7. Edfou, V, 350.

8. Ibid.

9. J. J. Tylor and F. Ll. Griffith, The Tomb of Paheri at el Kab (London, 1894), Pl. IV, and Urk., IV, 109.

10. Brugsch, Thesaurus, p. 380 : 5.

11. At Medinet Habu (MH, Vol. III, Pl. 154 : 686-704) are listed supplies for but one day. The only evidence for a duration of the feast for more than one day is in a papyrus of the second century after Christ (P. Brussels E 7535). The feasts of Hermes, beginning on Thoth 19, lasted seven days, but it is quite uncertain whether this duration reflects ancient custom or simply a transplanted Greek one. Cf. Marcel Hombert and Claire Préaux, "Les papyrus de la Fondation Égyptologique Reine Élisabeth," Chronique d'Égypte, XV (1940), 136 and 143.

12. This seems to be the explanation which Borchardt offered of the "Gardinerschen Phänomens"; cf. Mittel, p. 24. But mere double-dating in the civil and later lunar calendars would never account for the feast of Renutet falling, in every known instance from the 18th dynasty to the Roman period, on I šmw 1. Moreover, the calendar of Medinet Habu differentiates between feasts determined by the moon and feasts fixed in the civil year, and there is nothing there to indicate that the feast of Renutet on I šmw 1 was lunar.

13. Edfou, V, 348-60.

14. I have omitted the last four months of the calendar because their feasts have no bearing on the demonstration.

15. Ibid., p. 352, 14.

16. Ibid., p. 356, 22.

17. Brugsch, Thesaurus, p. 367 : 20-21.

18. Ibid., p. 382 : 11.

19. Ibid., p. 46; also my Pl. V.

20. Mariette, Denderah, Vol. IV, Pl. 77a, with some corrections from Brugsch, Thesaurus, pp. 325-28. A collation of this important text is badly needed.

21. Edfou, V, 350, 9.

22. Cf. V. Loret, "Les fêtes d'Osiris au mois de Khoiak," Recueil de travaux, III (1882), 43-57; IV (1883), 21-33; V (1884), 85-103; and H. Brugsch, "Das Osiris-Mysterium von Tentyra," ZAS, XIX (1881), 77-111.

23. It is my belief that the whole character of Egyptian kingship in its transmission from father to son will be found to have, ultimately, a lunar explanation. The dying Horus is the waning moon. Horus dead becomes Osiris, and the moon is invisible. The new crescent is the symbol both of the reborn Osiris as king of the dead and of his son and successor Horus as king of the living. The ceremony of the Sed is also understandable on a lunar basis. The king normally celebrated it for the first time in his 30th year. The 29 years he has reigned may be compared to the 29 days of the lunar month from the day of new crescent, the second day, to day 30. Like the moon, the king, Horus of the Living, has run his course. In his 30th year, pśdntyw, he dies and is reborn as the youthful Horus, the crescent moon, strong and vigorous.

24. This is in itself an indication of a lunar origin. On the importance of the first six days of the lunar month as being the six parts of the eye of Horus, cf. H. Junker, "Die sechs Teile des Horusauges und der 'Sechste Tag,' " ZAS, XLVIII (1910), 101-6.

NOTES TO EXCURSUS B

1. E. Meyer (Chronologie, p. 36) considered tpy rnpt to mean "first day of the wandering year."

2. Thesaurus, pp. 213 and 1124.

3. Beiträge zur ältesten Geschichte Ägyptens, p. 136; Kommentar . . . Pyramidentexten, IV, 16.

4. "Horus the Beḥdetite," JEA, XXX (1944), 30.

5. "Jahre und Tage der Krönungs-Jubiläen," ZAS, LXXII (1936), 52-59.

NOTES

6. According to Borchardt, on the anniversary of his "coronation"; but see A. H. Gardiner, "Regnal Years and Civil Calendar in Pharaonic Egypt," JEA, XXXI (1945), 24, who rightly insists on a distinction between accession and coronation, the former of which took place immediately on the death of the king's predecessor. In the 18th and following dynasties of the Empire, regnal years were reckoned from the day of accession.

7. Mond and Myers, Temples of Armant (London, 1940), Pl. XCIII 1 and pp. 163 ff.

8. Ibid., Pl. XCIII 3.

9. Op. cit., p. 30, n. 4.

10. Borchardt, op. cit., p. 53.

11. Ibid, pp. 53-54.

12. A. H. Gardiner, "The Goddess Nekhbet at the Jubilee Festival of Ramses III," ZAS, XLVIII (1910), 49. Borchardt, op. cit., p. 54, quotes Spiegelberg's old and incorrect reading, I šmw 28.

13. Gardiner, in ZAS, XLVIII, 48-49.

14. Borchardt, op. cit., p. 58. See also Robichon and Varille, Le Temple du scribe royal Amenhotep fils de Hapou (Le Caire, 1936), Pl. XXXV.

15. This important tomb has only recently been refound; cf. Ahmed Fakhry, "A Note on the Tomb of Kheruef at Thebes," Ann. Serv., XLII (1943), 447-532.

16. Ibid., p. 478.

17. Beiträge, p. 136. Cf. Michel Malinine, "Calendrièr égyptien des jours fastes et néfastes," Mélanges Maspero, I, 892-93, for a discussion of the meaning of ḥd tꜣ. In the astronomical day it meant the period of light before sunrise and is thus strictly a part of the preceding day. In the natural day of the people, who were up before sunrise, it meant simply "daybreak" of the new day.

18. J. A. Wilson, "Illuminating the Thrones at the Egyptian Jubilee," JAOS, LVI (1939), 294; LD III, 84a.

19. Mariette, Abydos, I, 51 : 44-47 = Brugsch, Thesaurus, pp. 213, 1124.

20. So considered by Moret, Du caractère religieux de la royauté pharaonique (Paris, 1902), p. 256, who translates: "... tu t'es levé sur ton pavois de la fête sed, tel que Râ au début de l'année."

21. G. Jéquier, Le Monument Funéraire de Pepi II, Vol. II (Le Caire, 1938), Pl. 50.

22. Belegstellen to Wb., II, 292, 4-5. The only bit of contradictory evidence is from one of the calendars of Edfu, where IIII ꜣḫt 29 is called Hathor's "beautiful feast of nḥb kꜣw," and the following day is denoted 'the second day of the feast of this goddess' (Edfou, V, 350, 9-10).

23. Thesaurus, p. 395, 1126.

24. Wb., II, 291, 15 and Belegstellen; A. W. Shorter, "The God Neḥebkau," JEA, XXI (1935), 47.

25. WB., II, 292, 4 and Belegstellen.

26. Edfou, V, 350, 10, and 399, 7.

27. This may be the conception behind the two quotations of Brugsch given above with reference to Harsamtawi.

28. Borchardt in ZAS, LXXII, p. 57, n. 5, believed that nḥb kꜣw as a New Year's feast was probably the name of the first day of the regnal year of Horus as king of Egypt.

NOTES TO EXCURSUS C

1. "Chronology of the Twelfth Dynasty," JNES, I (1942), 307-14. Giulio Farina, Il Papiro dei re restaurato (Roma, 1938), p. 63, had challenged the date as being incorrectly ascribed to Sesostris III.

2. Op. cit., p. 310.

3. By a remarkable coincidence, the results reached by Wood, "The Kahun Papyrus and the Date of the Twelfth Dynasty," BASOR, No. 99 (October, 1945), pp. 5-9, for the first year of Sesostris III and the beginning of the dynasty are the same as mine. His two errors, the one in taking crescent visibility to be the starting point of the month and the other in ascribing Berlin Pap. 10056 (see below) to the reign of Sesostris III, cancel one another exactly.

R. Weill's proposal to make the 12th dynasty contemporary with the Hyksos and reduce the period between its end and the beginning of the 18th dynasty to a maximum of thirty years (cf. "Remise en position chronologique et conditions historiques de la XII^{e} dynastie égyptienne," Journal asiatique, 1947, pp. 131-49, and "Le Synchronisme égypto-babylonien du début du IIe millénaire et l'évolution présente de la chronologie babylonienne," Chronique d'Égypte, No. 41 [January, 1946], pp. 34-43) has been criticized by Jean Capart, "Remarques sur l'article précedént," Chronique d'Égypte, No. 41, pp. 44-45, and C. F. A. Schaeffer, "A propos de la chronologie de la XIIe dynastie égyptienne et des Hyksos," Chronique d'Égypte, No. 44 (July, 1947), pp. 225-29. To their objections may be added the evidence in this excursus of the complete agreement of the lunar data from the 12th dynasty with the Sothic date of Sesostris III, which excludes a shift for the dynasty of some two hundred years.

4. Mittel, pp. 44-45.

5. There are others with varying degrees of uncertainty attached to the readings; cf. ibid., pp. 36-46.

6. ZAS, XXXVII, 92-93; cf. also Mittel, pp. 7 and 29 ff.

7. Some time ago Dr. W. Erichsen collated the original for O. Neugebauer, and the latter has kindly allowed me to quote his remarks.

8. Gardiner and Erichsen agree on 19, while Borchardt read ⌜20⌝. This it cannot be, since, as Gardiner pointed out in a personal letter, the sign immediately before the 9, which itself is mainly lacuna, is clearly the 10 before units and not the first part of 20, which is always different in form; cf. also Gardiner, "Regnal Years and Civil Calendar in Pharaonic Egypt," JEA, XXXI (1945), 22, n. 2.

9. Borchardt regarded 20 as uncertain, but it is perfectly clear.

10. The 10 is clear, but the units are in lacuna. Any other reading is excluded by the preceding and following dates.

11. Chronologie, p. 52.

12. Pointed out with emphasis by E. Mahler, Étude sur le calendrier égyptien (Paris, 1907), p. 131.

13. "The Chronology of the Twelfth Dynasty," JEA, IX (1923), 199, quoted and approved by Edgerton, op. cit. p. 310.

14. It cannot be entirely excluded as a possibility that here the exact meaning of this preposition is "down to, but not including," as in Gardiner, Grammar, p. 135.

15. Berl. Mus., Pap. 10003 A, ii, 16-19, published in Möller, Hieratische Lesestücke, I, 18, and Gardiner, Grammar, pp. 255-56.

16. Mittel, p. 45.

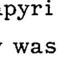
17. Gardiner, op. cit., pp. 21-23.

18. Borchardt had demonstrated (op. cit., pp. 31 and 45) that C cannot fit with D but does fit with A. As he had already assigned D to Sesostris III, A had to be, therefore, Amenemhet III. Fortunately for his argument as it stands, he failed to try to fit B with either.

19. Hypothesis I permits an agreement between a restored and a calculated IIII 3ḫt 18, while Hypothesis II permits none.

20. Edgerton has raised the point (op. cit., p. 313) that, since we have no pre-Manethonian document specifically dated to Sesostris III in any year after his nineteenth, it is not absolutely impossible that the Turin scribe may have reversed the order of Sesostris II and Sesostris III and his real opinion may have been that Sesostris II reigned 30 + x years and Sesostris III but 19.

Now if Sesostris III's year 7 was 1870 ± 6 years and his reign was 19 years long, years 30-31 of Amenemhet III must have been 1828-1827 ± 6 years. The only years which could possibly fit D would be 1827-1826, and calculation shows that the fit is a bad one. Let us assume, on the other hand, that D belongs to Sesostris II. As his reign might be from 31 to 39 years long, years 30-31 would fall between 1891 and 1871. The only possible years for D are 1877-1876 and 1888-1887. Upon calculation neither one will be found to yield a good fit. We may confidently conclude that the Turin scribe did not mistakenly reverse the reigns of Sesostris II and III.

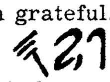
21. Borchardt had read Mktn s3 . . . -snb (ZAS, XXXVII, 93). Posener prefers Mkt to Mktn, pointing out that Ranke lists no hieroglyphic examples of the latter and the cursive hieratic of the Middle Kingdom does not distinguish between  and .

22. Griffith, Hieratic Papyri from Kahun and Gurob (London, 1897), Pls. X, XI.

23. The above discovery was communicated to me by Posener in a personal letter, and I am deeply indebted

to him for it. He commented further that a temple-scribe named *Ḥr-m-sȝ.f*, the recipient of many of the Illahun letters published by Scharff (*ZAS*, LIX, 20-51), had become an overseer sometime between years 18 and 24 of Amenemhet III (*op. cit.*, p. 22) and that if the *Ḥr-m-sȝ.f* named as temple-scribe in l. 2 of Pap. 10056 were the same man it would be necessary to consider whether the reading of "year 31" in ll. 2, 5, and 6 should not rather be "year 21." But he admits that the hieratic does not lend itself to that reading, and it is sufficient to check that hypothesis by means of the 25-year cycle to determine that, if the years involved were 20 and 21, the lunar months could not be fitted with either *A*, *B*, or *C*, and we should have three groups of lunar dates 21 years or higher, an impossibility for the kings involved. The obvious conclusion is that there was a second and later temple-scribe with the common name of *Ḥr-m-sȝ.f.*

24. Correct for Borchardt's 31-day month which ended I *ȝḫt* 20, but not for ours ending II *ȝht* 20.

25. M. G. Posener has made several valuable suggestions for which I am grateful. There can be little doubt that *ḥȝt-sp 9* is the correct reading in line 1. The original must have been , with  as in Kahun Pap., Griffith's Pls. XV, 13 and XXXIII 32. What follows in line 1 is quite uncertain but not important. Borchardt (*Mittel*, p. 34, n. 5) gave the date as "Jahr 9, 29. (?) 10. (?) W.," but the photograph shows clearly that no other month or day is possible.

26. *Mittel*, p. 29.

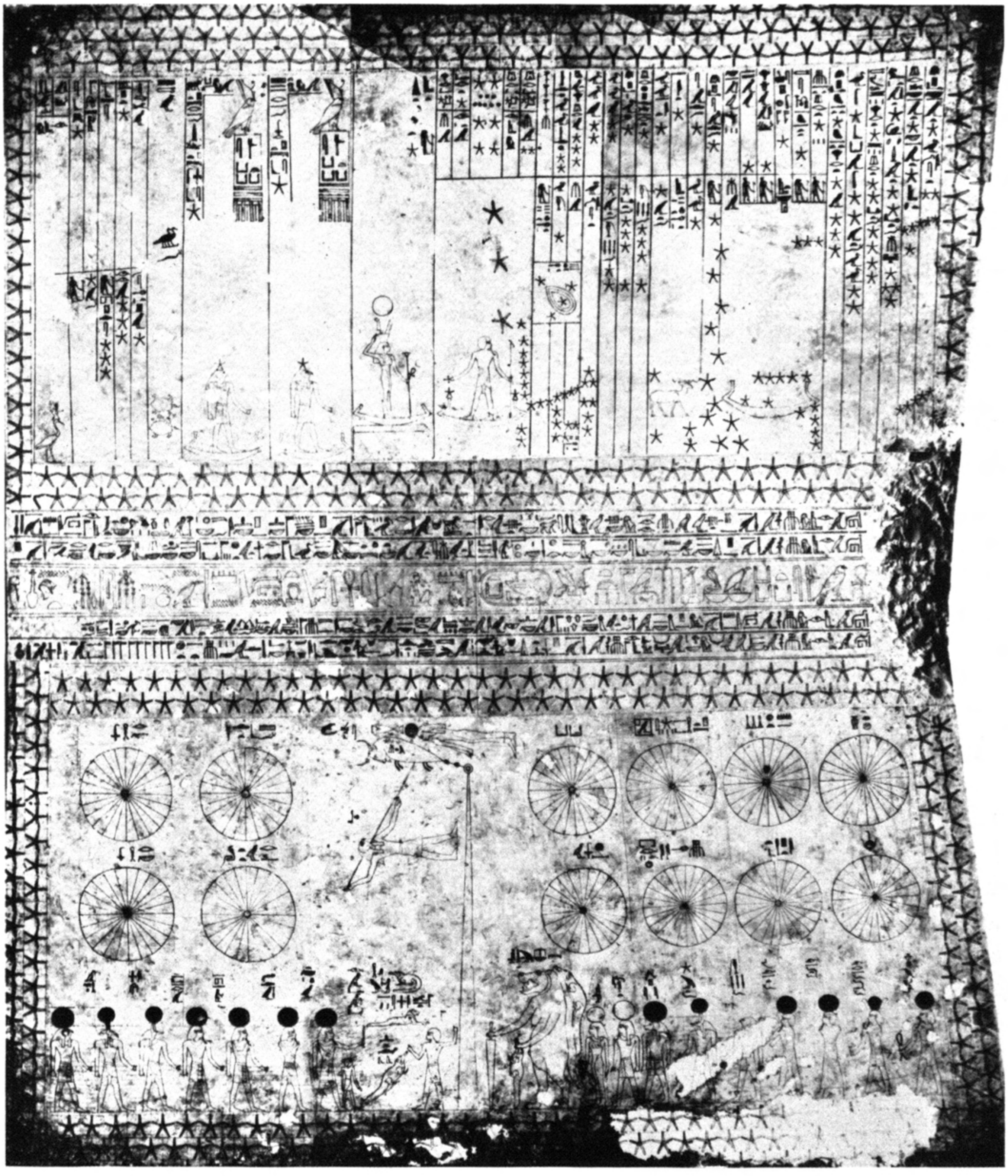
27. Edgerton, *op. cit.*, p. 312.

28. *Ibid.*

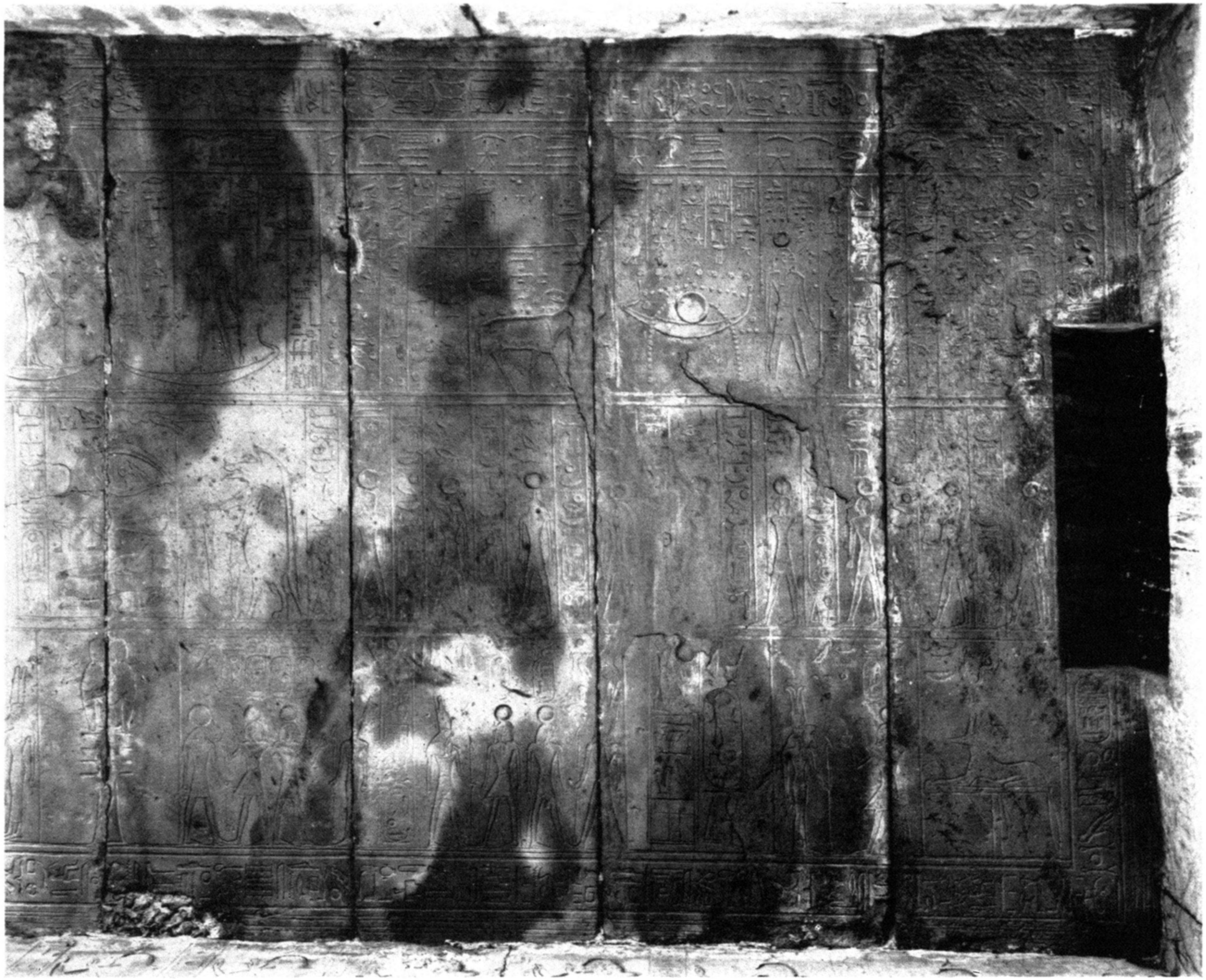
29. *Op. cit.*, p. 85.

PLATES

PLATE I



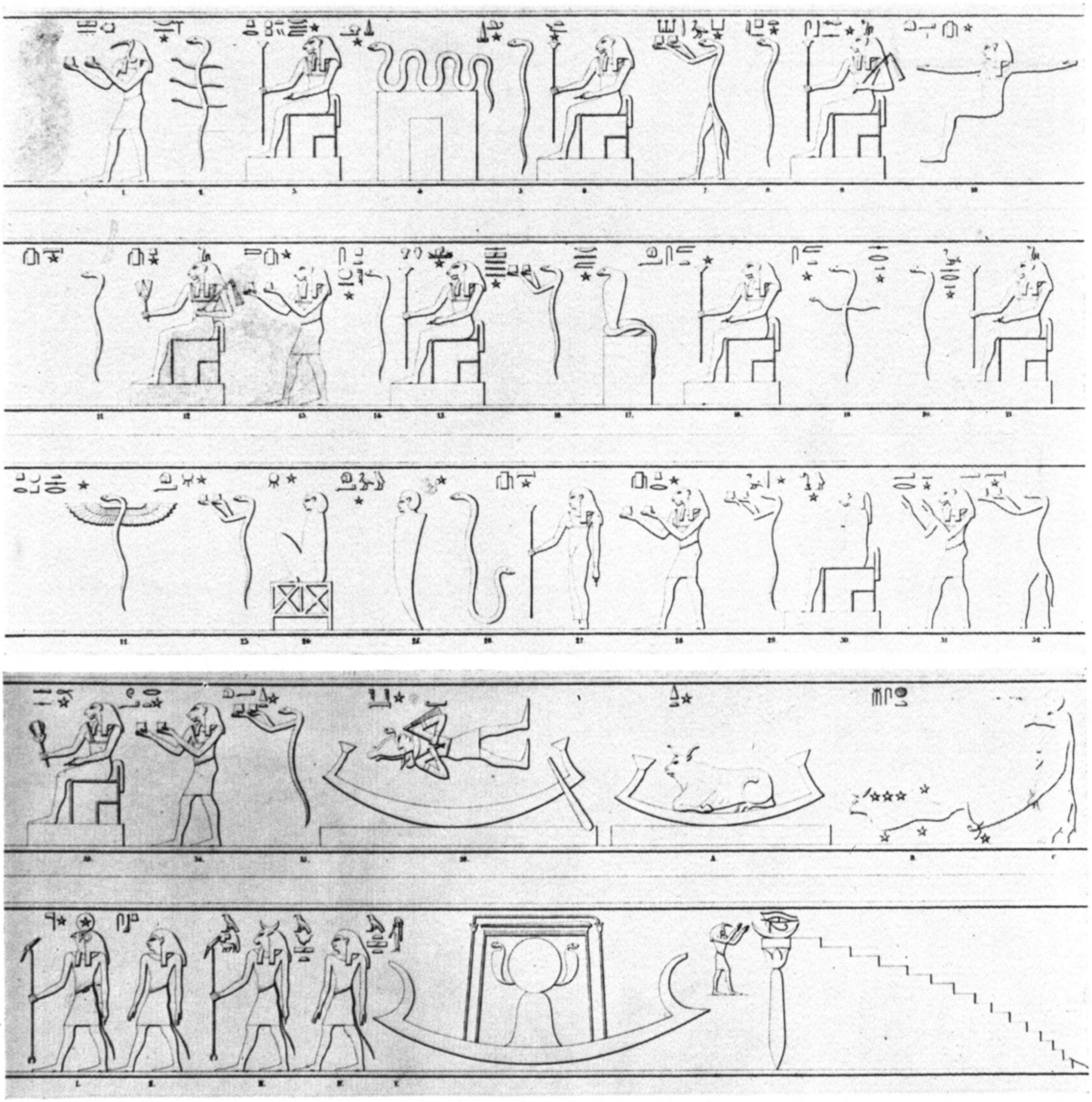
The Astronomical Ceiling in the Tomb of Senmut



THE ASTRONOMICAL CEILING OF THE RAMESSEUM (EASTERN HALF)

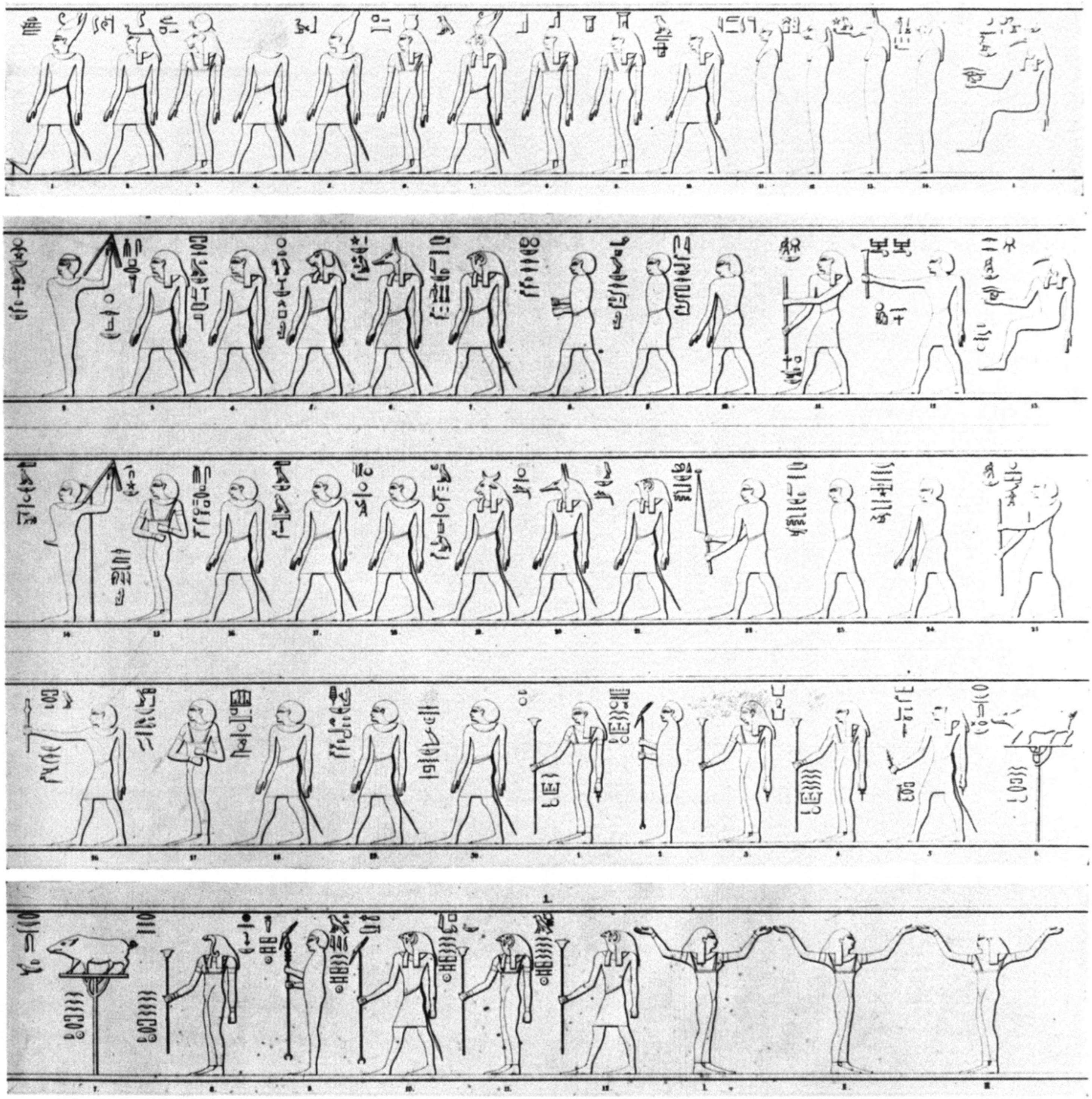
The Astronomical Ceiling of the Ramesseum (Western Half)

PLATE IV



THE ASTRONOMICAL FRIEZE OF THE TEMPLE OF EDFU (FIRST HALF)

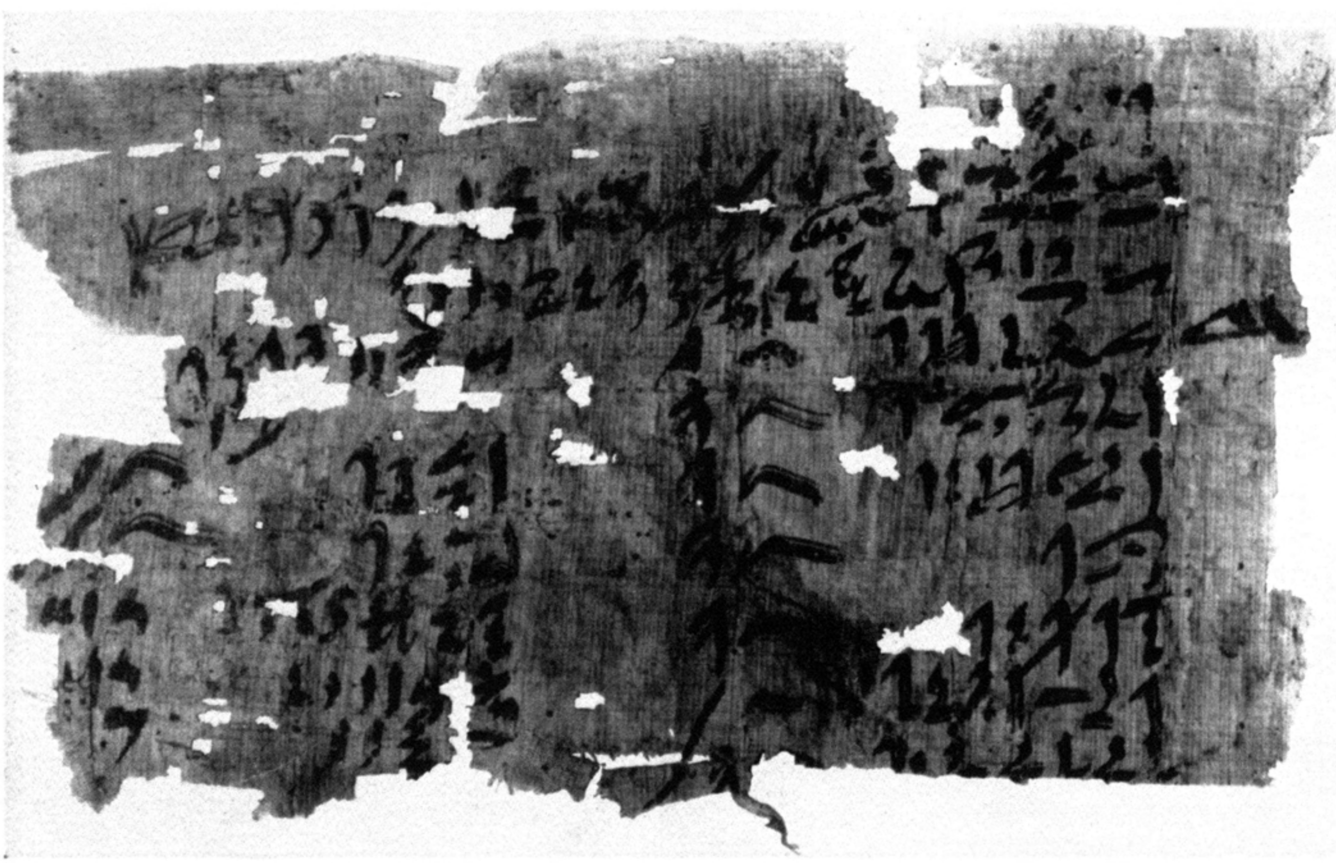
PLATE V



The Astronomical Frieze of the Temple of Edfu (Second Half)

PLATE VI

A, The Cairo *menat*-Fragment (Actual Size)



B, Cairo Papyrus 58065, Recto