Chapter 3

Investigating Ancient Egyptian Calendars

Much has been written about the calendars that the ancient Egyptians used, and none as perplexing as the calendar on the Ebers papyrus mentioned in chapter 1 and again here. Because scholars could not understand how to interpret its columns and its Sothic date in the ninth year of Amenhotep I it was virtually "disallowed" at the Gothenburg Colloquium in 1987 as a tool to aid chronology.

The Ebers calendar is a critical piece of evidence for the dating of the early 18th Dynasty. It must be correctly understood and not disallowed, as Kitchen suggested was the position of "most opinion" in the late 1990s.

Interest surrounds the dating of Amenhotep I because his reign preceded that of Thutmose I followed by Thutmose II, Hatshepsut, and Thutmose III; a range of reigns in which scientists have dated the eruption of the volcano Thera in the mid-to-late-17th century BCE updating the early 18th Dynasty by some 100–150 years.

Discussing other calendars used by the Egyptians may reveal how they understood the Ebers calendar. But before discussing the Ebers calendar, it is necessary to understand some fundamental matters, such as the solar or agricultural year based on the Nile phases, the Sothic year and Sothic cycle, the civil calendar, and dating by the use of lunar phases.

Seasonal or Agricultural Calendar

For the ancient Egyptians, the agricultural year began with the flooding of the Nile when heavy summer rains and melting snow brought silt-laden water down from East Africa and the Ethiopian highlands.[1] The inundation provided them with rich, friable soil, essential for the planting and growing of crops. When the Nile overflowed its banks, this first season of the year was known as *akhet* (*3ḫt*) or "inundation" lasting approximately four months—I *3ḫt,* II *3ḫt,* III *3ḫt,* IV *3ḫt*—from June to September in our Gregorian calendar; somewhat later in the Julian calendar—the calendar used to date ancient Egypt. When the waters had receded and land emerged, crops were planted and this season was known as *peret* (*prt*) "emergence", approximately October to January—I *prt,* II *prt,* III *prt,* IV *prt*—the Egyptian winter. In the third season, *shomu* (*šmw*), "harvest", crops were gathered, lasting from about February to May—I *šmw,* II *šmw,* III *šmw,* IV *šmw*—the Egyptian summer.[2]

These phases gave their names to the three seasons, which approximately, but not exactly, corresponded in length to the solar year: the time it takes the Earth to orbit around the Sun from one starting point until its return to that same point.

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[1] W.M. O'Neil, *Time and the Calendars* (Sydney: Sydney University Press, 1975) 70.

[2] See H.E. Winlock, "The Origin of the Ancient Egyptian Calendar," *Proceedings of the American Philosophical Society* 83 (New York: Metropolitan Museum of Art, 1940) 452; A.J. Spalinger, "Calendrical Evidence and Hekanakhte," *ZÄS* 123 (1996) 90 and sources cited in n. 26; R. Krauss, "Dates Relating to Seasonal Phenomena and Miscellaneous Astronomical Dates," *Ancient Egyptian Chronology* (eds. E. Hornung, R. Krauss, D.A. Warburton; Leiden and Boston: Brill, 2006) 369.

Civil Calendar

The so-called civil calendar was based on the three seasons of the Nile, each of four months of 30 days, plus five epagomenal (extra) days added to give it 365 days. It is not clear when the five days were added as there are indications that the Egyptians may once have had a year of 360 days.[3] In computing the Egyptian calendar, as we will see in Casperson's tables throughout these chapters, the five epagomenal days appear as days 1–5 in month 13.

It will help newcomers to Egyptology to make themselves a simple chart like the one below (Table 3.1) to compare the months as reckoned by the Julian calendar,[4] as used in Egyptian studies with the 12 months plus 5 days of the Egyptian civil calendar.

Table 3.1: Chart of Julian calendar months plus five days of the Egyptian civil calendar

Month		Season\month	Days	
1	I	Akhet = *3ḫt*	1–30	
2	II	Akhet = *3ḫt*	1–30	
3	III	Akhet = *3ḫt*	1–30	
4	IV	Akhet = *3ḫt*	1–30	
5	I	Peret = *prt*	1–30	
6	II	Peret = *prt*	1–30	
7	III	Peret = *prt*	1–30	
8	IV	Peret = *prt*	1–30	
9	I	Shomu = *šmw*	1–30	
10	II	Shomu = *šmw*	1–30	
11	III	Shomu = *šmw*	1–30	
12	IV	Shomu = *šmw*	1–30	
13			1–5	Epagomenal days

The Solar Year

In fact, the solar year consists of about 365.25 days. The inconsistency of the Egyptian civil calendar described above led, in due course, to the adoption of the Julian calendar, and ultimately to the Gregorian calendar used today.

While the solar year governs the seasonal agricultural cycle, the timing of the inundation or flooding of the Nile could vary by several months from one year to the next,[5] and was no reliable indicator of the beginning of the solar year. The civil calendar would stand alone as an independent record of the passing of time. Yet a civil calendar composed of 365 days instead of 365.25 days would also fall behind the realities of time dictated by our solar system. The Egyptians had a better indicator of the passage of long periods of time than their civil calendars (of 365 days) or the variable arrival of the inundation.

The helical rising of the star Sothis provided an assured signal every year of the beginning of the new solar year. It kept to the strict solar timetable of 365.25 days, but its appearance was recorded on a calendar composed of only 365 days. As a result, the heliacal rising of Sothis would appear on the same day for four years then on the next day of the civil calendar for the next four years, and so on. It would take approximately 1460 years for the Sothic cycle to once again be synchronized with the civil calendar. This is explained further shortly, but first a significant complication needs to be

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[3] See A.J. Spalinger, "Some Remarks on the Epagomenal Days in Ancient Egypt," *JNES* 54 (1995) 33-34. See also idem, "Month Representations," *Cd'É* 70 (1995) 113 n. 14, 114. The temple day was described as 1/360th part of the year on a tomb at Asyûṭ (A.H. Gardiner, "The Problem of the Month-Names," *Rd'É* 10 [1955] 20, 24) where tombs from the 9th, 10th, and 12th Dynasties were found.

[4] The later Gregorian Calendar used today adjusted for the time needed every 400 years to accommodate minor differences not dealt with by the quadrennial leap year.

[5] The beginning of inundation could vary from 335 to 415 days, according to Winlock, "Origin," 452.

mentioned, because the failure to recognize it has led to the disarray that exists throughout Egyptian chronology.

Seasonal Dates Differed in Upper and Lower Egypt

The inundation of the Nile took place earlier at Egypt's southern border near the first cataract at Elephantine (modern Aswan) where the lowest water occurred about the end of May. Rising slowly at first, the flood reached its height about the beginning of September in Upper Egypt and arrived at the Delta some time later.[6] Krauss writes:

> There are 34 maximum [flood] dates for Aswan on record, the earliest is August 18, the latest October 1, yielding maximum dates for Luxor between August 21/22 and October 4/5. Based on a comparison of the dates at Aswan and Roda [old Cairo], it follows that the maximum gauge occurred between 4 days (1882) and 63 days (1894) at Roda later than at Aswan.[7]

The difference in the arrival time of the Nile flood at the southern border of Egypt, and its arrival in the Delta, would have delayed the agricultural seasons accordingly. This has significance for our later discussion.

The Rising of Sirius was a Better Sign of the New Solar Year

A more exact marker of the new solar year was the annual reappearance of Sirius, the brightest star in the eastern sky just before sunrise, signalling the solar induced climatic seasons of the agricultural year.

Sirius, the Dogstar in the constellation of Canis Major, was known to Egyptians as *Spdt* after their goddess Sopdet, and as Sothis by the Greeks. As the Earth orbited around the Sun, Sirius could be observed for all but the 70 days of the year when it was obliterated from view by the Sun's light. Its reappearance came predictably every 365¼ days, known as its heliacal rising. It was a reliable indicator of the beginning of the solar year, and that the anticipated inundation beginning the agricultural cycle was near.

The striking reappearance of Sothis after 70 days was an expected event because the ancient Egyptians scrupulously observed the stars that were seen above the horizon throughout the year. Sirius was preceded by the constellation of Orion. R.A. Wells writes: "The red giant at the left shoulder of the figure of Orion, Betelgeuse (α Ori), and the slightly fainter, bluer star in the right leg, Rigel (β Ori), rise close together in time. When they are high enough in the sky so that Sirius can just be seen rising, the 3 stars together form a very distinctive triangle pointing downwards."[8] Together with other attendant stars the rising of Sirius was eagerly awaited and celebrated by the ancient Egyptians.

The "Going up of Sothis"

This "going up of Sothis" could be seen by the naked eye in Egypt's cloudless summer sky, but its observation depended on the arc of vision (*arcus visionis*). That is:

> The angle between Sirius and the sun when the star is first observed. The point of observation is not on the horizon, where observation is impossible. Modern calculations show that this angle is 7.5 degrees, with Sirius two degrees above the horizon, the sun

[6] Winlock states that it arrived about a month later, ("Origin," 452), while Spalinger cites 10 days ("Calendrical Evidence," 90). V. Hankey says, "It took 12 days for the first sign of the Nile flood, which was observed in the cataract at Elephantine to reach Memphis" (quoted in *High, Middle or Low? Acts of an International Colloquium on Absolute Chronology Held at the University of Gothenburg 20th–22nd August 1987* [ed. P. Åström; Gothenburg: Paul Åström's Förlag, 1989] Pt. 3, 45).

[7] Krauss, "Dates Relating to Seasonal Phenomena," 371.

[8] R.A. Wells, "Re and the Calendars," *Revolutions in Time: Studies in Ancient Egyptian Calendrics* (ed. A.J. Spalinger; San Antonio, TX: Van Siclen, 1994) 11.

> 5.5 degrees below it. Variations in this angle will affect the time of observation, hence the chronological conclusions drawn from the assumption that an ancient heliacal rising was made with one of 7.5 degrees.[9]
>
> Rita Gautschy writes:
> A realistic value for a successful first sighting of Sirius after its period of invisibility is an apparent altitude of 2° to 3° above the horizon, whereas the effect of refraction should be taken into account. In the following I will always denote that angle between Sun and star as arc of vision for which the star has an apparent height of 2° to 3° and the Sun 6° (7°, 8°, 9°, respectively) below the horizon. This is in contradiction to the classical definition of the arcus visionis, but reflects the true constraints in the sky.[10]

Gautschy notes three main uncertainties in calculating the heliacal risings of Sothis: the Sun's proper motion since Sirius is close to it; the arc of vision is not constant; and the rotation of the Earth decreases over time.[11]

Sothic Year

The Sothic year, understood as the time from one heliacal rising to the next, coincided with the length of the Earth's annual orbit around the Sun of 365.25 days. The "going up" of Sothis was first seen in Egypt at its southern border and was observed a day later for every degree of latitude going north. It stayed on the same day in the civil calendar usually for four consecutive years, occasionally for only three years or even five,[12] before moving on to the next day. In dynastic times the passage of Sothis through the year was recorded using the so-called civil calendar, but being a schematic calendar this was a later invention that we now need to discuss.

This schematic or civil calendar was a quarter of a day shorter than the solar year on which it was based, and, since days are always 24 hours in duration, the extra six hours were not represented in a year. The civil calendar was timed to begin with the heliacal rising of Sothis, which marked the first day of the new year on I *3ḫt* 1.

However, without a leap-year day to correct the ¼ day deficiency, the civil year moved forward of the solar year. Over four years the civil calendar moved forward of the rising of Sothis by one day, and on the fifth to eighth years by two days. Instead of being seen on I *3ḫt* 1 in the civil calendar, it was seen on I *3ḫt* 2. After 120 years the inundation no longer took place (ideally) in the month of I *3ḫt* but began to fall in II *3ḫt*, and after another 120 years in III *3ḫt*, and so on. After approximately 730 years the civil months were displaced by six months from their original positions so that the rising of Sothis and the inundation fell in the middle of the civil year in the months of II-III *prt* of the civil calendar. Sothis took a little less than 1460 years to move through each day of the civil calendar in dynastic times becoming marginally shorter over succeeding centuries.[13]

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[9] W.A. Ward, "The Present Status of Egyptian Chronology," *BASOR* 288 (1992) 58.

[10] R. Gautschy, "The Star Sirius in Ancient Egypt and Babylonia," at http://www.gautschy.ch/~rita/archast/sirius/siriuseng.htm

[11] Ibid.

[12] Ibid.

[13] A Sothic year was a minute longer than a Julian year, and when the difference added up to six hours, Sothis stayed on the same date only three years before moving on to the next day (R. Krauss, "Egyptian Sirius/Sothic Dates, and the Question of the Sothis-Based Lunar Calendar," *AEC* (2006) 441; M.F. Ingham, "The Length of the Sothic Cycle," *JEA* 55 (1969) 36-40.

When the rising of Sothis again coincided with I *3ḫt* 1 the Sothic cycle recommenced. The four years on which the heliacal rising appears on the same date is known as a quadrennium or a tetraeteris.

Date of the Rising of Sothis Differs at Different Latitudes

However, the heliacal rising of Sothis is not seen on exactly the same day throughout Egypt in any given year. It is seen first in the south near Elephantine with a latitude of 24.06°. For every degree moving north, the sighting is one day later, so that at Thebes with a latitude of 25.7° it is about two days later, and at Memphis with a latitude of 29.9° it is seen about six days later than at Elephantine. Wells explains the difference that latitude makes.

> Because the inclination of the ecliptic is greater relative to the level horizon at lower altitudes, the farther south the observation site, the earlier Sirius will be seen to emerge from solar occultation with a large enough elongation. In a given year, such a heliacal rising of Sirius would occur about four days earlier at Thebes, and about six days earlier at Elephantine, than at Memphis. Moreover, before sunrise the angular depression of the sun below the horizon (assumed to be level and free of clouds) at the moment of first stellar sighting is greater at latitudes nearer the equator than at higher latitudes.[14]

For example, Amenhotep I had a Sothic heliacal rising dated to III *šmw* 9 (the 9th day of the 11th month) in his ninth regnal year. This is the Ebers calendar date that we look at below. If this heliacal rising was observed at Thebes, because of the effects described by Wells, it would not be seen until about four days later at Memphis, when the date will be III *šmw* 13, because the Sothis rising stays on the same day for four years. The four days difference between Thebes and Memphis means that the passage of Sothis through the civil calendar will take about 16 years to move from III *šmw* 9 to III *šmw* 13. If the Sothic rising is seen at Thebes on a certain day of the civil calendar, the civil calendar or Julian date attributed to it at Memphis will be 16 years later.

The latitude of the northern coast of the Nile Delta is 31.33°. The distance between Elephantine and the Delta coast, being about 7° in latitude, amounts to a period of about 28 years in the Sothic cycle. Krauss notes that in the 28th century BCE Sothis rose 8–10 days later at the Mediterranean coast than at Elephantine.[15] It is always important to know where a specific heliacal rising was seen from. As noted previously, in the 1980s scholars spoke of a “high” date for Memphis, a “middle” date for Thebes, and a “low” date for Elephantine.[16] The “low” date of Elephantine is now favored, setting Ramesses II’s accession date in 1279, rather than earlier options of 1290, or 1304. But this date is not compatible with the science-based dates for the early 18th Dynasty. We shall examine the dates for Ramesses II’s reign later.

Sothic Dates and Kings’ Regnal Dates

The heliacal rising of Sothis is dated by the civil calendar to a specific regnal year in the reign of a number of kings. When the dates of two Sothic risings are known, dated to specific regnal years of two kings in the same place, it is possible to determine the number of years between the two dates because it usually took four years for Sothis to move one day in the civil calendar.

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[14] R.A. Wells, “Some Astronomical Reflections on Parker’s Contribution to Egyptian Chronology,” *Egyptological Studies in Honor of Richard A. Parker: Presented on the Occasion of His 78th Birthday* (ed. L.H. Lesko; Hanover and London: University Press of New England, 1986) 170 n. 13.

[15] R. Krauss, “Egyptian Sirius/Sothic Dates,” 440.

[16] *“High, Middle or Low?” Acts of an International Colloquium on Chronology held at the University of Gothenburg, 20th–22nd August 1987.*

For example, the Sothic rising in Amenhotep I's ninth year (early 18th Dynasty) dated to III *ŝmw* 9 and an earlier Sothic rising in the seventh year of Sesostris III (mid-12th Dynasty) dated to IV *prt* 16 shows that there is approximately 336 years between them. (The number of days between the two dates amounts to 84, and each day represents four years in the Sothic cycle). The individual reigns of the kings between these two dates, as derived from historical records, ought to agree with this span of years. Once the reign of one king associated with a helical rising is dated to a specific Julian date, it is theoretically possible to date other kings with heliacal risings associated with their reigns, assuming that the place of observation is the same for the others kings. If the rising of Sothis is observed from another location the difference in latitude must be taken into account.

The Julian dates to be attributed to the sightings of the heliacal risings also depend on whether the civil calendar has remained unchanged through the centuries or whether there has been an alteration to it at some time. A new Sothic cycle is known to have begun in 139 CE on I *3ḫt* 1 (see "Sothic Cycle ends/begins in 139 CE" in chapter 10). It is assumed by most scholars that one can calculate back nearly 1460 years to the beginning of the previous Sothic cycle, and another 1460 years for the beginning of its preceding cycle. However, this assumes that there had always been only one civil calendar, without change, over the centuries and that the recordings of the heliacal risings of Sothis have not been affected by any change—a precarious assumption as we shall see in chapter 10.

Amenhotep I's Ninth Year Reported at Thebes?

It is relevant to note that the Ebers papyrus recording the heliacal rising in Amenhotep I's ninth year was found *in Thebes* where Amenhotep resided. That suggests the observation was made in that vicinity. But the heliacal rising recorded in 139 CE is attributed to *Memphis*.

Most scholars presently reckon on an unchanged continuum of civil calendars and Sothic cycles, assuming that the date of III *šmw* 9 was recorded by the same calendar that recorded the one of I *3ḫt* 1 in 139 CE.[17] Krauss suggests that a shift was made from Upper Egypt to Memphis possibly in the 4th century BCE. (30th Dynasty).[18] A change did occur, but not at the time that Krauss assumes, as I will show.

The Civil Calendar

The civil calendar was given month-names. The origin of the names is uncertain and disputed. We shall discuss the early Egyptian month-names later, but in the Greco-Roman period they were given Greek pronunciation, as below.

I to IV *3ḫt*: Thoth, Phaophi, Hathor, and Choiak;
I to IV *prt*: Tybi, Mechir, Phamenoth, and Pharmouthi;
I to IV *ŝmw*: Pachons, Payni, Epiphi, and Mesore.

This calendar of three seasons was reformed in 238 BCE when Ptolemy III Euergetes I issued a decree in Canopus (near present-day Alexandria) requiring that every fourth year the Egyptian civil calendar should have a sixth epagomenal day. This decree was not generally implemented. In 46 BCE, the Roman Emperor, Julius Caesar, in consultation with the Alexandrian astronomer, Sosigenes, reformed their Roman calendar. The new calendar became known as the Julian calendar and added a 29th day to February every fourth year, giving the year 366 days.

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[17] Krauss, "Egyptian Sirius/Sothic Dates," 440.
[18] Ibid., 444.

It was not until 25 BCE, in the rule of the Emperor Augustus, that the Egyptians changed their civil calendar to include the leap-year day. The first day of this calendar, known as the Alexandrian, corresponded to the 29th day of August in the Julian calendar.

However, the Julian and Alexandrian calendars did not take into account that the solar year was 11 minutes shorter than the 365.25 day year, and over time it was realized that the years were too long and needed to be modified. In 1582, Pope Gregory XIII decreed that three leap-year days would be omitted every 400 years, in years evenly divisible by 100 but not by 400, as in 1700, 1800, 1900 but not 2000. This Gregorian calendar, now in use in many countries, is reckoned from January 1 and keeps in step with the seasons. However, it is the Julian calendar with its 365¼ days every year that is used to reconstruct ancient Egyptian chronology.

Dates of Heliacal Rising of Sirius (Sothis) Relating to Egyptian Kings

Modern computer programs can now calculate the heliacal rising of Sothis at any given location in Egypt going back over many millennia. Jean Pierre Lacroix provides tables in his HELIAC program for the heliacal rising (and setting) of Sothis and other stars seen from any location in Egypt over many millennia using the Julian or Gregorian calendars. For example, in 2000 BCE, using an altitude of 2° at Thebes (long. 32.6°; lat. 25.7°) Sothis rose heliacally on July 11, and at Memphis (long. 31.2°; lat. 29.9°) on July 16, and slowly changed so that it occurred on July 16 at Thebes and July 20 at Memphis in 139 CE. [19] However, Lacroix does not reference the rising of Sothis to Egyptian dates.

Gautschy provides tables from which one may download dates for the heliacal risings of Sothis at any location in Egypt with a range of options for the altitude and arc of vision from 3000 BCE to 2000 CE with Julian calendar dates converted to Egyptian calendar dates.[20] This gives a range of possible dates for the heliacal rising of Sothis in any one year so the appropriate altitude and arc of vision is important in order to obtain the correct date.

Some of the heliacal risings of Sothis discussed in this present work are shown in Table 3.2. (Question marks indicate that the dates are not recorded or preserved.)

Table 3.2: Heliacal risings of Sothis relating to Egyptian kings

5th Dynasty	1st or 2nd year of Neferefre on I *3ḫt* 1 at Abusir (near Memphis) based on a *w3gy* feast date on III *prt* 11
11th Dynasty	[1st] year Mentuhotep II on II *prt* 21, on coffin of Ashyat at Illahun
12th Dynasty	7th year Sesostris III on IV *prt* 16 at Illahun
17th Dynasty	11th (or 31st) year of unnamed king on II *ŝmw* 20 in Western Desert at Gebel Tjauti (this may be a new moon date not a Sothic date)
18th Dynasty	9th year Amenhotep I on III *ŝmw* 9 at Thebes; [? 33rd] year Thutmose III on III *ŝmw* 28 at Elephantine
19th Dynasty	41st year of Ramesses II on I *3ḫt* 22 at Thebes; 2nd or 4th year of Merenptah on 1 *3ḫt* 29 at Thebes
20th Dynasty	[?] year Ramesses III on I *3ḫt* [?]
Greek period	9th year Ptolemy III Euergetes I in 238 BCE on II *ŝmw* 1 at Canopus (near Alexandria); 11th year Ptolemy IV Philopator in 211 BCE on II *ŝmw* 7 at Memphis
Roman period	A new Sothic cycle started on I *3ḫt* 1 during the second consulate of Emperor Antoninus Pius and Bruttius Praeses in 139 CE at Memphis. In 238 CE, Sothis rose heliacally 100 years after 139 CE cited by Censorinus

[19] J-P. Lacroix, "Heliacal rising of Sirius in Thebes," http://www.ancientcartography.net/LEVERheliaqueAN.html

[20] R. Gautschy, "The Star Sirius in Ancient Egypt and Babylonia," http://www.gautschy.ch/~rita/archast/sirius/siriuseng.htm

The dating of these Sothic risings will depend on what calendar or calendars were used by the Egyptians—and whether they were all dated by the same calendar over the course of dynastic history. In an effort to answer that question, we turn first to determine what calendar(s) the Egyptians used *before* the civil calendar—or before civil *calendars—*came into existence.

Early Calendars Disputed

Evidence from calendar citations in ancient sources led scholars throughout the last century to attempt various explanations. The chronological puzzles and the controversies they have generated will be considered in depth in future chapters. Here, I offer a brief survey of significant viewpoints.

Two Civil Calendars?

Sir Alan Gardiner (1879–1963), a renowned Egyptologist, contended over 100 years ago that there were *two civil* calendars used in ancient Egypt: an early and a late calendar that ran simultaneously and overlapped each other so that the months of the later calendar were always one month behind those of the earlier calendar.

He assumed that Mesore was the first month of the earlier calendar and the last month of the later and the other 11 months followed suit.[21] Opposing Parker's idea in 1955 that the Egyptians had used an original lunar, a civil, and a later lunar calendar, Gardiner maintained that the month-names for both calendars were civil, with the festivals associated with various months having been moved back to the next month from the earlier to the later calendar. This accounted for the fact that some festivals had two dates one month apart.

He did not believe in Parker's lunar calendar.[22] Gardiner's and Parker's views will be discussed at length in later chapters.

Lunar Calendar(s)

The idea that the ancient Egyptians had originally used a lunar calendar was suggested by Heinrich Brugsch (1827–1894) and developed by Ludwig Borchardt (1863-1938). But the main proponent has been Richard A. Parker. Parker wanted to find the calendar behind the fourth century BCE 25-year cycle of new moons dated to the civil calendar on the Carlsberg 9 Papyrus (see chapter 5) and worked back to try to find evidence for an original lunar calendar.[23]

In 1950, he proposed that the ancient Egyptians had used an original lunar calendar, followed by a *civil* calendar, and then a *later lunar* calendar.[24] He wrote, "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."[25] Then he writes:

> 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,

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[21] A.H. Gardiner, "Mesore as First Month of the Egyptian Year," *ZÄS* 43 (1906) 136-44.

[22] A.H. Gardiner, "The Problem of the Month-Names," *Rd'É* 10 (1955) 22-25.

[23] R.A. Parker, "The Problem of the Month-Names: A Reply," *Rd'É* 11 (1957) 92; O'Neil, *Time and the Calendars*, 66; R. Krauss, "Lunar Days, Lunar Months, and the Question of the 'Civil-Based' Lunar Calendar," *AEC* (2006) 389.

[24] Idem, *The Calendars of Ancient Egypt* (SAOC 26; Chicago, IL: Oriental Institute of the University of Chicago, 1950) 30-50; idem, "The Calendars and Chronology," *The Legacy of Egypt* (ed. J.R. Harris; Oxford: Clarendon, 1971) 13-26.

[25] Ibid., 32 §156.

> 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.[26]

By the "event of *wp rnpt*" he means the heliacal rising of Sothis. Parker proposed that an intercalary month was inserted whenever the first day of the lunar year fell before the first day of the civil year.[27] This was assumed necessary in order to keep the "great feast of the rising of Sothis, called *wep renpet*, 'opener of the year', … [in] the last month of the year … It was necessary therefore to arrange a calendar which would keep this event properly within the month which it named."[28]

Parker rejected Gardiner's idea that there had been two civil calendars. He assumed that the month-names for the civil calendar derived from an original lunar calendar, and that the appearance of festivals being held out of their eponymous months (the months that the festivals were named after) was due to the time that the month-names were transferred from the lunar to the civil calendar. He proposed a later lunar calendar introduced after the inauguration of the civil calendar to account for the fact that several of the annual festivals had two dates one month apart, one being a fixed date, and the other moveable, based on a lunar date moving in the civil calendar.[29]

Parker sought to support his theory by various lines of argument, which we shall look at in greater detail when we come to the Gardiner/Parker controversy. Based on Parker's arguments, most Egyptologists now accept that the first calendar of the ancient Egyptians was a lunar calendar, and it is little wonder that most Egyptologists dismiss the Ebers calendar from consideration, or that the puzzles in ancient Egyptian chronology remain unsolved.

A Schematic Calendar Based on the Sun-god Re

R.A. Wells proposed another theory that takes into account Parker's idea of a lunar calendar. He noted that in Upper Egypt, the rising of Sothis was celebrated at the beginning of the solar/agricultural year in an annual festival known as *prt Spdt* "the going forth of Sopdet."[30] However, in Lower Egypt the people celebrated the birth of Re, the sun-god, in the 12th month of the year.

Wells postulated two early calendars: a southern lunistellar calendar in Upper Egypt and a northern lunisolar calendar in Lower Egypt. He proposed that the sky mythology associated with the sun-god Re and the goddess Nut correlated with solar positions in the Milky Way, placed Re's conception at the spring equinox just before he entered the mouth of Nut. Nine months later (272 days in 3500 BCE[31]), Re exited at Nut's birth canal at the winter solstice.[32] Six months later, Re arrived at the summer solstice, at about the time of the rising of Sothis in Upper Egypt. Re's mythical travel through the horizons took 365 days or one solar year, understood as the time it took Re

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26 Ibid., 32 §157.

27 Ibid., 26 §126; idem, "Calendars and Chronology," 15-16; A.J. Spalinger, "Thoth and the Calendars," *Revolutions in Time*, 45-47.

28 Parker, "Calendars and the Chronology," 15.

29 Idem, *Calendars*, 54, §§269-72; 58, §290.

30 Wells, "Re and the Calendars," 1, 20.

31 Idem, "The Goddess Nut, Pharaoh's Guarantor of Immortality," *VA* 10 (1995) 208 and n. 8.

32 Idem, "The Mythology of Nut and the Birth of Ra," *SAK* 19 (1992) 305-21; idem, "Re and the Calendars," 4-9; idem, "Goddess Nut," 205-14.

to make a round trip from Upper Egypt to Lower Egypt and back, or from winter solstice to winter solstice.[33]

The 12th month of the civil calendar in Lower Egypt was named Re Horakhty (*R^{c}-Ḫr-3ḫty*), that is, "Re Horus of the Two Horizons," inferring Re's year-long travel through the skies. According to Wells, the lunistellar calendar of Upper Egypt took precedence over the lunisolar calendar of Lower Egypt and the two calendars amalgamated before the emergence of the civil calendar.

In Pharaonic Egypt, Re's feast was celebrated at about the same time as *prt Spdt* in Upper Egypt, that is, at the time of the summer solstice, assumed to be a "secondary birthplace."[34] This was an appropriate time for Re, the sun-god, to be worshipped as the personification of the Sun.

In the Greco-Roman Period, the 12th month was called Mesore, from Egyptian *mswt R^{c}*, "the birthday of Re." When it was seen that the lunar calendar over time did not keep in step with the seasons, the Egyptians introduced a schematic calendar, the so-called civil calendar, which was based on the lunistellar calendar.[35] Wells adopted Parker's view of the lunar and civil calendars, both having *R^{c}-Ḫr-3ḫty* as a substitute for *wp rnpt* as the 12th month,[36] even though *wp rnpt* means "the opener."

Though Parker theorized a second, later, lunar calendar—to make up for the slippage after 200 years between the original lunar and the civil calendar, and to account for feasts with two dates a month apart, Wells pointed out that there is no textual evidence of any kind for a later lunar calendar.[37] He recognized one lunar and one civil calendar and proposed that the "dual calendar system co-existed throughout the remainder of Egyptian history until it was supplanted by the Julian calendar and later Alexandrian calendar reforms."[38]

A Calendar Based on the Stars

One of the earliest attested methods that Egyptians used to tell the passage of time was by observing the night positions of the stars, or decans as they were called. A new decan arose every 40 minutes, making it possible to divide the night sky into sections.[39] There were two decanal systems: the original one used the heliacal risings of certain stars or star groups, and the later one used meridian transits, being the time at which the decans reached the highest point in the sky; that is, the meridian.

The first system consisted of 36 stars used as markers on the eastern horizon, After an invisibility of 70 days, each star rose heliacally 10 days after the preceding star, thus marking a period of 10 days.

The pictorial representation of the decans in 36 columns, where the first is replaced by the second and so on, each moving upwards a row and from right to left every "ten days" gave the appearance of a diagonal line, thus their misnomer: "diagonal star calendars." These star clocks represented the year of 360 days, having 12 months of three decades (or three weeks of 10 days) as in the civil calendar.[40]

The five epagomenal days (that is, the five days remaining after the 360th at the end of the year) were treated separately as days of festivity for the five deities they

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33 Ibid., 312; idem, "Goddess Nut," 205-14.

34 Idem, "Re and the Calendars," 22.

35 Ibid., 21-23.

36 Ibid., 25, table 1.

37 Ibid., 27.

38 Ibid.

39 See J.G. Read, "Placement of El-Lahun Lunar Dates and Resulting Chronology," *DE* 33 (1995) 105-6.

40 Read, "Placement of El-Lahun Lunar Dates," 105-6.

represented: Osiris, Isis, Horus, Seth, and Nephthys. The first system was found drawn or carved on coffin lids primarily from the Middle Kingdom (11th and 12th Dynasties) when the civil calendar was already established, though the origin of the decans may have gone back much earlier. The second system was introduced when the earlier system was no longer useable because the ¼ day extra to the 365 days of the year was not accommodated by the civil calendar, so that by about the time of the 12th Dynasty the civil calendar was not synchronized to the decans. The new system used mostly different decans from the first system, and measured hours by means of the transits in half-monthly intervals, so that there were 24 half-month periods to every year.

The earliest surviving star clock is depicted on the southern ceiling of the tomb of Senmut,[41] vizier to Queen Hatshepsut (early 18th Dynasty). Senmut had two tombs, one at Sheikh Abd el-Qurna (TT71), and a larger one situated just east of Hatshepsut's mortuary temple at Deir el-Bahri (TT353). The latter has astronomical ceilings, with star maps on the southern and northern panels of the ceiling, but the tomb itself was never finished. On the southern ceiling, the decans are shown from right to left, Sirius, no. 36, is drawn just above the horizon, the last and most important of the decans.[42]

In addition to decans, the star clocks exhibited stars and other deities. Referring to the astronomical ceiling of Senmut's tomb, Ove von Spaeth claimed that judging from the positions of the planets at conjunction, with Mars significantly placed by itself on the extreme right and the possibility of a faint solar eclipse depicted in the same year, that the star map points to a specific time: 7th May 1534 BCE.[43]

Earlier scholars, however, suggested it was copied from a star clock dating from 400 years previously (presumed to be at the end of the 12th Dynasty).[44] It remains to be seen whether Spaeth's recent analysis and date of the star clock can be corroborated by, and correlated with, other chronological data.

Similar star conjunctions to that of Senmut's tomb appear on star maps of Amenhotep III, Seti I, and Ramesses II.[45] In addition, later astronomical *calendar* depictions appear also on the ceiling of the tomb of Ramesses VI, Ramesses VII, and Ramesses IX, of the 20th Dynasty. Water clocks, such as that of Amenhotep III, eventually replaced star clocks, which I explain later.

The decanal clocks show that, from early on, the Egyptians used star patterns to tell time during the night hours and the length of a year, and specifically that of the star Sirius whose heliacal rising was used as the harbinger of the solar year and coming inundation. Parker asserted that their calendar depictions of deities with month-names represented a *lunar* calendar, but this is contested by Anthony Spalinger. I examine their views later. With this succinct overview, I will now briefly introduce the calendar on the Ebers papyrus, leaving a fuller discussion to a later chapter.

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[41] See O. Neugebauer and R. Parker, *Egyptian Astronomical texts* III. *Decans, Planets, Constellations and Zodiacs* (Providence, RI: Brown University Press, 1969) 10.

[42] Ove von Spaeth, "Dating the Oldest Egyptian Star Map," *Centaurus International Magazine on the History of Mathematics, Science and Technology* 42 (Blackwell, 2000) 164. Also: at http://www.moses-egypt.net/star-map/dating_the_senmut_star_map.pdf

[43] Ibid., 159-179; date from p. 173. See star maps depicted on pp. 160 and 161.

[44] See, e.g., Neugebauer and Parker, *Ancient Egyptian Astronomical Texts*, III, 118; R. Krauss, Excursus 3, "Läst sich die astronomische Decke im Senenmut-Grab für die absolute Thutmosiden-Chronologie auswerten?" in "Das Kalendarium des Papyrus Ebers und seine chronologische Verwertbarkeit," *Ä und L* 3 (1992) 93-96.

[45] Von Spaeth, "Dating the Oldest Egyptian Star Map," 170.

The Ebers Calendar

The Ebers calendar (shown here in Figure 3.1), arguably the most famous calendar of ancient Egypt, is inscribed on a medical papyrus bought in Luxor by the German Egyptologist Georg Ebers in 1873—hence its name. Ebers bought the papyrus from an American dealer, Edwin Smith, acting on behalf of its owner who had access to it as early as 1862. The papyrus was wrapped in old mummy cloths and was in an excellent state of preservation.[46] It is 30 cm high and about 20 meters long.[47] Written in Egyptian hieratic script, it has 108 columns each containing 20–22 lines of text relating to a medical condition, possibly diabetes, and ends in a calendar on the first column of the verso.[48] Initially published in German by Heinrich Brugsch in 1870,[49] the papyrus now resides in the University of Leipzig library.

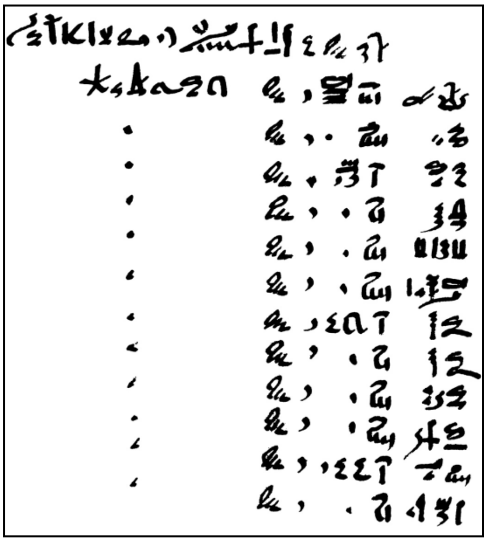

Figure 3.1: The Ebers calendar.

A hieratic copy is displayed above (Figure 3.1),[50] and a hieroglyphic transliteration[51] of the calendar with an English translation is displayed in Figure 3.2. In the original, the calendar is written from right to left, but for our orientation its columns are arranged from left to right.[52]

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[46] M. Clagett, *Ancient Egyptian Science, Vol. 2: Calendars, Clocks, and Astronomy* (Philadelphia, PA: American Philosophical Society, 1995) 193; L. Depuydt, "The Function of the Ebers Calendar Concordance," *Orientalia* 65 (1996) 61; S. Carpenter et al., *An Interlinear Transliteration and English Translation of Portions of the Ebers Papyrus Possibly having to do with Diabetes Mellitus* (Annandale-on-Hudson, NY: Bard College, 1998) 3.

[47] A.J. Spalinger, "Dates in Ancient Egypt," *SAK* 15 (1988) 257.

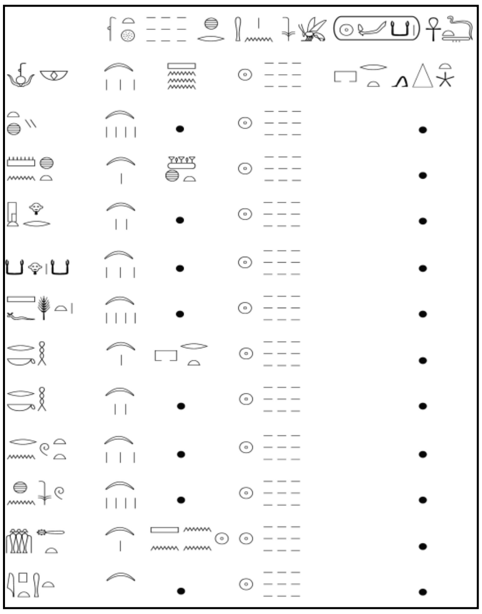
[48] Carpenter et al., *Interlinear Transliteration*, 3.

[49] H. Brugsch, "Ein Neues Sothis-Datum," *ZÄS* 8 (1870) 108-11.

[50] Copied from Krauss, "Das Kalendarium des papyrus Ebers," 76.

[51] Copied from Depuydt, "Function and Significance," 119 (unattributed). Other references cite K.H. Sethe, "Urkunden der 18. Dynastie," Vol. 1 of *Urkunden des aegyptischen Altertums*, 44.

[52] For a description and discussion of the Ebers calendar, see, e.g., L. Borchardt, *Die Mittel zur Zeitlichen Festlegung von Punkten der Ägyptishcen Geschichte und ihre Anwendung* (Quellen und Forschungen zur Zeitbestimmung der Ägyptischen Geschichte; Band 2; Kairo: Selbsterverlag, 1935) 19-29; Parker, *Calendars*, 37-42, §§188-219; idem, "The Sothic Dating of the Twelfth and Eighteenth Dynasties," *Studies in Honor of George R. Hughes, Jan 12, 1977* (eds. J.H. Johnson and E.F. Wade; SAOC 39; Chicago, IL: Oriental Institute of the University of Chicago, 1976) 185-86; E. Hornung, *Untersuchungen zur Chronologie und Geschichte des Neuen Reiches* (Ägyptologische Abhandlungen 11; Wiesbaden: Otto Harrassowitz, 1964) 14-23; idem, "'Lang oder kurz?' - das Mittlere und Neue Reich Ägyptens als Prüfstein," *High, Middle or Low?* (Pt. 1) 27, 31-32; R.D. Long, "A Re-examination of the Sothic Chronology of Egypt," *Orientalia* 43 (1974) 266-68; K.A. Kitchen, "The Basics of Egyptian Chronology in Relation to the Bronze Age," *High, Middle or Low?* (Pt 1) 42; R. Krauss, *Sothis- und Monddaten* (HÄB 20; Hildesheim: Gersternberg, 1985) 104-16; idem, "Das Kalendarium des Papyrus Ebers und seine chronologische Verwertbarkeit," *Ä und L* 3 (1992) 75-85, 96; U. Luft, "Noch Einmal zum Ebers-Kalender," *GM* 92 (1986) 69-77; idem, "Remarks of a Philologist on Egyptian Chronology," *Ä und L* 3 (1992) 112-13;"W. Helck's paper," *High, Middle or Low?* (Pt. 3) 40-45; J. von Beckerath, "Das Kalendarium des Papyrus Ebers und das Sothisdatum vom 9. Jahr Amenophis' I.," *SÄK* 14 (1987) 72-33; idem, "Das Kalendarium des Papyrus Ebers und die Chronologie des ägyptischen Neuen Reiches. Gegenwärtiger Stand der Frage," *Ä und L* 3 (1992) 23-27; W. Barta, "Das Kalendarium des Papyrus Ebers mit der Notiz eines Sothisaufgangs," *GM* 101 (1988) 7-12; W. Helck, "Erneut das angebliche Sothis-Datum des Pap. Ebers und die Chronologie der 18. Dynastie," *SÄK* 15 (1988) 149-64; A.J. Spalinger, "Dates in Ancient Egypt," *SAK* 15 (1988) 255-58;



Year 9 under the majesty of the king of Upper and Lower Egypt Dsr-k3-Rc may he live forever			
wp rnpt	III šmw	day9	going up of Sothis
ṯḫy	IV	day9	•
mnḫt	I 3ḫt	day9	•
ḥwt ḥr	II	day9	•
k3 ḥr k3	III	day9	•
šf bdt	IV	day9	•
rkḥ wr	I prt	day9	•
rkḥ nds	II	day9	•
rnnwtt	III	day9	•
ḫnsw	IV	day9	•
ḫnt ḫt	I šmw	day9	•
ỉpt ḥmt	II	day9	•

Figure 3.2: The Ebers calendar with hieroglyphic transliteration and English translation. (• = ditto.)

The Ebers calendar assists the reconstruction of Egyptian chronology in a number of ways.

a. It reports the solar year and months of Upper Egypt related to the seasonal or agricultural year.

b. It displays the civil months of the year used in Upper Egypt.

c. It connects the civil and solar calendars to the Sothic cycle for one particular year, and discloses the relationship between them.

d. It locates the ninth year of Amenhotep I in the Sothic cycle.

At this stage our purpose is only to introduce the features that relate to the solar calendar with its seasonal festivals of the agricultural year, and the civil calendar of Upper Egypt. In later chapters, we will see how it assists the reconstruction of the chronology of the Egyptian kings, especially with respect to Amenhotep I.

As shown, the inscription consists of 13 lines arranged in 4 columns.

Describing the Calendar

The heading of the calendar (two lines in English), is written in red ink and locates the calendar in the 9th year of *Dsr-k3-R*^{c}, king of Upper and Lower Egypt. The prenomen (throne name) identifies the king as Amenhotep I, second king of the 18th Dynasty. The remainder of the calendar is written in black ink.

The first row of the calendar plainly indicates that the rising of Sothis occurred on the ninth day of III *ŝmw.*

Looking at the columns, scholars agree that the second column gives month designations of a civil calendar. III *ŝmw* is followed in the next line by IV *ŝmw,* then in

idem, "A Return to Papyrus Ebers," *BES* 10 (1989/90) 137-44; idem, "Notes on the Ancient Egyptian Calendars," *Orientalia* 64 (1995) 19-22; idem, "From Esna to Ebers: An Attempt at Calendrical Archaeology," *Studies in Honor of William Kelly Simpson*, Vol. 2 (Boston, MA: Museum of Fine Arts, 1996) 755-63; C. Leitz, *Studien zur ägyptischen Astronomie* (Ägyptologische Abhandlungen 49; Wiesbaden: Otto Harrassowitz (1989) 23-34; idem, "Bemerkungen zur astronomischen Chronologie," *Ä und L* 3 (1992) 99; M. Clagett, *Ancient Egyptian Science*, Vol. 2, 37-48, 193-216; Depuydt, "Function of the Ebers Calendar," 61-68 (see bibliography on Ebers calendar pp. 86-88); idem, *Civil Calendar*, 90-95; idem, "Function and Significance of the Ebers Calendar's Lone Feast-Hieroglyph (Gardiner Sign-List W3)," *JEH* 1 (2008) 118-19.

the following lines by I to IV *3ḫt* and I to IV *prt*, ending with I and II *ŝmw*. The other months are indicated only by their numerical designations, II, III, or IV, followed by a mark like a large dot, which cannot be anything other than ditto marks referring to the season given above. This column reflects an underlying calendar originally based on the agricultural seasons with four months each of inundation (*3ḫt*), sowing (*prt*), and reaping (*šmw*). But the discrepancy between the actual agricultural seasons (the solar year) and the civil calendar is what the Ebers calendar displays.

The third column gives "day 9" for all 12 months. The word for "day" is a small mark shaped somewhat like an apostrophe and the "9" is a hieratic "squiggle."[53]

In the fourth column, under the "rising of Sothis," large dots appear in the subsequent 11 rows, similar to the dots used for the unnamed civil months, suggesting that they too are ditto marks. The first line of the second, third, and fourth columns are to be read together to give "going up of Sothis [on] III *ŝmw* 9," which refers to Amenhotep I's ninth year stated in the heading.

Thus, the civil calendar appears to begin with the rising of Sothis on III *ŝmw* 9, followed by the other months in the usual order. The repetition implies 12 months of 30 days without the five epagomenals. It is said that the epagomenals are not accounted for because the "day 9" of IV *ŝmw* ought to have been followed by "day 4" of I *3ḫt*.[54]

The civil months cannot start on "day 9" because they always start on day 1. Furthermore, lunar months consist of 29 or 30 days, not 12 months of 30 days, and they would not all start on day 9.

The oddity of all the remaining rows being designated "day 9," and the use of ditto marks indicates that the compiler is focusing on the same day in the successive months of the civil calendar. The civil calendar is in the orthodox order, except for the fact that it begins the 12 months of the year on III *ŝmw*. But that is merely because in the ninth year of Amenhotep I the rising of Sothis occurred on that date in the Sothic cycle.

The primary interest of the compiler is to construct a seasonal or agricultural calendar for that year beginning with the rising of Sothis, represented in the first column. This is the Sothis-related calendar of Upper Egypt. He lists the months of Upper Egypt. The first month is *wp rnpt* (the opener of the year), the second is *tḫy* and so on, aligning the solar year with the civil calendar for that year. Thus, columns one and four are the framework of the calendar, the rising of Sothis triggering the seasons and festivals of the year, while columns two and three display how they connect to the civil calendar in that same year.

Interpreting the First Column

The interpretation and application of the Ebers calendar has been extensively discussed by scholars in the past, especially the nature of the first column. Earlier scholars proposed that it represented a fixed Sothic year of 365¼ days, correlated with the 365-day civil calendar and the heliacal rising of Sothis on III *šmw* 9.[55] But more recent scholars rejected this idea because there is no evidence that Egyptians ever added a day every fourth year to attain a fixed-year calendar until the decree of Canopus in 238 BCE.[56]

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[53] In the 1870s, scholars were unsure whether this mark was 3, 6, or 9, and "new moon" (*psḏntyw*) was suggested in 1935, but nowadays 9 is accepted as correct. See Depuydt, "Function and Significance," 120-21.

[54] M. Clagett, *Ancient Egyptian Science*, Vol. 2, 196.

[55] Ibid., 15, 193-95; L. Depuydt, "Function of the Ebers Calendar," 75.

[56] See A.J. Spalinger, "The Canopus Stela," *Three Studies on Egyptian Feasts and their Chronological Implications* (Baltimore, MD: Halgo, 1992) 36-7.

In 1950, Richard Parker used various arguments for the existence of an original lunar calendar, and asserted that it was this lunar calendar that appears in the first column of the Ebers calendar.[57] Anthony Spalinger argued, in 1995, that the month representations on other calendars were not lunar but civil,[58] and, in 1996, that the first and second columns of the Ebers calendar were also civil. [59] However, Spalinger did not jettison the idea of a lunar calendar altogether because he needed it to account for the fact that in certain inscriptions some feasts were held out of their eponymous months.[60]

That feasts were held *in* their eponymous months in the Ebers calendar was one of Gardiner's prime items of evidence in 1906 and 1955 for two civil calendars, one starting with Mesore and the other with *tḫy*. Feasts were held out of their eponymous months in a latter calendar, as seen in the Greco-Roman calendar. Gardiner totally rejected the idea of a lunar calendar.[61] Spalinger did not want to resort to Gardiner's 1906 hypothesis that there were two civil calendars as he saw no need for it. [62] These matters will be dealt with at length in subsequent chapters.

The controversy over the interpretation of the Ebers calendar—whether the first column represented a lunar or civil calendar (instead of the solar/agricultural year as explained), and how to interpret the Sothic date, must be settled before we can decide what calendars the ancient Egyptians used to date their reigns and other events.

The Order of the Months on the Ebers Calendar

The order of the seasonal months beginning with *wp rnpt* "the opener of the year," which coincides with the helical rising of Sothis as shown in the Ebers calendar, is not replicated in most other calendars associated with Egyptian chronology.

In many later calendars, the feasts all appear to have been moved to the first day of the following month, and, therefore not in the month to which they gave their name.

This anomalous situation, of feasts apparently occurring outside their eponymous months in later calendars but within their appropriate months in the Ebers calendar, has remained an enigma to scholars for well over 100 years. The first column in the Ebers calendar contains what appear to be month-names of a calendar. These months are referred to on various other calendars and inscriptions.[63]

Opener of the Year *wp-rnpt* (wep-renpet)

The first name is *wp-rnpt* which means "opener of the year" and seems to be appropriately named for the first month in the list of 12 months. It is followed by *tḫy* (Tekhy) in the line beneath.

But other calendars have *tḫy* in *first* place. This is seen in calendar depictions on the northern ceiling of the tomb of Senmut, the Karnak water clock from the reign of Amenhotep III (both of the 18th Dynasty), on the Ramesseum ceiling of Ramesses II

57 Parker, *Calendars,* 50 §252; idem, "The Problem of the Month-Names: A Reply," *Rd'É* 11 (1957) 96-97.

58 A.J. Spalinger, "Month Representations," *Cd'É* 70 (1995) 110-22.

59 A.J. Spalinger, "From Esna to Ebers: An Attempt at Calendrical Archaeology," *Studies in Honor of William Kelly Simpson* Vol 2; (Boston: Museum of Fine Arts, 1996) 762. Also at http://www.gizapyramids.org/pdf%20library/festschrift_simpson/s9t

60 A.J. Spalinger, "Ancient Egyptian Calendars: How Many Were There?" *JARCE* 39 (2002) 241-50.

61 Gardiner, "Mesore as First Month," 136-44; idem, "The Problem of the Month-Names," *Rd'É* 10 (1955) 9-31.

62 Spalinger, "From Esna to Ebers," 761-62.

63 The names have also been proposed as feast names (e.g. Clagett, *Ancient Egyptian Science*, Vol. 2, 46-7, 200).

(19th Dynasty), its copy at the Medinet Habu temple of Ramesses III (20th Dynasty), and elsewhere.

This is a major difference, and the cause of questions and controversy. Apart from this difference, the succeeding 11 months in the Ebers calendar are found in the same order as in the later representations. The Ebers calendar ends with the month of *Ipt ḥmt* (later Epiphi), as its 12th month. But in other calendars *Ipt ḥmt* is the 11th month, and the 12th month displays either *wp rnpt* (from the first month position in the Ebers calendar) or *R*ᶜ-*Ḥr-3ḫty* (Re Horakhty) or Mesore.

In calendars dating from after the reign of Amenhotep I, *wp rnpt* is never in first place. It is always in last place unless that position is occupied by *R*ᶜ-*Ḥr-3ḫty* ("Re Horus of the Two Horizons"), and *wp rnpt* does not appear at all. This repositioning is significant for our later discussion.

In summary, for an artefact like the Ebers calendar to exist, there needed to be:

- an underlying calendar originally based on the agricultural seasons with four months each of inundation (*3ḫt*), sowing (*prt*), and reaping (*šmw*) seen in the second column, which is termed the civil calendar; and
- the observance of the solar year related to the heliacal rising of Sothis in which the difference with the civil calendar is recorded (as the ninth day of III *šmw*); and
- an annual calendar of Upper Egypt related to the actual solar year and the heliacal rising of Sothis, beginning with the month named *wp-rnpt* meaning "opener of the year."