CHAPTER 4
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THE EGYPTIAN CALENDAR: KEEPING MA’AT ON EARTH

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Summary. The ancient Egyptians had just one calendar in operation, the civil one, during most of their history and before the overwhelming influence of Hellenic culture. This calendar may have been invented for a specific purpose in the first half of the third millennium B.C., when the previous local Nile-based lunar calendars were rendered useless, as the result of the unification of the country and new social, economic and administrative requirements. The civil calendar always started at the feast of wpt rupt in the first day of the first month of the Inundation season (I 3ḥt 1). Its peculiar length of 365 days might have been established from simple astronomical (presumably solar) observations. Lunar festivals were articulated within the framework of the civil calendar, which had a well documented set of 12 month names from the beginning of the New Kingdom, if not earlier, but in the Ramesseide period or later, several of these months altered their names, probably for social or religious reasons.

4.1. Introduction

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 (civil and lunar) became apparent. A good guess might be to put it in the neighbourhood 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.


With the removal of the lunar calendar from all of these scenes, the importance of the civil calendar is stressed. At the risk of anticipating myself, I do not see the lunar calendar playing an important role in Egypt outside of some feasts. It is my contention that the Egyptian calendric system is simpler than usually maintained. ... The implication for a complete revision of Egyptian calendrics is evident.


The two contentions just cited were separated by almost half a century but they are quite representative of the state of studies of the ancient Egyptian calendar at the turn of the 20th century. For almost 50 years, Richard Parker’s “Calendars” reigned supreme in the view of most Egyptologists as the last word on Egyptian calendrical matters. This was so despite of the fact that several of the ideas and hypotheses expressed in that book had scarcely been proven. Hence, one frequently reads in various manuals, either of Egyptology or of the History of Astronomy and Archaeoastronomy, that the Egyptians had three calendars working at once, with no attempt to enter into further discussion or to challenge that supposition.

This situation persisted until the mid 1990s when, after Parker’s death, several scholars decided to enter this slippery field of research and started to produce new and interesting approaches to ancient material, proposing new interpretations in several
cases, as well as publishing new material, previously unknown or never discussed in a proper way. The names of several of these scholars should be mentioned in this context and the two last decade contributions of Leo Depuydt, Rolf Krauss, Christian Leitz, Ulrich Luft and Anthony Spalinger have been pivotal in the last few years and will be fundamental to our discussion. We must also take into account the review volumes by Marshall Clagett and Anne-Sophie von Bomhard.

After detailed examination of a high percentage of the bibliography generated in the last decade (and most of the relevant earlier works), my main conclusion is that the study of the ancient Egyptian calendar suffers from what I will call the “Ebers syndrome”. I say this because I have found that the Calendar written on the verso of the Ebers Medical Papyrus, discovered in Thebes in 1862 and first published a few years later, has contributed little, if nothing, to the solution of any of the open questions on Egyptian calendrics in the last 150 years. It is important to notice that from the moment of its discovery to the present, more than 40 papers have been published on it (14 in the last quarter century alone), most of them presenting attempts at interpretation in open contradiction with one another.

I first demonstrated this in an article published in 2003 devoted to some open questions of Egyptian calendrics. In that paper, I decided to risk proposing a working hypothesis, reconsidering the situation by evaluating the idea of what might have happened if the Ebers Medical Papyrus had never been discovered or if its Calendar had never been written by the ancient Egyptians on the verso of the papyrus. I knew that this was a revolutionary and hazardous approach since the Ebers Calendar was the first in a series of important documentary discoveries associated with Egyptian calendrics and chronology, and had hence always been one of the pivotal aspects of every discussion on the subject. However, it was my contention that by ignoring it, the discussion of Egyptian calendrics becomes much unexpectedly simplified, and that several apparent problems may easily find a fairly reasonable solution. This chapter is an updated, simplified and illustrated version of that work.

4.2. Calendar or calendars?

How many calendars were simultaneously in operation in ancient Egypt? This is the basic question to be answered. Without finding a reasonable solution for this, it would be impossible to go any further in the analysis and solve other important problems and questions. It is my intention to show that throughout Egyptian history, from the very creation of the civil calendar to the Roman conquest, the Egyptians had only one calendar, the civil one, despite the fact that some of their feasts could be established according to the moon and that under Persian and Macedonian rule (6th to 1st centuries B.C.), the lunar calendars of these peoples might have produced a certain influence in local calendrics and would also have been used to date documents or monumental inscriptions in Aramaic or Greek, respectively.

The civil calendar of ancient Egypt consisted of 12 months of 30 days each, grouped into three seasons, which from the very beginning received the names of ḫḥt (translated as Inundation in Greek texts), prt (translated as Winter) and šnw (translated as Summer). Each of the months was divided into three decades (mḏw) of 10 days. This 12 month year amounted to a total of 360 days. Normally, a civil date is expressed by a number for the regnal year (each reign represented a new era in ancient Egypt), followed by a set comprising a Roman numeral for the ordinal month within a season (similar to the actual Egyptian strokes for the numbers), then the season proper and finally the day.
of the month. One example is III šḥt 26, which reads as the 26th day of the 3rd month of the Inundation. However, later on, we will argue, following Griffith, that we should probably read 26th of ḫw(t)-ḥr (Hathor or Athyr in Greek papyri), exactly as we write 29/02/2008 but we read 29th of February of 2008.

Figure 4.1. Images of the twin goddesses Maʿat and Renpet together in a beautifully carved relief of the temple of Seti I in Abydos. The Egyptian kings swore at the moment of their accession not to alter the year (rḥʿt) as one of their duties to keep mšt on Earth. Photograph by J.A. Belmonte.
To the end of this year of 360 days, five extra days known as the “Five above the Year” (5 hryw rpnt) or epagomenals, were added throughout most of Egyptian history, although there is some evidence that they might have been placed at the beginning in earlier times. However, this discussion is probably nonsense since, as Spalinger has lengthily argued, they were considered as outside of the year and were not taken into account at all on most occasions. Furthermore, these five days were reported to have a nefarious character, despite the fact that, thanks to the god Thoth who managed to get those extra days, the “Birth of the Gods” (these were Osiris, Horus the Elder, Seth, Isis and Nephthys) took place during them. With the epagomenals, the civil year completed 365 days, a number very close to the length of the tropical year (the seasonal year) which in 3000 B.C. lasted for some 365.2425 days. Consequently, the civil calendar has frequently been quoted as the Egyptian “solar” calendar, which, to a first approximation and in one generation (25 years) would be a very appropriate term.

However, one peculiarity of the civil calendar is that no days were added to the standard 365 (as we do in leap years) and so the civil dates wandered through the seasons, completing a circuit in nearly 1506 years. The Egyptian skywatchers probably know that the tropical year was almost a quarter of a day longer but they never did anything to resolve this fact. Curiously, according to Nigidius Figulus (first century B.C.), the Egyptian kings were obliged to swear at coronation that they would never tamper with the calendar, thus keeping the year and m3$t in perfect agreement (see Figure 4.1.). Consequently, important astronomical events, such as the stations of the sun (solstices and equinoxes) and the heliacal rising or settings of stars would also wander through the civil year, there being roughly a one day’s delay every four years and one month’s delay every 123 years. One of the bases of Egyptian chronology is that no reform was performed (although it was attempted notwithstanding the prohibition) so that the seasons were wandering through the civil year, from the creation of the calendar, in the early 3rd millennium B.C. (see Section 4.3) to Augustus’ reform and the creation of the Alexandrian calendar in 23 B.C. The consistency of this wandering to the New Kingdom has been proved by Depuydt and is widely discussed by Krauss in his works.

In this respect, one special case is that of Sirius (Egyptian spdt, Sopdet, Sothis in the Graeco-Egyptian context), the brightest star in the sky. The high proper motion of this star, owing to its proximity to the Earth, caused the Sothic year (i.e. the period of time between, for example, two successive identical position of the star in the Earth-Sun reference framework) to be almost exactly 365.25 days throughout most of the history of ancient Egypt. This meant that the important phenomenon of the heliacal rising of Sirius, known as prt spdt since the Middle Kingdom, moved forward by one day in each four-year period (e.g. from II 3h 3 to II 3h 4), wandering through the entire civil year in 1460 years (a Sothic cycle). In fact, during our period of interest, Ingham has shown that two whole slightly shorter Sothic cycles elapsed, the first of 1454-1456 years (from c. 1315 to 2770 B.C.) and the second of 1452-1453 years (from c. 139 AD to 1315 B.C.), according to modern calculations.

As we saw in the opening paragraphs of this chapter, Richard Parker, one of the most renowned scholars in Egyptian astronomy (including calendrics) during most of the 20th Century, strongly supported the idea that in Egypt there were three calendars in operation at the same time, namely:

- The civil calendar, as already discussed.
- The “old” lunar calendar. This, according to Parker, would have been the original calendar prior to the invention of the civil one. It would have worked
like a lunisolar calendar, consisting of 12, or occasionally 13, lunar months of 29 or 30 days, heralded by the heliacal rising of Sirius, which according to him, had to be called \textit{wpt rnpt}, and beginning by the following conjunction or new moon (\textit{psdntyw}), to be called \textit{tpy rnpt} (see Section 4.6 for an appropriate discussion in these terms).

- The “new” lunar calendar. This would have been invented when the divergence between the civil and the former lunar calendar had become evident. A new set of 12 or 13 lunar months was attached to the civil calendar, heralded by the 1st day of the civil year, \textit{3ḥt}, also called \textit{wpt rnpt} (a secondary use of the term, according to Parker, but very probably its actual significance).

These ideas (from my point of view, they are too weak to be fairly catalogued as a theory once all the weak points are known) were rarely questioned for several decades and we had to wait until the 1990s for a serious threat to most of Parker’s arguments from various scholars such as Spalinger, Grimm and Luft (followed by Clagett). The first of these scholars had even reach the point of questioning the independent operation of any sort of lunar calendar in ancient Egypt, which as he wrote, would make Egyptian calendrics \textit{simpler than usually maintained}, but without jumping completely into the deep end and fully rejecting their existence. However, recently, Parker’s views (especially regarding the existence of the “new” or civil-based lunar calendar) has received a breath of fresh air from the work of the Flemish scholar Leo Depuydt, now at Brown University, where Parker spent much of his career. His erudite book on the “Civil Calendar and Lunar calendar in Ancient Egypt”, published in 1997, is a stupendous reference for the comprehension of what has been going on the study of the Egyptian calendar since the 19th century, despite the fact that I disagree with some of his conclusions. It is worth noting that, in his most recent works, this scholar has introduced the term lunar time-keeping system as an alternative to lunar calendar. As the reader may have imagined, my point of view is much nearer to Spalinger’s than to original Depuydt’s, but I am perfectly happy with the use of the term lunar time-keeping system or \textit{lunar computus}, still rejecting the existence of an articulated lunar calendar.

The simultaneous use of more than one calendar by a certain culture is not an unusual phenomenon. Furthermore, it is also a well established fact that, once a good calendar has been developed, it is fairly difficult to reform it and still more difficult, if not impossible, to abandon it. Hence, in principle, I would not be against the simultaneous use by the ancient Egyptians of more than one calendar. However, in our context, I have doubts concerning this possibility since it would be in flat contradiction to the Egyptian mentality, simply because to have more than one calendar simultaneously in operation might produce chaos and thus, as we have shown, would be contrary to the idea of \textit{mṣṭt}, the Cosmic Order, the pivotal thinking of Egyptian political, social and religious behaviour.

In contrast, the use of two calendars simultaneously is very common in the Muslim world today. In fact, I shall illustrate the situation by reference to two countries, each with a long history, facing each other across the Mediterranean Sea: Spain, the homeland of the author, and Islamic Egypt. In Spain, Roman tradition reigned supreme for several centuries and hence all aspects of daily life were and still are governed by the Gregorian (or Julian prior to the 16th century) calendar. However, Christian tradition is also dominant and several religious feasts move according to a lunar computus. The most important is Easter which is fixed as the first Sunday after the first full moon, (which must not be a Sunday) after the Spring Equinox. Once Easter is known, the dates of Ash Wednesday (with Carnival), Palm Sunday, Good Thursday, Good Friday,
Pentecost (Pinkster) and Corpus Christi are established accordingly. Obviously there are
what we can called lunar controlled feasts, but there is not a lunar calendar in parallel
operation with the Gregorian and indeed most Spaniards do not concern themselves with
the behaviour of the moon.

However, the situation in traditional Islamic Egypt was quite different. The Muslim
calendar governed the religious and social life of the majority of the people but, as a
purely lunar calendar, it was rendered quite useless in governing the economic life of the
country. The reason for this is that the Muslim calendar is a purely lunar calendar of 12
lunar months and is thus 11 days shorter than the tropical year, being quite useless for an
agrarian culture. Consequently, in every country converted to Islam, it has been almost
mandatory to keep older calendars in use for practical purposes. In traditional Islamic
Egypt, this task was the responsibility of the Coptic calendar, the direct descendent of
the Alexandrian one, the corrected (to include leap years) version of the civil calendar. It
is worth noting that the Coptic calendar has mostly been substituted today by the
Gregorian one. Indeed, in Egyptian society, either modern or traditional, one calendar
cannot work without the other and, in this case, the obvious result is the necessity of two
completely independent calendars, one solar and the other lunar, with different dates,
different beginnings and different month names operating at the same time. The point of
view I am defending is that the time-keeping system of the Egypt of the Pharaohs was
closer to that found in modern Spain than to that found in modern (or traditional) Egypt.

However, a similar argument to the reasoning for the necessity of two operating
calendars in Islamic Egypt has frequently been claimed as the reason for the existence of
more than one calendar in ancient Egypt, especially the “earliest” ones, the old Sirius-
based lunar and the civil one. This idea is based on the supposed inability of the civil
calendar to follow the seasons because it is a vague (wandering) year. For example, von
Bomhard associated the term rnpt gbt (upset year) in the text: … Come to me, oh Amon!
Save me of this upset year. It happened that the sun did not rise, that winter arrived in
summer, month follows month in the wrong order, the hours are disrupted …, with the
365 day year, thus leaving the impression that the ancient Egyptians considered their
civil calendar to be unsuitable.

However, this argument is, to my point of view, aprioristic and fallacious. On the one
hand, this text does not apply at all to the civil calendar, since only the sentence winter
arrived in summer might be applied to it (and precisely not at the time when this
paragraph was written, in the early Ramesside period); on the other hand, it is
completely incorrect to say that the civil calendar was useless in daily life, and that the
Sothic heralded lunar calendar was necessary to keep the correct track of the seasons.

In fact, the civil calendar was ideal for daily life. It only diverged by 10 days from the
tropical year in 40 years (an average human life time in antiquity) and, considering that
the most important natural seasonal phenomenon in Egypt, the rise of the Nile, can vary
as much as 70 days (see Figure 4.2), it would have been perfectly capable of handling
local agriculture and even state administrative policy, over very long periods of time.
This was also clear to the father of history who wrote: “their calendar is in my opinion
better than that of the Greeks, because these introduce an intercalary month every two
years, in consideration of the seasons, whereas the Egyptians, with their twelve (12)
months of thirty (30) days, add five (5) supernumerary days to each year; so that the
cycle of the seasons always appears at the same date for them” (Herodotus II, 4).

That the harvest occurs in the season named ḫr, instead than in the season named
šmn (translated by inference as Harvest by several authors; later we will discuss this
particular problem of the season names), as occurred at the end of the Old Kingdom. So
what? We have a month with a name that means 7th and it is our 9th month and nobody seems unduly perturbed about that.

Figure 4.2. “Egypt is a gift of the Nile” (above). Without the river and its inundations there would have not been Egyptian civilization and the country would be an extension of the Saharan Desert. The river controlled the economy of the country with its different ecological phases: the flooding or inundation often starting close to the summer solstice (SS), the decreasing of the waters four months later, allowing the land to be cultivated, and the nearly four month drought period, when the level of the waters was very low (middle). In principle, the average period between successive arrivals of the flooding season should be that of a tropical year. However, periods as large as 410 days or as short as 320 days has been reported in the historical record during the 19th Century (below). This would certainly have been the case in ancient times. Photograph by O. González. Last graphic adapted from Neugebauer (1938).
There is a further argument to be mentioned against the existence of a well structured original lunar calendar as proposed by Parker. For me, it is quite obvious that if the Egyptians had ever developed such an “old” lunar calendar, they would never have needed (and thus invented) the civil one, since the lunisolar nature of it, having dates in harmony with the seasons, would have made the implementation of yet another calendar completely unnecessary (and even undesirable according to m\textsuperscript{3}r\textsuperscript{7}).

However, it is worth mentioning that several pages in Parker’s “Calendars” (whose reading I strongly recommend) are devoted to explaining the operation of this “old” (the Sirius based) lunar calendar and to defending its existence. Today, it is quite clear that most of his arguments were fallacious or inaccurate. Clagett’s concerns are categorical: “In brief, it appears to me that Parker’s opinion that the old lunar calendar was intercalary may be correct (though not certainly so) but that (1) the use of the Sothic heliacal rising as the mechanism of intercalation, that (2) the intercalary month (if it existed) was named Thoth, and that (3) the lunar calendar in schematised form is that given in the Ebers calendar and in the astronomical ceiling of Senenmut’s tomb and the Ramessaeum are all unproved and indeed untenable”. To this, we could add that the identification of prt spd\textit{t} with wpt rn\textit{p} is nowadays completely dismissed (see Section 4.6). Actually, today, the only support for the old lunar calendar seem to come from the Ebers Calendar which, in terms of the experiment proposed in this essay, was never discovered and thus, at this precise moment, cannot be used to prove anything.

Moreover, another of the classical alleged proofs, the calendar of supposed lunar months of Papyrus Berlin 10056 A, briefly following the heliacal rising of Sirius, found in the Illahun archive, has been recently challenged by Luft and Krauss. These scholars have demonstrated that the document shows periods not from lunar day 1 (ps\textit{dhty}w) to lunar day 1 (i.e. a lunar month), but rather from the second day of the Egyptian lunar month and thus they might be better described by the term wr\textit{s} (moon period service). More recently, Krauss, defending its lunar character, has argued that “the Illahun lunar year may be interpreted as standard calendar, used and modified for a temple roster”, but, as I see the problem, a modified lunar computus does not necessarily mean a fully operative, monthly expressed, lunar calendar.

Taking all these points into consideration, I would even argue against the use of the term “lunar month” in ancient Egypt (unless in the archaic and perhaps Ptolemaic periods) and would instead claim the use of the term lunation for any period of time between two consecutive identical phases of the moon (be it conjunction, first crescent, full moon or any other aspect), leaving the term month only for the well attested months of the civil year. This will henceforth be the policy followed hereafter in this chapter (and in most of this volume with the particular exception of Chapter 5).

To be able to continue with this proposal, we must first show that the other alleged lunar calendar, the civil-based one, was not expressed as an actual calendar and that the term lunar month is consequently not needed. The reason to justify the later invention of the new lunar calendar is less clear than in the case of the Sirius-based lunar calendar (which theoretically even predated the civil one) and, apparently, those defending its existence argue for the correct placing of lunar feasts within the framework of the civil calendar. But we have seen that to have lunar-governed festivals within a calendar does in itself not make a lunar calendar.

Above, we have seen that in Spain, and Catholic countries in general, there is a large collection of festivals (religious and profane) dictated by a lunar computus but nobody
in this country would claim that there are two calendars in simultaneous operation, a solar and a lunar one. This is so in spite of the fact that the Methonic cycle is used to correlate the phases of the moon and the tropical year, but again a lunisolar cycle does not make a calendar. This same argument could be applied in the case of those citing that the Egyptians’ knowledge of the 25 year cycle (as found in Papyrus Carlsberg 9) in the Graeco-Roman period, supports the idea of the civil-based lunar calendar. In Papyrus Carlsberg 9, the dates of the beginning of 300 lunations in 25 civil years are presented (out of the 309 lunation possible, those starting in the epagomenals and those belonging to “blue” months are not considered), according to Depuydt’s clever and simple interpretation of the Papyrus. “Blue” months are those civil months where two lunations can start at the same time within a certain year, one in day 1 and the other in day 30.

Only in the case that the civil-based lunar calendar had left unmistakable signs of a complete operative system, might we be confident of its existence. This is in fact what the otherwise excellent volume of Depuydt had tried to show but I challenged in a long discussion on the topic in my earlier work on the calendar. There, I presented some ideas that offered an alternative, simpler and plausible explanation for the controversial two undisussed double “lunar-civil” dates reported so far (civil II šmw 13 equivalent to the full moon of I šmw and civil IV šmw 18 equivalent to the second lunar quarter of III šmw, respectively), without needing to resort to the invention of a whole new calendar on the basis of such slender evidence.

In principle, considering the presumed “design” of the civil-based lunar calendar, as Depuydt has already pointed out, there are two possibilities: yearly or monthly pairing. The former means that “lunar” I šḥt would start at the first psdnṭyw (conjunction or new moon) of civil I šḥt and then the “lunar” months would continue their counting consecutively until the end, even in the presence of a “blue” month. The second means that, if a blue month is present, the second lunation within that civil month is not counted (what would its name be?) and it is the following lunation, starting in the appropriate month, that receives the name. From my point of view, this second possibility is completely abnormal and does not define a functioning calendar anywhere on Earth. Curiously, this is exactly the situation of the two dates, since the “lunar” months are named according to monthly pairing. If yearly pairing had been applied, the months would have been II šmw and IV šmw, thus exactly the same as their civil counterparts, further complicating the situation.

It is worth mentioning that there would have been a series of actual and definitive proofs of the existence of the civil-based lunar calendar. For example, one definitive proof would have been established if we had found two “lunar” months mentioned consecutively, both with the same name and simply distinguished by a numeral (e.g. IV ṣrt and IV ṣrt sn=ṣn), as in the Babylonian calendar when a full, 13 lunar month, year is present. Although, in this case, it is always found at the middle (Elulu II) or at the end (Adaru II) of the year and not in a random position within the year. Another unmistakable case would have been the report of a proper “lunar” month starting in one of the hṛw rmpt (the straddle month in the 5 cases out of 309 when this happens) and the specification of its name. However, neither of these two cases has ever been reported in the sources!

As we have seen, the proposed civil-based lunar calendar leaves itself open to a series of serious challenges such as the use of the illogical monthly pairing and the open question of what would have been the name of this second lunation within a blue month.
Besides, it is based on weak proofs. To summarize, all this makes the existence of this calendar very unlikely.

![Hieroglyphic inscription](image)

**Figure 4.3.** Hieroglyphic inscription of one of the festival lists of the tomb of Khnumhotep II at Beni Hassan. In the second row, the two “beginnings” of the year (*epy rnpt* and *wpt rnpt*) and the large and small year feasts (*rnpt ṣt* and *rnpt ndst*) are reported. Notice also the existence of the two Burning festivals (*rkh ṣt* and *rkh nds*) in the following row, the five epagomenal days (*ṣr ḫrw rnpt*) and the 12 first crescent (*ḥbd*) and full moon (*ṣmdt*) lunar festivals associated with the civil calendar of 12 months. All these items play an important role in our discussion.

To close the question of how many calendars were operating at the same time, we will deal with an argument that is often invoked as a proof of the existence of two calendars operating simultaneously in ancient Egypt. This is the mention of a great (*ṣḥt*) and a small (*ndst*) year in one of the lists of feasts in the tomb of the provincial governor Khnumhotep II at Beni Hassan (dated in the 12th Dynasty). The list is presented is Figure 4.3 and the two “years” can be seen in the second row of the text. The hypothesis is that the “great year” would be associated with the civil (or solar) year of 365 days or, even better, with a full lunar year of 13 lunations of 384 days, and the “small year” with a hollow lunar year of 12 lunations of 354 days. This would be supported, as first noticed by Neugebauer, by the fact that 16 great years and 9 small years are mentioned in Papyrus Carlsberg 9. This is exactly the correct ratio of 12 and 13 month years in the 25 year cycle presented in the papyrus.

The problem is that the papyrus, produced in Tebtunis some time after Antoninus’s year 7 (144/145 A.D.), reproduces a simple arithmetic rule applied to the 25 year cycle and not a calendar according to Depuydt, and, besides, there is a whole 2000 year gap between it and Khnumhotep’s list, without any other similar case being documented in that long period of time. In fact, Spalinger completely rejected that assumption and once more proposed a “simpler” explanation, that the “small year” and “great year” rather refer to the short civil year of 360 days, frequently used in many aspects of Egyptian society, and to the full year of 365 days, including the 5 *ḥrw rnpt*.

For me, there is a further problem, both *rnpt ṣḥt* and *rnpt ndst* are within a list of festivals and also both have the determinative of festival close to them (see Fig. 4.3). So, they must refer to specific feasts (either one day or a short-period term) and not to a period of one year considered a feast as a whole (this might already be expressed by the closing formula *ḥb nb*, “each feast” in the last row of the inscription). We will not argue this point further here since it has more to do with the question of how many beginnings the Egyptian year had and we thus postpone the discussion to Section 4.6.

To conclude, after considering all options, I must agree with Spalinger and a few others that Egyptian calendrics must have been much simpler that is usually maintained.
However, I will even go one step further in proposing that one, and only one, calendar would have been in operation in Egypt from the creation of the civil calendar in the early 3rd millennium B.C. to the reform of Augustus and the imposition of the Alexandrian calendar after 23 B.C. It was, of course, the civil calendar. Obviously, lunar feasts and a lunar computus were taken into account for various purposes (mostly ritual and religious), but they were always connected to the civil calendar, exactly as they are in present Gregorian calendar, and never as independent features of any alternative calendrical system. This will be discussed further in Section 4.7.

For obvious reasons, this proposal poses new questions regarding the “various” lists of month names, some of which had been assigned to one or other lunar calendar and to the various “beginnings” of the Egyptian calendar “years”. We will deal with these open questions in Sections 4.4 and 4.6. However, prior to that, we have to deal with perhaps the most mysterious of all the problems that we must consider: why, how and when did the Egyptians develop such an unusual 365 day calendar.

4.3. The solar origin of the 365 day calendar: a working hypothesis.

There must have been a powerful reason for the archaic Egyptian society to invent a calendar that, in the words of Otto Neugebauer, was indeed the only intelligent calendar which ever existed in human history, or, in my less optimistic opinion (because other clever systems of time-keeping were invented in other places, as for example the Maya long count and the associated circular calendar), one of the most efficient that had ever been developed, surviving in human society since its implementation in the first half of the 3rd millennium B.C. (see below), until the Julian Date was invented for continuous time keeping and astronomical calculations in the 16th Century by the astronomer and chronologist Scaglieri.

However, Neugebauer also pointed out in 1942 that every theory of the origin of the Egyptian calendar which assumes an astronomical foundation is doomed to failure. As an astronomer, I regret such an affirmation because the vast majority of cultures worldwide and throughout history has used the observation of the heavens as the most reliable way of time-keeping, leading eventually to the creation of a calendar. So the origin of the 365 day year is a highly controversial issue that is far from achieving a consensus. Can we put forward a reasonable solution?

Since the beginning of Egyptology, several theories have been proposed, discussed and established on a certain basis, with more or less success, and almost every specialist in the topic has tried to postulate his own hypothesis. The most reasonable have been:

a) A Sothic origin, 365 being the average value of days between two successive heliacal risings of Sirius. This has been defended by several scholars since the very beginning of Egyptology (even before the decipherment of hieroglyphs), because several classical sources associated the rising of Sirius with the beginning of the Egyptian year. Considering the length of the Sothic cycle as 1460 years, the inauguration of the civil calendar would have been around 4241 B.C., according to 19th Century scholars, or around 2781 B.C. once the origin of Egyptian history was brought by Meyer to nearly 3000 B.C. in the early 20th Century.

b) A solar origin, based on the determination of the period of time between two successive repetitions of the same station of the sun, either a solstice or an equinox. This was never seriously considered (the previous hypothesis was more
popular), but it was defended by Sethe and Gardiner and, recently, it has been revived by Wells.

c) A lunar origin, based on an average lunar month and an average lunar year. Parker was the champion of this hypothesis, based on his defence of the lunar calendar heralded by Sirius.

d) A Nilothic origin, based on the average value of the interval of days between successive Nile risings. Neugebauer was the pioneer of this idea.

The first two were astronomical and both were discounted by Neugebauer on the grounds that, since the civil year was almost a quarter of a day shorter than the Sothic and tropical years, it would have been very clear from the very beginning (just after 8 or 12 years had passed) that the phenomena would not have been repeated within a period of 365 days. This is not completely true. When the Julian reform was applied to the Roman calendar, leap years were to be included “every four years”. However, because of the Roman inclusive way of counting numerals, this was made effective every 3 years. The problem lasted and, in fact, was not corrected until 8 B.C. by Augustus (all leap years between 8 B.C. and 8 AD were suppressed), some 36 years after the reform had been introduced.

In fact, the actual problem with the Sothic origin (a), as recently stated by Krauss, is that it is difficult to establish clearly that 365 is the number of days between two successive heliacal risings of Sirius. On the one hand, something that is frequently forgotten is that this celestial event is highly dependent on latitude (with differences of nearly 8½ days for 2800 B.C. and nearly 6 days for 200 B.C. between the First Cataract and the Delta, respectively) and on atmospheric conditions. These effects could have introduced variations of several days in the observation of the phenomenon for different locations.

On the other hand, even if we admit that we are faced with a well defined place of observation (e.g. a temple at the country’s capital, Memphis, or a very important sanctuary in a relevant location such as Buto or Elephantine) and a perfect atmosphere, we have yet another problem. Imagine that you are observing the rising for 3 consecutive years (this was Sethe’s hypothesis); the sequence would have four possibilities:

\[
\begin{array}{ccc}
365 & 365 & 365 \\
365 & 365 & 366 \\
365 & 366 & 365 \\
366 & 365 & 365 \\
\end{array}
\]

So, only in 1 out of 4 possibilities (25%), would we have reached the unequivocal value of 365 days. As a consequence, it is highly improbable that the heliacal rising of Sirius was the phenomenon observed to establish the length of the civil year as 365 days.

Regarding the stations of the sun, forty years of observation must make it obvious that the year fell short by 10 days. But, did the Egyptians ever observe the solstices or the equinoxes? We will come back to this question later on; in Section 4.5 (see also Chapter 8). For now, it is worth mentioning that it was proposed almost a century ago that the Egyptian year once started at the summer, or even the winter solstice (the so-called Gardiner’s Misore year), and, in recent years, Wells has produced a new, and in some aspects complicated, theory. This relates to the mythology of the birth of Re by the sky goddess Nut and the development in Lower Egypt of a lunisolar calendar, heralded by the rising sun at the winter solstice (there are no traces of such a calendar in any
historical register). Simultaneously, a lunisolar calendar, heralded by the heliacal rising of Sirius (Parker’s old version) would have been developed in Upper Egypt. The civil calendar would have been the final result of an amalgamation of both around 3250 B.C. As we will see later, the Palermo Stone demonstrates that, very probably, there was no organized calendar in Egypt at such an early epoch.

To avoid Neugebauer’s categorical judgement, Parker proposed instead an astronomical approach, but one that would not suffer from the gradual shift within the year or, if indeed it did suffer such a shift, it would not be immediately apparent and thus easily detected. He then arrived at hypothesis (c). The bases of his theory were:

i. The presence already of a well regulated and working lunar calendar (the lunisolar one related to Sirius).

ii. The civil calendar must have been tied not to Sirius but rather to some event that was variable in itself, or that in the forward shift of the year would not be immediately apparent.

iii. The theory must include an explanation of why the later lunar calendar tied to the civil one was inaugurated.

He then argues that there are economic disadvantages of a lunar year of now 12 months, and now 13 (I wonder why, because billions of people in Eastern Asia do not seem to identify this disadvantage, even today), proposing that a lunar schematic year of 12 months of 30 days was developed and that the extra 5 days would have been easily worked out by averaging the excess between the actual lunar year and the new 360 day year in a period of some 25 years. According to his proposal, he finally argued for an introduction of the calendar between 2937 and 2821 B.C.

![Graph of Average Nile Year](image)

**Figure 4.4.** Successive approximations to an average Nile year (interval between two consecutive inundations) through a period of 30 years, between 1875 and 1905. This graph was used to substantiate the origin of the 365 day calendar. However, averages of 366 or even 364 might perfectly well have been selected. See text for further discussion. Adapted from Neugebauer (1938).

The idea is worth considering and it has received further support in Depuydt’s most recent works. However, I have argued before that if a culture had developed a precise and useful calendar such as the Sirius heralded lunar calendar, they would probably never have felt the necessity of creating yet another calendar, and also that there is no real hint that this calendar was in operation at any stage of Egyptian history (we will come back to this point in Sections 4.6 and 4.7). Additionally, I mentioned before that there are serious doubts that the civil-based lunar calendar ever existed. Hence, this left
us only with point (ii), the necessity of a variable event, as the remaining workable contour condition for any reasonable theory.

Neugebauer sought that event in the inundation of the Nile. Each year, the heavy monsoon rains on the Ethiopian Plateau produce the rising of the waters of the Blue Nile. By early spring the waters reach Khartoum and the White Nile, moving north at such a rate that they reach the first cataract and the traditional frontier of Egypt at Elephantine at the latest for the time of the summer solstice (Gregorian 21st of June) and Memphis some 10 days later. Actually, the phenomenon, although cyclic, is highly non-periodic and relatively unpredictable, with reported risings of the waters arriving at Cairo (or Memphis) as early as April 25 and as late as July 3. This means that, within two consecutive Nile risings, a period as short as 10 lunations or as long as 14 might have elapsed (see Fig. 4.2).

For the inhabitants of the Nile valley, the most important fact of their year would undoubtedly have been the arrival of the new waters, which would control the whole vegetative cycle and, as a consequence, the economic life of local societies. Indeed, the arrival of the Inundation (as the name of the first season might show, see below) may have acted as the herald of that calendar and as the point to start counting the moons. When the unified state was formed, it was necessary to unify the criteria for the entire country and a new calendar ought to have been developed.

For Neugebauer, the simplicity of the Egyptian calendar was a sign of its primitivity; it was the remainder of prehistoric crudeness, preserved without changes. He alleged this primitive astronomy also to be the origin of the 30 day length of the civil month. Hence he proposed that an average Nile year would have been established through observations of successive Nile rising at a certain place. As a first step, a crude average of 360 days (30 x 12) would have been selected and then the 5 remaining days would have been calculated by averaging the differences with 360 during a period (as Parker’s lunar) of nearly 25 years.

He pointed out that the civil calendar was developed for the necessity in private and public economy of determining future dates regardless of the irregularity of the moon (and of the Nile risings I would add), following a quite materialistic point of view. However, it is surprising that, at the same time, he had proposed highly developed theoretical astronomy for the Babylonians, who implemented a working lunisolar system, arguing that the differences with Egypt can perhaps be found in the differences of social and economic structures of the two countries. Points like this have been severely criticized as aprioristic and gratuitous.

One important fact is that, considering the high variability of the arrival of the inundation (see Fig. 4.2), only after two or three centuries would this Nile calendar be considered as no longer accurate (when I $\theta$t 1 was systematically ahead of the arrival of the inundation anywhere in Egypt), and consequently, he argues, the Egyptians were forced to adopt a new criterion for the flood, which happened to be the reappearance of the star Sirius (i.e. $\text{prt spd}t$). I find this last point quite probable as we will discuss further in the following sections. However, Krauss has gone even further when dealing with the wandering problem when he states that: “a way out of this dilemma is the presumption that the 365-day calendar was intentionally planned and inaugurated as a calendar which moved forward through the seasons”. Although the seasonal displacement of the calendar should not be a problem under this clever ad hoc hypothesis, I found this solution quite improbable and impossible to falsify.

Coming back to the Nile hypothesis, I have my doubts about the possibilities of the averaging method over long periods of time. To do this, you need not only a well
organized society deciding where and when the systematic measurements would be done (which is probable), but also somebody, who would need to have had a long life, with the ability to look ahead and a capacity for prediction, able to decide when the average was suitable. In this sense, curiously enough, the data used by Neugebauer between years 1875 and 1905 to establish his theory fully contradict his own reasoning. Looking at Figure 4.4, the person in charge of selecting the appropriate average would probably have chosen 366 instead of 365, since for 5 years, between 1892 and 1896, and thus only 20 years after starting the experiment (saving time is always important), an average value of an additional 6 day period to 360 would have been obtained.

Consequently, the discussion has left us with no uncontroversial theory for the origin of the civil calendar. But, there must be one!

To support his theory, Neugebauer felt obliged to ignore any other options, especially the most challenging for his purposes, the astronomical ones. Indeed, to produce a new reasonable theory is not an easy task and for this purpose I shall take the best of previous theories, use new data and allow myself a little speculation.

Figure 4.5. A fragment of the annals presented in the verso of the Palermo Stone, representing the beginning of the reign of Shepseskaf (upper row) and a year of the reign of Userkaf (lower row). The upper row shows that Menkaure reigned x months plus 24 days in his last year which was shared by x+3 months plus 11 days of the reign of Shepseskaf. This is an indirect proof of the existence of the 30x12+5 (365) day civil calendar in that period.

A few years ago, when visiting our institution, Rolf Krauss offered me a completely new perspective for the Palermo Stone, the largest fragments of a stela with the annals of the first five Egyptian dynasties. I had already noticed other relevant aspect of the verso of the stone related to calendrics, such as the 100% probability that the 365 civil year was fully implemented in the transition between the reigns of Sahure and Neferirkare (c. 2480 B.C.) or even those of Menkaure and Shepseskaf, three decades before (see Figure 4.5); but for me it was a revelation to learn that Palermo contained a clue to the importance of the Nile year in ancient Egypt. Firstly, and most important, every year in these annals was identified not only by a special event occurring in it, but
also by the height reached by the waters of the Nile somewhere in the country (unfortunately we do not know where). However, it is in the first row of the annals of the kings of the 1st Dynasty where we have the most relevant datum (see Figure 4.6). There, we have four consecutive “yearly” registers, with the two central ones (2 and 3) including a certain number of months and days (6 months and 7 days, and 4 months and 3 days, respectively), but just one notation of the flood level below the third register. Besides, between registers 2 and 3, there is the typical vertical stroke, separating two consecutive reigns.

Krauss interprets this fact (and I tend to agree with him) as reflecting a single year, straddling both reigns and amounting to a total of only 10 months and 20 days. Of course, this “year” is too short for either a civil year of 365 days or even for the shortest possibility for any kind of lunisolar or lunistellar year (354 days). However, it fits a Nile year perfectly, in which a period between 315 and 320 days has elapsed between two successive measurements of the lowest (or highest) level of the inundation. From my point of view, this is perhaps the best proof, not known to Neugebauer, of the possible existence of a Nile-governed calendar before the invention of the civil one.

**Figure 4.6.** A very particular and interesting fragment of the annals in the second row of the Palermo stone showing a year of reign changing between two kings of the 1st Dynasty. The length of this year was of only 10 months and 20 days, too short for a civil year but even for any kind of lunisolar or lunistellar year, but still within a reasonable limit for a very short Nile-year. See the text for further discussion. Photograph by J. A. Belmonte.

Another proof would be the names of the seasons. The three seasons **(prt)** (ḥṣt), **(śmuw)** (śmuw) are normally translated as Inundation, Winter or Growing, and Summer or Harvest, respectively, on the basis that this set of names is clearly related to an agricultural year. However, as recently argued by Depuydt, there could be a controversy with these names and this paradigm is far from secure. Actually, when the names were first discovered by Champollion, the French scholar translated ḥṣt as Vegetation and śmuw as Inundation. However, in the middle of the 19th century, Heinrich Brugsch defended the theory, supported with several well-sustained arguments, that it was ḥṣt which was the season to be identified with the period of the Inundation (and so translated) and since then any other readings have been considered almost a heresy. But, as Depuydt has stated, there are still some old epigraphic hints that would better relate ḥṣt with the roots “to be verdant” or “to flourish” instead of the root “to flood”.

However, we can deal with this dilemma by studying the ecology of the process followed by the Nile. On the one hand, when the waters started to rise, more or less at the period of the summer solstice (see Fig. 4.2) a formidable biological process occurred. Millions of micro-organisms, whose parents had been dormant for months in the waters of the river, blossomed as the level of the waters started to rise, changing the
water colour from a pale blue-grey to a dark green. This would last for several weeks until the typical red waters, full of sediments of the Ethiopian Plateau, become dominant. This idea would perfectly fit epigraphy and nature and ṣḥt could be translated as the arrival of the Inundation in the sense of becoming verdant. On the other hand, the other two seasons may refer to other important periods in the Nile ecology: going forth (prt) of the land, after the period in which it had been covered by the waters and, finally, drought, with the river at the lowest level and most of the useful water (mwr) stored in the basins (δ). Hence, in a calendar year, we would have a complete Nile year.

Afterwards, the original meaning of the seasons was probably forgotten as time passed, especially when due to the wandering nature of the calendar they no longer adjusted the actual behaviour of the river, and, in later periods, other meanings had to be found when the names were translated into foreign languages. In this line of argument, the current Coptic meaning, that has been translated into other languages as Inundation, Winter and Summer, is perfectly explained by the fact that the Coptic year starts in August 29 Julian (today, 11 of September Gregorian). This implies that Inundation covers from late August to December (a period when the waters are high, see Fig. 4.2). Besides, Winter extends from December to April and Summer from late April to August. The parallelism with the traditional Mediterranean winter and summer seasons is appealing and the translation is thus obvious.

Consequently, I would be tempted to believe that, prior to the invention of the civil year, the Egyptians did have a year connected with the Nile. The logical way of operating it would have been to wait for the arrival of the rising waters and then start to count the months, in this case obviously lunar months, with the first subsequent conjunction or the first crescent visibility (this is not obvious for such an early epoch). This Nile year would then run until the next rising of the waters or perhaps until the end of the harvest epoch. Such a calendar would have been efficient for a small local community, but would have had some problems.

On the one hand, although average years would normally have been 12 or 13 lunar months long, they might occasionally have included only 10 or 11 lunations or as many as 14 lunar cycles (see Fig. 4.2). On the other hand, since the flood lasted some 12 days from Elephantine to the Mediterranean, different communities along the river (to the north), would surely have started their year one month after other groups to the south of the country, whenever a new lunar month had started in any of those 12 days. Once the country was unified, such a situation must have been unacceptable. Considering that we do not know of any procedure (smoke signals or similar) that the Egyptians might have used to pass information quickly from the extreme south of the country to the north, it is difficult to imagine what might have been the easiest solution to choosing a single reference place, and then passing the information across the rest of the country, so that every community would start their year at the next conjunction (or new crescent). Obviously, a reform was absolutely necessary. In any case, if this place ever existed, it would probably have been Elephantine, regarded during most of Egyptian history as the place of origin of the Nile floods.

For the new calendar, two solutions were adopted: first, a standard month of 30 days was created, very probably taking as a model the synodic month; then a year of 365 days was inaugurated with an origin that, despite Neugebauer, I maintain was astronomical. Both processes are from my point of view intimately related to each other and, at the same time, to the Egyptian way of understanding the cosmos.

Apparently, from the very beginning, the Egyptians used a base ten counting system, which was also applied to time-keeping, as it is the origin of the decades, an extremely
important period of time throughout Egyptian history. A lunar synodic month is on average 29½ days long. In many societies, the best way to approach 29½ is by the alternation of 30 and 29 day periods. However 29 is not divisible by 10 and when creating a new average month, the Egyptians might have preferred to choose a single value that, at the same time, could easily be counted in three decades. The name chosen for that period was $\frac{256}{30} \ (3bd)$, which is equivalent to the traditional name of the second day of the Egyptian lunation (the first being the conjunction, $\text{psdntyw}$, see Section 4.7). From my point of view, this might reflect the fact that at the very beginning of Egyptian history, the lunar month of the Nile year might have been considered to start at first crescent visibility. However, this relation might have been completely forgotten very early in daily life and the months of the civil year might have completely lost any connection with the actual moon, as happened in many other languages and societies (e.g. English with the terms “month” and “moon” is an obvious case).

For the origin of the 365 day period, I will introduce a new astronomical concept which, from my knowledge, has been hardly taken into account in Egyptian historiography. In the second half of the 3rd Century B.C., the Alexandrian scholar Eratosthenes, born in Cyrene (in today’s Libya), made a revolutionary measurement of the circumference of the Earth [Cleomedes, De motu circulari corporum caelestium I, 10]. To accomplish this, he made use of what must have been a well known fact to contemporaneous Egyptian society, that the noonday sun at the summer solstice was able to illuminate the water at the bottom of a very deep well (see Figure 4.7) in the city of Syene (Aswan). This happened because at that exact moment of the year and at that latitude the sun (in fact only part of it, see below) passed exactly overhead. This is a phenomenon known in astronomy as the zenith pass (see Chapter 1).

![Figure 4.7](image_url) A well within the ruins of ancient Syene in the island of Elephantine. This old well was in use until recent times. Although it has suffered many reconstructions, this could still be the original one mentioned by Eratosthenes. At low river, with the water some 9 to 10 metres below the rim of the construction, the summer solstice zenith sun was still able to illuminate the water at the bottom of the well. A similar device (perhaps a rudimentary Nilometer) could have been used in proto-dynastic Egypt to establish the length of the solar (tropical) year in 365 days. Photograph by J. A. Belmonte.
This phenomenon happens in two occasions each year only in those places located between the tropics of Cancer and Capricorn, which of course receive the name of tropical zones. The limits are located exactly at the tropics, where the sun has a zenith pass only once at the day of the local summer solstice, when it reaches its maximum declination. Curiously, in 3000 B.C., the maximum declination of the sun was 24° 5’, exactly the latitude of central Aswan and, of course, of one of its most important areas, the island of Elephantine.

The island of Elephantine was already at that time a very important settlement and archaeology has shown that a sanctuary (and perhaps a Nilometer) was already in operation on the site of the later temples of Satet and Khnum (the gods of the first cataract and of the inundation) at least from 3200 B.C. Was the zenith pass observed at Elephantine in that epoch? I suggest that it was and, going even further, I speculate that this would have been in fact the way to determine the length of the (solar) year as 365 days.

We have not yet considered the interval between two sunrises or sunsets at consecutive summer solstices (or winter solstices) as a good candidate for the determination of the period of 365 days because it had been argued that, within a short time, it would have been obvious that the exact moment of the solstices was moving backwards in relation to the civil year. However, this is not exactly true. During the solstices, the sun stands at almost the same declinations for several days and hence its rising or setting positions arrived at a standstill (hence the name). Even if the proto-dynastic period Egyptians were able to determine precisely these positions on the horizon (which we believe they were), they would hardly have reached a precision better than 2’, equivalent to 8 days and, considering the wandering of the civil calendar of 4 years per day, it would have lasted at least 32 years before the displacement was obvious.

However, the effect becomes much more dramatic when zenith pass is considered. If the non-shadow effect on a gnomon (an obelisk or little pyramid for example, since both are known as extant monuments in early dynastic Elephantine) or either the illumination of a deep well were the phenomena observed, the length between two consecutive zenith passes would have been easily established as 365 days. But, at the same time, once the civil year had been in operation, it would have been extremely difficult to detect the displacement of zenith pass events during the months.

The reason for this is that the sun is not a point source of light, but rather it has a well defined circular shape with a diameter of some 36’. That is also the reason why the illumination phenomenon was still observed in the well in Aswan in Eratosthenes’s times, despite the fact that the extreme declination of the sun at that moment was of only 23° 47’ due to the decreasing value of the inclination of the axis of the Earth with respect to the plane of its orbit (the obliquity of the Ecliptic). Hence, one third of the solar disc was still able to shed light on the bottom of the well.

With this fact in mind, we can even give an estimate of the interval when the civil calendar was inaugurated, provided our hypotheses are correct. Imagine that the civil year was inaugurated at the beginning of a lunar month following the summer solstice and the moment of zenith pass at Elephantine. This was also the latest average date of the arrival of the flood at this particular spot and we can thus consider it as the beginning of the corresponding Nile year. We can easily calculate that the earliest time in Egyptian history when 1 śḥt 1 coincided with the summer solstice was in the four year period centred more or less on 2760 B.C. Considering that the new lunar month might have started as much as 29½ days later, this might have happened 118 years earlier.
Also, considering reasonable numbers, we can estimate an error of roughly 72 civil years (equivalent to 16', half a solar diameter) before it was obvious that the sun was not clearly crossing at the zenith in I ḫt 1. Summing up all these numbers, we reach to an interval roughly between 2950 B.C. and 2690 B.C. for the inauguration of the civil calendar (slightly later dates could also be acceptable). This is an interval of time more or less between the beginning and the end of the proto-dynastic period, when several relevant aspects of the Egyptian civilization would have been developing. Indeed, the calendar could be one of them.

Within this context we can place the earliest presumed mentions of the seasons. The first is a most controversial piece of evidence from the reign of Djer (see Figure 4.8), whose reign would anyway fit with the upper limit of the interval. The second is an inscription undoubtedly mentioning the month III  ResourceManager in the Step Pyramid complex in Saqqara, which is perhaps the first evidence of the civil calendar after its invention. This inscription could be logically placed in the reign of Djoser, situated by most chronologies immediately after our lower time limit. It is also worth noting that if Inundation had been the original meaning of  ResourceManager, as proposed by Champollion and other scholars in the beginnings of Egyptology, the inauguration of the calendar would move to a date c. 3300 B.C., when it is highly probable that there were neither a centralized state nor a common calendar in ancient Egypt. This argument also contradicts any kind of support for this outdated and abandoned translation.

Another important feature of our proposal is that a zenith pass event did not occur at any other important city to the north of Elephantine and thus its people would not have been cognisant of the phenomenon. This is relevant to Neugebauer’s point about the impossibility of an astronomical origin of the calendar because with the nucleus of the kingdom well established in the Memphis region, nobody would have cared about the displacement of the civil year from an unobservable (for them) celestial event.

Once the periods of 30 and 365 were established, the internal distribution of the calendar was forced by the simplest arithmetic: 36 decades of ten days, grouped in 12 months of 30 days, plus 5 extra troublesome days located above the year. As a heritage of the old Nile year, the set of 3 seasons was kept, with 4 months as their standard length (this might not have been necessary the case in Nile years).

Figure 4.8. A facsimile of an ivory tablet of the reign of Djer, 4th king of the 1st Dynasty (original at the Pennsylvania Museum). According to H. Altenmüller, it may represent the first mention in Egyptian history of  ResourceManager, the “Opening of the Year”, in I ḫt, and to the contemporary heliacal rising of Sopdet. However, due to the difficulty of interpretation of the hieroglyphs at these early stages, this hypothesis has been seriously contested by A. Spalinger and by M. Clagett, who recognizes the goddess Sekhet-hor, instead of Sopdet, in the stylized image of a recumbent cow.
To conclude my argument, I shall quote in evidence a cultural parallelism that has never been considered in the discussion of Egyptian calendrics. This is the Mesoamerican calendar of 365 days. Apparently, like the Egyptian civil calendar, it worked with a permanent period of 365 days (without leap years) during well established historical periods such as, for example, during the classical Maya epoch, when the Haab (i.e. the 365 day year) was an integrated and dynamical part of a very elaborated system of time keeping, together with the long count, the 260 day ritual calendar, the lunar series and other time cycles (all them well attested by archaeology and ethnography). Nobody in Mesoamerican studies doubts that the origin of the Mayan and Aztec 365 day year was solar, as nobody in late Antiquity doubted that the origin of the Egyptian civil calendar was also solar. The following texts are good examples of this: “... the Egyptians organise months and years in a very special way. Relating the days not to the movement of the moon but of the sun, ...” [Diodorus Siculus I, L]; and “It is said that the priests in Thebes are mostly astronomers and scholars: to the priests we owe the habit of calculating the days, not according to the moon but to the sun, and to add each year 5 days to the 12 months of 30 days each” [Strabo, Egypt XVII, I, 46].

Surprisingly, we can establish two further parallelisms. On the one hand, the Mesoamerican year was divided into 18 months of 20 days, summing 360 days, plus five extra day (called Nemonteni by the Aztecs), which were considered nefarious as well. The reason for this strange internal distribution was again arithmetical since the Mayas and the Aztecs used a numerical system in base twenty, hence the length of their months, equivalent to the Egyptian decades. On the other hand, zenith pass does occurs twice a year in most of Mesoamerica, including the Mayan and Aztec areas, and several scholars have recalled the important role of those special events within Mesoamerican calendrics. Of course, I do not wish to be misunderstood and I am not in the least suggesting that the Mesoamerican calendar system and the Egyptian civil calendar were somehow related or received any sort of mutual influence, but rather that, when confronted by similar situations, humans often develop similar intelligent solutions to certain problems.

One question that we could ask is what would have happened once it was obvious that the civil calendar and the climatic (ecological) seasons were no longer in agreement. (when I 3hnt 1 was systematically ahead of the arrival of the inundation anywhere in Egypt). This may have happened some 120 to 200 after the creation of the calendar, or nearly 500 years for a complete seasonal displacement (the complete flooding period occurring in pr). I guess that further systematic astronomical observations should have been made in connection with the solstices or other cyclic annual phenomena in order to test the accurate behaviour of nature. My contention is that the relevance of solstitial observations during the Pyramid Age (see, for example, Figure 4.9 but specially Chapter 8) and the introduction of the heliacal rising of Sirius (pr spdt) as the harbinger of the Flooding, attested at least from the Middle Kingdom onwards (see Section 4.6), were the collateral effects of this necessity.

4.4. The names of the months

Not surprisingly, there has always been a “problem” with the names of the Egyptian months, considering the ongoing discussion on the number of calendars and the likelihood of which set of month names belonged to which calendar. The problem has
reached the level that, in Depuydt’s words, after many decades of debate, each single item has been tirelessly discussed.

The nucleus of the problem comes from the fact that in the well known and widely used “Concise Dictionary of Middle Egyptian”, R.O Faulkner identifies, for example, hwt-hr as the fourth month of the Egyptian calendar or ḫnsw as the 10th, whereas all the documents demonstrate that Athy (Greek equivalent to Hathor) and Pachon (Greek equivalent to That of Khonsu) where clearly the third and the ninth months of the civil year. The main reason for that is apparently Faulkner’s loyalty to his former master, Gardiner, who, basing his argument primarily on the Ebers Calendar, had proposed that Mesore (a later name of wpt rnpt) had originally been the first month of the year, once more a consequence of the Ebers syndrome.

![Figure 4.9. Sunset at the winter solstice of 2006 in the (reconstructed) NW corner of Snefri’s Bent pyramid in Dahshur, as seen from the centre of his associated valley temple. When the pyramid was built, the effect would have been still more spectacular with the sun setting a complete solar diameter to its left. This is one of the many solstitial light and shadow effects that have been identified in the pyramids of the 4th Dynasty which could be related to some needed verifications of the length of the civil year, several decades after its invention. Photograph by J. A. Belmonte.](image)

Thus, for our discussion, we will rely only on the four extant lists of months which have reached us in an almost complete state of preservation (remember that, under our hypothesis, the Ebers Calendar has not been discovered). These are presented in Table 4.1. The youngest of the four is the list of months on the astronomical frieze of the temple of Edfu. This list, by itself, would have been sufficient to prove the names of 11 of the 12 months of the civil calendar, since these names are clearly associated with the seasonal names of the months (e.g. the two ṛkh to II ṭrt and III ṭrt, respectively). Other inscriptions of the temple further emphasized that parallelism for month IV ḫṭ, I ṭrt, II ṭrt and III ṣnw, and also provide an alternative name for IV ṣnw, wpt rnpt. However, because of the historical debate, they had been seen alternatively as the names of the civil-based lunar calendar or as the names of the original lunar calendar that had been borrowed by the civil calendar owing to the archaic style of the inscriptions of Edfu.
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**Table 4.1.** Extant lists of month names from the tomb of Senenmut (18th Dyn.), the Karnak Water Clock (18th Dyn.), the Ramessseum at Thebes (19th Dyn.) and the astronomical frieze of the Horus temple at Edfu (Ptolemaic Period). In the case of the 3 later examples, the list of accompanying deities is also presented. The last column shows, for comparison, the set of month names that can be obtained from data of Deir el Medina such as the Cairo Calendar (86637, verso), and several ostraca (BM29560, DM1088, DM1265).

---

**OLD NAMES**

1 Thoth 1
2 Phaophi
3 Athyr G
4 Choaik G ¹
5 Tybi G ²
6 Mechir G
7 Phamenoth G
8 Pharmothu G
9 Pachon
10 Payni
11 Epiph G
12 Misor G ²

**NEW NAMES**

Drunkenness
Clothing
Hathor
Ka on ka
Emmer Spring
(Butler) Burning
(Small) Burning
Renoutet’s
Khonsu’s
First of ...
Her majesty Ipet
Year Opener
Birth of Re² (Hor-Akhty)

**Table 4.2.** Proper names of the traditional civil months. Additionally, for each seasonal month, the old and new proper Egyptian names are presented, together with their possible translation. G stands for those months suffering the Gardiner Phenomenon: a Feast of the same or similar name in the first day of the following month. In bold type, those months whose name changes completely in the Ramesside period. See text for further discussion.

(1) Feast of Nehebkau
(2) Only a possibility. It was celebrated in I prahi 20 at Dendara.
(3) Removing the 5 epagomenal days.
(4) Reflects the domination of Thebes, her gods and her festivals.
(5) Same name with New Kingdom grammar.
(6) Later form of IV smw.
This is surprising, especially when one compares these names with those in the oldest month list, that of the astronomical ceiling in the tomb of Senenmut (18th Dynasty, c. 1470 B.C.). Nine names are virtually identical, and those which are not (two) are strikingly similar. The twelfth, ⟨ḫwt-hr⟩, can be found in many other references, including the papyri and ostraca of Deir el Medina, as the name of the third month of the civil year. Thus, from any logical point of view, we might think that in Senenmut we have the oldest list with the proper names of the months of the civil calendar. However, once more, Senenmut’s list has been alternatively identified as the twelve names of the lunar months of the Sirius-based lunar calendar or as a list of festivals associated with those months. Its obvious civil arrangement has been almost always neglected.

However, there is an almost contemporary proof that this set of names is certainly civil and not lunar. This is in the upper rim of the Karnak water clock, dating from the reign of Amenhotep III but probably following much earlier models of the sage Amenemhat, dating to the beginning of the 18th Dynasty. There, the original designer of the clock identified the hour marks for each month of the civil year, starting perhaps with I 3ḥt, followed certainly by II 3ḥt and ending with III 3mḥw, with the months clearly identified by their seasonal names. However, at some stage, the border of the clepsydra was broken in the area where I 3ḥt was written and subsequently restored. Curiously, the person who made the restoration did not write again I 3ḥt but instead th. This is demonstrated in Figure 4.10 and stressed in Table 4.1. Thus, I 3ḥt is obviously identical to th and, if this is so, why not the rest of the whole list?

Figure 4.10. A side of the Karnak Water Clock, showing the three vertical registers (decans and planets in the upper one, northern constellations and “lunar” deities in the middle and the gods of the months in the lower). In the upper rim of the device, the months of the civil calendar are represented to mark the hours of the night, starting with th (instead of I 3ḥt), II 3ḥt, III 3ḥt, and so on, successively. This fact clearly demonstrate that th was the proper name of the first month of the civil calendar I 3ḥt and not the name of the first month of any hypothetical lunar calendar.
If any doubt remained, we might still draw the attention of the reader to the oldest reference to some of the month names, appearing in the papers of Hekanakhte studied by James, a set of hieratical documents dating from the reign of Mentuhotep II (c. 2000 B.C.). There, the names sf hdt, one of the rkh and hnt hti prty are clearly mentioned in a civil calendar context for the first time in Egyptian history.

The list of names of the months is presented in Table 4.2. This list is basically that of the tomb of Senenmut with some minor modifications from the other lists. These names, as Edfu demonstrates, were used as the proper names of the months, at least in monumental inscriptions, until the Graeco-Roman period. However, at some point during the New Kingdom, a new set of names was developed for less official documents, such as papyri and ostraca, which would finally be the origin of the month names known from later Aramaic, Greek and Coptic sources. This new set of names is also presented in Table 4.2. The corresponding Greek forms of this new set are presented in the first column of the table.

As can be seen in Table 4.2, two names (3 and 4) are identical and another two can be considered as mere New Kingdom variants of previous forms (8 and 9), where the article p3 and the preposition n has been added to the original name. One has suffered a little variance (11) and in the case of the 12th month, wpt rnpt, this name is kept for hieroglyphic and hieratic sources, while it never appears in the later Aramaic, Greek, Demotic or Coptic documents where the name Misore is preferred (the hieroglyphic counterpart of Misore, mswt-r³-hr-ihty is attested in hieroglyphs as a feast name but never as a month name). For the first month, it might be possible that it was also known as dhwytyt in earlier times (see below).

Five months changed their names completely from the old to the new set. We have no clear reason for this neither is it possible to find an explanation in the extant sources. However, one fact is clear, months 2 (p n ipt), 7 (p n imnhtp) and 10 (p n int), and perhaps also 9 (p n hnsw), reflect the new dominant political, social and religious situation of Egypt in the New Kingdom, since those names clearly derived from three of the most important festivals celebrated in Thebes from that time onwards. Hence, at some moment during the New Kingdom, the Egyptians changed the names of several of their months (as was the case in our calendar twice), at least in some of their documents and probably in the speech of daily life, so that this new set of names was the one that passed to later sources and survived to our time in the names of the months of the Coptic liturgical calendar.

It is worth mentioning that Depuydt has defended the existence of two parallel sets of names as due to the fact that one belonged to the lunar calendar (almost our old set) and the other to the civil calendar (the new set), and that the second derived from the first. However, we do not have any irrefutable proof of the existence of a whole set of 12 (or 13) well articulated lunar months at any moment in Egyptian history. Consequently, applying the Principle of Economy, we must conclude that in Egypt there was just one single set of 12 names for the twelve months of the civil calendar, at least from the beginning of the New Kingdom, and perhaps even during the Middle Kingdom. For unknown reasons, some of these names were either altered or slightly changed during the New Kingdom or later (the case of Misore), but still keeping the same internal coherency. However, the old set of names was perhaps partially maintained for some monumental inscriptions, as data of Edfu suggest, in parallel to the set of typical seasonal names.

As we have seen, Griffith had suggested, a suggestion followed by many, that the seasonal set of names was written on the inscription but that the proper names of the
months were the ones usually read. Can we go further in time to earlier periods of Egyptian history and try to see what the names of the months of the civil calendar were at the moment of its appearance?

![Figure 4.11. Part of a list of festivals in the walls of the tomb of Mereruka in Saqqara. wpt rnpt, “New Year’s Eve”, is followed by the Feast of Thoth, the controversial tpy rnpt and the wjgy Feast. This order of feast, typical of the 4th and 5th Dynasties, may suggest a lunar computus with the celebration of wjgy in III iht. The precise nature of this computus, presumably connected with the arrival of the actual Inundation, is still a matter of debate. Photograph by J. A. Belmonte.](image)

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![Figure 4.12. Comparative table between the 12 festivals usually mentioned in the standard feast list of the Old Kingdom and the twelve months of the civil calendar. It is the intention of this diagram to show that, generally speaking, each of these twelve festivals might have been vaguely associated with each of the months within a civil year. See text for further discussion.](image)

To finish the “problem” of the month names and trying to understand how some of the months earned their names, we must devote some time to discussing the Brugsch
and Gardiner phenomena, largely discussed by Depuydt in his “Civil Calendar and Lunar calendar”. Hence, I will merely summarize the problem:

i) The Brugsch phenomenon comes from the fact that the last month of the Egyptian calendar, wpt rnpt, the Opener of the Year, has a name that apparently refers to a beginning.

ii) The Gardiner phenomenon is connected to the well known fact that several important festivals, which bore the same name as the months, were not celebrated in their eponymous months but rather in the first (or second) day of the following month. Six unmistakable cases of the phenomenon are attested (see Table 4.2), with two more doubtful.

Depuydt found an explanation for both phenomena in the mutual influences and derivations produced first between the Sirius-based lunar calendar and the civil calendar and, later, between this and the civil-based lunar one. However, as we have seen, all the names attested so far would have belonged to the civil calendar probably since the Middle Kingdom onwards. What would the original names (if they ever existed) of the Nile year lunar months have been prior to the invention of the civil calendar?

The Old Kingdom inscriptions do not offer much information on this particular issue. However, there is a large number of festival lists from various sites (especially the necropolises at Giza and Saqqara), which offer a good set of festival names (see Figure 4.11). From a compilation of all the sources, it is clear that the most complete list was that formed by 11 festivals plus the closing formula hb nb (r⁻⁷ nb), “each festival, each day”, completing a total of 12 entrances. However, on several occasions, a twelfth feast, called wỉh ḫḥ, was added frequently between the original ⁷th and ⁸th, seldom between ⁸th and ⁹th, and rarely in other positions, perhaps indicating a moveable nature. The standard list, including wỉh ḫḥ in the most common eighth position, would be as follows:

| (1) wpt rnpt | (5) hb skr | (9) prt mn |
| (2) dhwytyt | (6) hb wr | (10) (3bd n) s3d |
| (3) tpy rnpt | (7) rkh | (11) (tp) 3bd |
| (4) wígwy | (8) wỉh ḫḥ | (12) (tp) smdt |
|           |           | hb nb (r⁻⁷ nb) |

It is at least striking that the standard list included a total of 12 feasts, exactly the same as the numbers of months in the civil calendar (there was even a closing formula that might stand in the same, and perhaps equivalent, position to the epagomenal days). This might lead to the suggestive speculation that each of these feasts might in some way represent each one of the 12 months of the civil calendar. This hypothesis is schematically presented in Figure 4.12, where we have associated the feasts with each of the months.

First, we have the obvious parallelism of wpt rnpt with day I ẖt 1 and with the last month of the year, wpt rnpt (we will come back to the Brugsch phenomenon later). Then we have the Feast of Thoth (dhwytyt), well attested in I ẖt 19 in later sources, and even the later name of the first month in later sources (was that name as old as the Old Kingdom, dhwytyt being an alternative name of ḫḥ?). We will now jump forward and leave tpy rnpt without discussion until Section 4.6. The celebration of the Feast of wígwy is well attested in I ẖt 17 and 18 from the Middle Kingdom onwards. However, in the Old and Middle Kingdom, there was a second, moveable wígwy Feast. There are firm hints that during the Old Kingdom, it might have been celebrated once in III ẖt 28, on lunar day 18 (or 17) of the lunacon following either the rising of the Nile waters, the
summer solstice or *prt spdt* (see Section 4.6). For IV *ḥt*, we have the well attested Feast of Sokar (*skr*) in IV *ḥt* 26.

The list follows with the Great Festival (*ḥb wr*). There is extremely little information on this feast, but in the very late temple of Edfu there is a Great big festival (*ḥḥ ḫb ḫw* or *ḥb wr*) celebrated on II *ḥt* 4 and thus close to the beginning of the station *ḥt*. Then comes *rkh*. This is one of the long-lasting festivals, certainly lending its name to a pair of months of the calendar, II *ḥt* and III *ḥt*. Middle Kingdom sources (the Illahun archives) indicate that the *rkh* festival was celebrated twice, in III *ḥt* 1 and IV *ḥt* 1 (two instances of the Gardiner phenomenon), and thus we might relate the *rkh* of the Old Kingdom list to both of them and, consequently, we may associate it with two months. Eventually, we might assign *wḥ ḫḥ* to IV *ḥt* and, by doing that, we have another good hint since, in later sources such as the festival list of the temple of Ramses III at Medinet Habu, recently studied by El-Sabbah, the Procession of Min (*ḥt mn*) was established in connection with the *psḏntyw* of I *ḥm*.

This parallelism might also tell us that, in the case of the Old Kingdom, the feast list might reflect a much older situation, one where we are in fact dealing with an older lunar system, which, as W. E. P. demonstrated, was increasingly overshadowed by the civil calendar as Egyptian civilization evolved. We speculate that this older system was the original Nile year. The list ends with three events that are clearly lunar. One is poorly known, (*ḥbd n*) *ṣd*, and it might account for month 10 (11 if *wḥ ḫḥ* is counted first, see below). However, (ṭp) *ḥbd* and (ṭp) *smdt* are clearly the first crescent day feast and the full moon feast and, consequently, they might have been celebrated twelve times per year (see Section 4.7). However, the uncommon adjective ṭp might mean that these were two special events. One possibility might be that these could be related to the last month in a peculiar way. In the Nile year, the last lunar month (an even the previous one) might not be present in the case of a very short year (as the one in the Palermo stone) and thus they might not have had a proper name assigned, being ignored as in the primitive Roman calendar or simply numbered as our September or October.

Of the original 9 feasts of the Old Kingdom perhaps related to months, only three survived as month names of the Egyptian calendar in later epochs (*wḥ ḫḥ*, *ḏḥwt* and *rkh*). Consequently, we may imagine that the names of the months could have been properly assigned at a later time, perhaps in the Middle Kingdom, when three of them are attested. However, as the late renowned astronomer Carl Sagan used to say, the *absence of evidence is not evidence of absence* and we could argue that the months of the civil year already had a proper name from the very beginning.

In fact, the only way to solve the problem of the Brugsch and Gardiner phenomena is to assume that the vast majority of the months (especially those suffering the Gardiner phenomenon) must have taken their names from another source, from the very moment of the inauguration of the civil calendar. This situation is perfectly illustrated in Figure 4.13.

Let us imagine the moment of creation of the civil calendar and let us assume the following hypotheses:

- The calendar was inaugurated at the same time as a Nile year began, i.e. the first I *ḥt* 1 was the first day of a lunar month. From that point to the very end of Egyptian history, I *ḥt* 1 would be the date to celebrate the Feast of *wḥ ḫḥ*.
- The Nile year had a set of month names, starting with the Opener of the Year (*wḥ ḫḥ*), eponymous with its corresponding feast, followed by *ḥ*, and so consecutively. Not necessarily all the months would have had a name and for those having a name, this does not need to be the same as that given in later
sources (Dynasty 18, see Table 4.2). However, for simplicity, we will assume the old set of 12 names in Table 4.2 already in operation.

- Three normal Nile years of 12 lunar months follow each other.

With these working hypotheses, we might obtain the following conclusions. Already in year 1 of the series, some part of the lunar months of the Nile year would have fallen one month ahead in the civil calendar. In the second year the parallelism would have been substantial and in the third year almost complete so that \textit{wpt rnp} was coincident with IV $\textit{smw}$, \textit{th} with I $\textit{jht}$ and so on successively. Since no name for the intercalary month (if it ever existed) is reported, the situation would have been still more dramatic at the beginning of the 4\textsuperscript{th} year. Hence, we may speculate that at some moment, either in year two or better in year three after the inauguration of the civil calendar, several month names were borrowed by the civil calendar from the simultaneous names of the corresponding lunar months (or lunations we might already call them) of the discredited Nile year, which was in the process of abandonment. This explanation might easily account for the Brugsch phenomenon and might explain why \textit{wpt rnp} was the name of the last month of the civil year.

What about the Gardiner phenomenon? Here we might find a more global solution that might explain, not only the six months (we have already discussed \textit{wpt rnp} and we will not consider $\textit{tf bdi}$) affected by the phenomenon but also why other important feasts such as \textit{dhwtyt} (I $\textit{jht}$ 19), $\textit{thy}$ (I $\textit{jht}$ 20), $\textit{sf-bdt}$ (I \textit{prt} 20 in Dendara) or \textit{hnsw} (I $\textit{smw}$ 19) were fixed where they were. As first noticed by Spalinger, the special location of the Feast of Thoth within the civil calendar could have something to do with the importance of the god as time-keeper (in his character of lunar god) since the day I $\textit{jht}$ 19 had a peculiarity; it corresponds to the difference in days between 13 lunations (384 days) and the 365 day civil calendar. This might have been relevant for lunar phase calculations or, perhaps, might simply have had a symbolic character.

For the other feasts, the solution is still simpler. As shown in Figure 4.13, five instances of the Gardiner phenomenon ($\textit{hwt}$-$\textit{hr}$, \textit{nbb} $\textit{k3w}$, associated with $\textit{k3}$ \textit{hr} $\textit{k3}$, \textit{rrk} \textit{wr}$,$ \textit{rrk}$ \textit{nds}$ and \textit{rnwtt}$), celebrated in the first day of months 4, 5, 7, 8 and 9, respectively, are related to days 13 to 16 of the corresponding lunations in the second Nile year of the cycle. Considering that the moon looks full from day 13 to 15 or from 14 to 16, depending on the length of the lunation (29 or 30 days, respectively), all five feasts could have been the \textit{smdt} festivals (full moon) of their eponymous lunations. Since the feast falls at the same time on a very special day within the civil calendar (the first day of the following month), it might have been decided that this peculiar situation should be frozen within the civil calendar.

Another curious situation is for the case of the Feast of \textit{thy} in I $\textit{jht}$ 20 (or \textit{th} 20), well reported at least from the Middle Kingdom and perhaps earlier. In this case, the feast is located within its eponymous month. Parker suggested that it should be also associated with a \textit{smdt}; however, as Spalinger has shown and Fig. 4.13 illustrates, it fits much better if the Feast of \textit{thy} was originally the \textit{psdnwy} of its eponymous lunation. Thus, \textit{thy} might have been fixed in day 20 of I $\textit{jht}$ as soon as the second year of implementation of the civil calendar, when the corresponding \textit{psdnwy} occurred exactly on that day.

Curiously, a similar line of reasoning might have dictated the decision, taken some 12 centuries later, to fix the first day of the Feast of Opet (\textit{ipt}) in II $\textit{jht}$ 19, since as we can see, it also might have corresponded to the \textit{psdnwy} of \textit{mnht}, the month to be known later as Phaophi (\textit{p n ipt}). However, another possibility would have been the special relevance taken by days 18 and, overall, 19 within the civil months as important dates for the celebration of festivals. This might explain the last case of the Gardiner
phenomenon, that of *ipip*, the eponymous feast of *ipt-hmt=s* (III *šnw*, later Epiphi) but that was celebrated in days 1 and 2 of IV *šnw*, which might have correspond to lunar days 18 and 19 of the “almost” eponymous lunation.

**Figure 4.13.** Diagram showing the hypothetical moment in which the civil calendar was created from an original lunar calendar, starting with *wptrupt* feast as the first day of both the new civil calendar and the old cycle of lunar months. Within three years, the civil calendar would have run completely independently, keeping within its structure old features of its lunar counterpart that are controversial. These are known as the Brugsch and Gardiner phenomena. See text for further discussion.
Summarizing, we have tried to demonstrate that there was just one set of month names, pertaining to the civil calendar, which changed some of their names later in Egyptian history. The majority of these names were perhaps taken from a set of original lunar months of the previous Nile-based lunar year, from the very moment of creation of the civil calendar, in the first half of the third millennium B.C. This rapid assimilation might explain some problems, later identified as the Brugsch and Gardiner phenomena, that were inherent to the Egyptian calendar from the very beginning, and not the result of the side effect provoked by the interaction throughout history between the civil calendar and the alleged (and far from certain) Sirius-based and civil-based lunar calendars.

4.5. The solstices within the framework of the Egyptian calendar

There has always been, since the beginning of Egyptology, an acrid debate between those scholars supporting knowledge of the stations of the sun by the ancient Egyptians and those attacking that possibility (e.g. the Sethe theory for the beginning of the year at the winter solstice). Recently, Leitz has defended the solar roots of the Egyptian calendar, while Wells has proposed a theory that has related the mythology of the birth of the god Re from the goddess Nut (identified as the Milky Way) with the relative positions of both the sun and the Milky Way at the vernal equinox and at the winter solstice. However, the theory for the calendar, proposed as a corollary of that hypothesis, is unreliable, as we have already mentioned in Section 4.2.

What it is absolutely certain, and difficult to deny any longer, is the fact that several Egyptian temples were orientated towards the solstices and perhaps the equinoxes. This will be largely discussed in Chapter 8, where irrefutable proof that the Egyptians were interested in the stations of the sun will be presented. But, was this interest also calendrical or merely symbolic?

It has frequently been claimed that there are two features of the Egyptian calendar that might have a solstitial origin. On the one hand, the name of the 12th month of later periods, Misore, the Birth of Re, and of the eponymous feast at I `lht 1, have been related to the birth of the sun at the winter solstice, a common link with many other cultures throughout the Mediterranean but (apart from Wells’s hypothesis) never convincingly postulated in the case of ancient Egypt. On the other hand, the name of the sixth and seventh months, rkh, i.e. “Burning”, has variously related to the heat of the sun at the summer solstice, a hypothesis defended by Sethe, and, on the contrary, with the much more prosaic solution of artificial heat needed in Egypt at the time of the winter solstice, a hypothesis proposed and defended by Parker.

The name Misore, instead of wpt rnh, for the 12th month has been reported only in the Late Period and, especially in the Aramaic, Greek and Coptic papyri written after the conquest of Egypt by the Persians in 525 B.C. However, there is an early mention, in a necropolis report from Deir el Medina, of a feast under the name of mswt rfh-`lhty, celebrated in I `lht 1 as early as the 20th Dynasty. So the association between the feast of Misore and the first day of the civil year must be much older, but by how much? We propose the hypothesis that this link can effectively be associated with a moment when I `lht 1 was at the time of the winter solstice, but not in prehistoric or proto-historic times, as generally argued, but well into the historic period. To be precise, because of the wandering of the civil calendar across the seasons, there have been two occasions when I `lht 1 has fallen at the moment of the winter solstice: in a four year period centred on 2004 B.C. and in 500 B.C., respectively, as shown in Figure 4.14. Considering the 20th
Dynasty mention of the feast, we cannot consider 500 B.C. This brings us to the year 2004 B.C.

This was a very interesting moment in Egyptian history. Mentuhotep II from Thebes had just re-unified the country and new buildings, on a large monumental scale, were constructed for the first time in the very south of the country. The most significant of all was his mortuary temple at Deir el Bahari. Also, a few years later, the temple of a new aspect of the solar god, Amun, was re-erected by Senusret I on the other side of the river, in Karnak, also on a larger monumental scale (see Chapter 8). Not surprisingly, both monuments were orientated to the rising of the sun at the winter solstice and thus, for a few years, to the rising of the sun at the first day of the civil year, I 3ht 1. We speculate that at this precise moment, when the actual Birth of Re at the winter solstice occurred in I 3ht 1, the feast of mswt r² was frozen at wpt npnt for the rest of Egyptian history.

A reflection of this ancient tradition could have been inherited by two of the most important festivals of Amun, celebrated during the Ramesseide period when the winter solstice was not centred on I 3ht 1, but rather occurred at the time of the months II prt, III prt and IV prt. These were the Festival of “Lifting Up the Sky” (‘lh pt), celebrated from II prt 29 to 30, ending when the god “Enters the sky” (‘kh pt) in III prt 1, followed by the festival of “Entering the Sky” from III prt 29 to 30, and finishing when the god “Re-enters the sky” (s‘kh pt) in IV prt. In 1261 B.C. (see Fig. 4.14), in year 18 of Ramses II, the winter solstice occurred more or less at III prt 1 and we speculate that this is what was commemorated at the very moment when the god “enters” the sky. Obviously, this would have occurred just for a period of a few years but, in any case, the winter solstice would have fallen in II prt or III prt during most of the New Kingdom.

This fact has some connections with the problem of the two rkh. This was the name of two months of the civil calendar (II prt and III prt, months 6 and 7 respectively) and of two eponymous festivals celebrated in III prt 1 and IV prt 1, respectively, as the Illahun archive clearly showed. Since the Middle Kingdom (see Fig. 4.3), both were distinguished by the adjectives “great” (‘ or wr) and “small” (nds). Originally, in the Old Kingdom, just one rkh feast was reported in the 7th position of the standard festival list. We have argued that this might have been the name of months 6 and 7, within the civil calendar, since its invention (c. 2760 B.C.), and thus during that period, rkh would have fallen more or less at the time of the winter solstice. Hence, in the Ramesseide period, when the rkh feasts are not mentioned at all, the equivalent Amun winter solstice festivals took their place. Taking this hypothesis into account, Parker’s idea of “burning”, meaning artificial heat, does not sound unreasonable.

However, there is another possibility. At the archive of Illahun there is a document which shows a list of revenues for the temple of Anubis, at the pyramid complex of Senusret II, which are delimited to a yearly interval, from year 1 III prt 1 to year 2 II prt 30. During the Middle Kingdom, the summer solstice was moving from III prt 1 in 2015 B.C. (see Fig. 4.14) to IV prt 1 in 1890 B.C. and beyond. So, during this period, a Nile year interval would have fallen more or less as described in the Anubis’ temple account. Furthermore, it is at Illahun were the two rkh festivals were reported exactly on those dates, the first days of III and IV prt. Another possibility would be that rkh was in fact a term for the epoch of the summer solstice and that, in a similar manner as mswt-r², it might have been frozen within the civil calendar, in association with months 6 and 7, exactly in that epoch. Against this idea, we have the striking evidence presented before that rkh might have been associated in some way with months 6 and/or 7 already in the Old Kingdom. Currently, I am unable to give preference to one hypothesis or the other.
However, following the same kind of reasoning, there is a final hypothesis that would explain why the name Misore supplanted that of wpt rnpt as the name of month IV ṣmw only in the Late Period (as a matter of fact, not in the Deir el Medina documents, where the rest of the new names, as p n ipt or p n int, are already present). From approximately 645 B.C. to 520 B.C., the winter solstice, perhaps the original meaning of mswt-ṛ, fell in the month IV ṣmw. In 525 B.C., Egypt was conquered by the Persians, for whom the association of the winter solstice with the birth of the sun god Mithra might have been pretty obvious. Finally, in 500 B.C., I ḥḥ 1 and the winter solstice were once more coincident. This might have been the trigger for the definitive association of Misore with month IV ṣmw and of the Feast (of the Birth) of the Sun (ḥb ṛ) with New Year’s Day.

![Solar and Sothic Dates and the Civil Calendar](image)

**Figure 4.14.** Civil dates of the solstices as a function of time and of the heliacal rising of Sirius (prā ṣpāt) as a function of both time and location. Those marked with an asterisk are those reported by ancient sources. The Ebers Sothic “date” is printed in italics. See text for further discussion.

### 4.6. The beginning(s) of the Egyptian year

From any logical point of view, if there was just one calendar in ancient Egypt, there must have been just one beginning of the year. However, the perennial discussion on the existence of other calendars has tried to find “beginnings” for the different proposals. Besides, it is an established fact that, in ancient Egyptian sources, there are mentions of more than one term that might be interpreted as the beginning of the year. In this line of argument, from the feast lists of the Old Kingdom (see Section 4.4) and of the Middle...
Kingdom (see Figures 4.3 and 4.11), we have at least two terms that could be interpreted as the beginning of the year. These would be:

- ![image](image), \textit{wpt rnpt (hb)}, the Opener of the Year (Festival),

and

- ![image](image), \textit{tpy rnpt (hb)}, the First of the Year (Festival).

The second one must not be confused with the also very common term

- ![image](image), \textit{tp rnpt (hb)}, Head, At the Front or Beginning (also First) of the Year (Festival).

Fortunately, this is practically accepted to be an alternative term for the first of the epagomenal days (also known as \textit{mswt-wsir}) that could also be considered to be at the “beginning” of the year. This must be distinguished from:

- ![image](image), \textit{tp tr}, the Beginning of the Season.

Also, to this sample we might add (see Fig. 4.3)

- ![image](image), \textit{rnpt \textasciitilde{t} (hb)}, the Great Year (Festival),

and

- ![image](image), \textit{rnpt ndst (hb)}, the Small Year (Festival),

terms which, as we have seen, are very difficult to interpret. Fortunately, for the End of the Year we found just a single term:

- ![image](image), \textit{rk rnpt (hb)}, the Closing of the Year (Festival),

which is always undoubtedly associated with the last day of the civil year, excluding the 5 \textit{hryw rnpt}, IV \textit{šmw} 30.

The situation, however, is further complicated by the appearance in the Middle Kingdom of the term:

- ![image](image), \textit{prt spdt}, the Going Forth of Sothis (Heliacal Rising of Sirius).

This last term was from the very beginning of Egyptian calendrical studies associated with the term \textit{wpt rnpt} for two reasons especially, based on two documents: the Ebers calendar (remember the Ebers syndrome) and the Tanis version of the Decree of
Canopus. In the hieroglyph section of this extremely important bilingual (tria-
alphabetical) inscription we can read:

\[ \text{On the day of the Going Forth of Sothis, called wpt rnpt in name in the writings of the House of Life.} \]

From this and other lesser documents, such as the astronomical ceiling of the temple of Dendara, Parker proposed the validity of the equation \( wpt\ rnpt =\ prt\ spdt \) since the very beginning of Egyptian history. As a consequence, \( tpy\ rnpt \) was proposed as the first day of the Sirius-based lunar calendar, a hypothesis that had not been seriously contested so far.

However, this is not the case for the equation \( wpt\ rnpt =\ prt\ spdt \), which has been severely challenged, as the vast majority of the documents from the Old Kingdom (Abusir Archive, studied by Posener-Krieger), passing through the Middle Kingdom (Ilahun Archive, studied by Luft) to the New Kingdom (e.g. the Buto Stela) and beyond clearly demonstrate that \( wpt\ rnpt \) was from the invention of the civil calendar the name of the feast associated with the first day of the civil year 1 \( \tilde{3}t \). What shall we do then with the clear statement of the Canopus Decree? Spalinger has argued that the most reliable version of the decree is the one written in Greek, and that the Demotic and hieroglyphic version are mere translations of the former.

The Greek version states: on the day of which the star of Isis heliacally rises which is regarded in the sacred writings to be a new year; which gives in the Demotic version the term \( h3t\ rnpt \), the “beginning” of the year, not the “opener”. So what the Decree clearly says, as Spalinger has pointed out, is that \( prt\ spdt \) is associated with the beginning of a new era and not necessarily with the precise date of \( wpt\ rnpt \). However, it is obvious that Sothis was somehow associated with the beginning of the year, and that a certain sort of year begins with its rising (see also Section 4.7), as several later-period texts demonstrate. For instance, one example from Dendara explains that:

\[ \text{years are reckoned from her shining-forth.} \]

The special relation between Sothis and \( wpt\ rnpt \) might have been generated in the New Kingdom, when the star actually had its heliacal rising during the month \( wpt\ rnpt \) (IV \( \hat{s}m\)) and, depending on the latitude, exactly at 1 \( \tilde{3}t \) in the decades around the beginning of Ramses II reign, as the famous inscription in the Ramesseum apparently demonstrates (see Figure 4.15):

\[ \text{May him let you shine as Sothis on the sky in the morning of the Opening of the Year.} \]

However, it is important to notice that we lack evidence of any other earlier connection between Sothis and \( wpt\ rnpt \). Anyway, it is clear that Sirius was in some way or other related to the calendar even in the Old Kingdom, since in the utterance 96S of the Pyramid Texts, as published by Faulkner, we can read:
It is Sothis, your daughter, your beloved, who has made your year-offerings in this her name of Year. The direct calendrical meaning is not obvious, but the assimilation of Sothis with the goddess Renpet, companion of the god Min and one of the goddesses in charge of counting the years (together with Seshat) might have interesting implications for such an early period.

The basic problem is that the term prt spdt is not mentioned until the Middle Kingdom, when it frequently appears in festival lists and is mentioned twice in the Illahun Archive (the famous and controversial Sothic date of IV prt 16, see below). Does this mean that the heliacal rising of Sirius was not observed (or was of lesser importance) in previous periods of Egyptian history, including the Old Kingdom?

Figure 4.15. “May he let you shine like Isis-Sothis in the sky in the morning of New Year’s Eve (wpt ra pt)”. This beautiful text is inscribed in the astronomical ceiling of the Ramesseum in Thebes. This should actually have happened in Thebes in the years around 1285 B.C., during the reign of Ramses II’s father, Seti I, due to the wandering nature of the Egyptian calendar. Photograph by J. A. Belmone.

However, as we have seen, Krauss has gone even further and has suggested that knowledge of the progressive delay of the heliacal rising of Sirius had been a planned part of the firm establishment of the civil calendar of 365 days since its very beginning. Also, Nolan has recently published a very interesting study where he unmistakably demonstrates that the “cattle count” was not at all regular during the Old Kingdom and the number of “years after” the count should be dramatically reduced to one third. This must have strong implications for the chronology of the age of the pyramids, still not fully understood and even less applied by modern studies.
In that paper, he has also suggested that “cattle counts” were made on a semi-regular basis in agreement with Parker’s lunisolar calendar, heralded by \( \text{prt spdt} \). However, an in-depth analysis of his own data demonstrates that this possibility is unrealistic and aprioristic (there is a data selection effect). So the reality of the observation of the heliacal rising of Sirius before the Middle Kingdom is highly controversial and, from my point of view, scarcely proven.

To save the situation, Spalinger, after disqualifying Parker’s equation (i.e. \( \text{wpt rnpt = prt spdt} \)), has re-enacted a proposal made in the 1950s by the Hungarian scholar V. Wessetzkzy, according to which the Old Kingdom term for \( \text{prt spdt} \) was none other than \( \text{tpy rnpt} \), so conspicuous in festival lists and located, in the standard arrangement, after \( \text{wpt rnpt} \) and \( \text{dhwytyt} \). In our discussion of these lists (see Fig. 4.12), we had associated \( \text{tpy rnpt} \) with month II \( \text{3ht} \) and the transition to III \( \text{3ht} \) (with \( \text{wgy} \) associated with the following month). Effectively, as shown in Fig. 4.14, \( \text{prt spdt} \) would have taken place in III \( \text{3ht} \) 1 in the decades around 2500 B.C., in the middle of the Fourth Dynasty (according to most accepted chronologies) and at the precise moment when the festival lists started to appear in the private necropolises at Giza and Saqqara. Another fact has been claimed to support this hypothesis: that \( \text{tpy rnpt} \) is sometimes present in typical Middle Kingdom festival lists (where \( \text{prt spdt} \) is not explicitly mentioned) just after \( \text{rkh} \). Considering that at the beginning of the Middle Kingdom, \( \text{prt spdt} \) took place, in the decades around 3030 B.C., at III \( \text{prt} \) 1, the classical date of \( \text{rkh} \), it would have occurred after that date during most of the Middle Kingdom, exactly as the feast lists suggest.

However, unfortunately, a doubt could arise from Middle Kingdom data as well. In a statue of a certain Amenemhet, found at Abydos and dated during the reign of Senuseret I or Amenemhat II, the following list of festivals is reported:

\[
\text{3bd / smdt tp / w3gy / dhwytyt / hb wr / hb skr / prt mn / prt spdt / tpy rnpt / wpt rnpt / hb r}^c \text{ nb}
\]

Although the order does not seem fully chronological (the location of \( \text{w3gy} \) before \( \text{dhwytyt} \) is an innovation of the end of the Old Kingdom, when the civil-based \( \text{w3gy} \) was settled in I \( \text{3ht} \) 18 just before \( \text{dhwytyt} \) in I \( \text{3ht} \) 19), there is one important objection: \( \text{prt spdt} \) is mentioned near both \( \text{tpy rnpt} \) and \( \text{wpt rnpt} \). So, unless we accept the correction that \( \text{tp rnpt} \) (standing for the first of the epagomenal days, see above) should have been written instead of \( \text{tpy rnpt} \), we would be facing a serious challenge to the hypothesis proposed above.

Consequently, the equation \( \text{prt spdt = tpy rnpt} \) is not as obvious as we would have liked and we might therefore need to search for an alternative explanation for the term \( \text{tpy rnpt} \) as the beginning of something. My answer is that this alternative can be found in the Nile year that we have widely discussed throughout the paper. Once the civil calendar was inaugurated, the Nile year probably ceased to be operative. However, the arrival of the rising waters must still have been a primordial event, even within the frame of the wandering civil calendar, as the archaeological proofs found at the temple of Satet in Elephantine and others certainly suggest. Since a feast is unlikely to be celebrated unexpectedly, when the arrival of the waters were detected at the Nilometers, it is possible that the celebration of the flood would have been moved to either \( \text{psdntyw} \), \( \text{3bd, smdt} \) or any other important day of the following lunation, which, in fact, would have been the first (\( \text{tpy} \)) event of that class in the new Nile year (which might also be called \( \text{rnpt} \)). Of course, this does not mean that a whole set of lunar months would have been counted after that event, although there might perhaps have been some special
lunar computus with a set of lunar festivals whose dates could have been estimated from that point onwards.

In the same sense, there is yet another important point to discuss: if \textit{prt spdt} (either if it was identical to \textit{ipry rmpt} in the Old Kingdom or not) could be considered as the beginning of some of these periods of time, either a certain set of lunations (not properly a year) or a set of lunar festivals, as has been frequently claimed. We will deal once more with this particular point, regarding either \textit{prt spdt} or a first lunar event after the arrival of the flood, in Section 4.7.

One particular problem of these two “beginnings” is that both have a markedly local character. The inundation would arrive, on average, twelve days earlier at Elephantine than at Buto in the Delta, and, in a similar fashion, the heliacal rising of Sirius would have been observable, under good atmospheric conditions, 8½ (c. 2800 B.C.) to 6½ (c. 200 A.D.) days before at Elephantine (latitude 24°) than at Buto (latitude 31°). This means that any lunar event calculated from those “beginnings” could have a difference of a whole lunar month from Elephantine to some important city further to the north. This will be relevant for the argument in the following section.

To finish this discussion on the “beginnings” of the year, we should proceed with a brief discussion on the festivals known as \textit{rmpt} \textit{vt ht hb} and \textit{rmpt ndst hb} that can be found in a few feast lists of the Middle Kingdom (see Fig. 4.3). I can hardly imagine another festival, with a different name, celebrated either on the first day of the civil calendar \textit{(wypt rmpt)}, on its last days \textit{(yrk rmpt)} or on any of the epagomenal days \textit{(5 hryw rmpt)} since all of them are already present in the list, as shown in the same figure. Thus, for me, Spalinger’s idea that these terms might represent a festival associated with the “great” year of 365 days and another one with the “small” year of 360 is difficult to maintain. Should we go back then to a lunar interpretation? We have seen that this was Neugebauer’s idea in connection with Papyrus Carlsberg 9. Also, in a Demotic papyrus edited by Parker, a mention of “small” and “great” years is associated with the key word \textit{wrš}, which could be translated as a lunation period of service (not necessary a lunar month). So it is probable that the Festivals of the Great and of the Small Year might have been celebrated at some particular lunar events. However, with the current data it is impossible to take these conclusions any further.

4.7. The lunar festivals and the lunar computus

It is clear that the ancient Egyptians were especially keen on the phases of the moon and that several of their major festivals were celebrated at key moments in the lunar cycle, either for every lunation within the civil calendar or in some important ones. However, it is also quite clear that these lunar feasts were always expressed within the framework of the civil calendar, and that there are no proofs that these lunar festivals were ever articulated in the form of a calendar once the civil one was in operation. This is illustrated by the fact that, in the feast lists of the tomb of Khnumhotep II (see Fig. 4.3), there is a mention of 12 \textit{3bd} and 12 \textit{smdt}, despite the fact that in some years, there could have been an extra \textit{3bd} or \textit{smdt} either in one of the \textit{hryw rmpt} or as an additional one in a civil “blue” month. Apparently, these extra lunar events were not taken into account. Spalinger has gone one step further in proposing that the 12 \textit{3bd} and the 12 \textit{smdt} of the lists might actually refer to days 2 and 15 of the 12 civil months. However, I do not find this hypothesis reasonable, given that there are several occasions when a clear lunar event is reported with an independent civil date, such as the famous occasion
of a psḏntyw (whether predicted or observed, nobody knows) at the battle of Megiddo, which is reported to be exactly at day I šmwt 11 in the 23rd year of Thutmose III:

\[ \text{[Hieroglyphic text]} \]

and where psḏntyw corresponds to the day of new moon or conjunction, the first day of the Egyptian lunation (synodic month) according to most authors. This feast day is already mentioned in the Pyramid Texts where, however, it is written without the preposition n: ḫmꜥ.

Other common lunar days since the Old Kingdom onwards were ḫ ḫ, or simply ḫ, ẖbd (First Crescent), for the 2nd day, or ḫ ṭ, smdt (Full Moon, read also md-dl-nt, according to Luft), for the “15th” day of the cycle (also reported as ḫ ṭ). In the Middle Kingdom, also snw, the 6th day, is found. From the early New Kingdom, a standard list including of the order of half a dozen of these festivals is often reported (see, for example, Figure 4.16).

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**Figure 4.16.** The stele of Ahmosis and Teti Sheri (Cairo CG34002). This impressive monument includes a comprehensive list of lunar festivals in the fourth and fifth rows of the texts (marked grey). These included psḏntyw, ḫbd, prt sm, iht ḫ ḫ, smdt and snw, the traditional 1st, 2nd, 4th, 5th, 15th and 6th lunar days, respectively. This list is typical of the New Kingdom onwards. Adapted from Manley (2002).
However, in the sources of the Graeco-Roman period, such as the astronomical frieze of the temple of Edfu, we can find a whole set of days of the month, which we can take from the eclectic list reported by Parker in his “Calendars”, with minor modifications:

1. psdntyw  
2. śbd  
3. mspr  
4. prt sm  
5. iht hr hśwt  
6. snwt  
7. dntīt  
8. tp  
9. kšp  
10. sīf  
11. sīt  
12. mšš sty  
13. sīšw  
14. smdt  
15. mspr sn-nw  
16. īfh  
17. sdm mdw=f  
18. stp  
19. ṣprw  
20. ph spdt  
21. dntīt  
22. knhw  
23. stt  
24. prt  
25. wsīb  
26. šb-sd nwt  
27. šh śšw  
28. ṣpr mn  
29. ṣpr mn

Given that the list offers 30 days, and that it is located within a civil calendar context, it has been argued that these are actually the proper names of the thirty days of the month of the civil calendar. In fact, many of them have never been reported, either in a lunar or in a civil context and some others, as day 18<sup>th</sup>, īfh (“moon”) has only ever been found in a civil context, representing day 18 of a certain civil month.

It is not easy to deny this hypothesis. However, it is quite clear that several of these names (for days 1, 2, 4, 5, 6, 7, 10, 15, 16, 27, 29 and 30) have been reported in a quite obviously lunar context, and thus it is highly probable that the whole set would have been developed to offer suitable names for each day of a lunation. This might have been especially important since it would have not been clear exactly when the lunation commenced.

Since Parker’s “Calendars”, it has usually been accepted that the Egyptian lunation started at psdntyw, on the day following that in which the last crescent of the moon could be seen at dawn. Frequently, an illustrative text at the Ptolemaic propylon of the temple of Khonsu at Karnak is advocated, supporting this idea:

He (Khonsu) is conceived (bšš) on psdntyw, he is born in śbd, he grows old after smdt.

However, there are scarce mentions of psdntyw in the Old Kingdom (while śbd and smdt are very frequent). The same can be said for the Middle Kingdom. For example, in the Illahun Archives, psdntyw is mentioned three times, while śbd and smdt have more than 15 entries each. Most importantly, calculating the interval between various śbd and their corresponding smdt, it has been demonstrated that it is frequent that there are not 12 full days between one and the other (as would be expected if they were always days 2 and 15 of the lunation), but sometimes there are instead 11 or 13, indicating that we might be faced with a real (and not a calculated) lunation, starting at the evening
visibility of the first crescent, which then grows until full moon. This idea might be
reinforced by the following text, also of Middle Kingdom provenance:

*I know, O souls of Hermopolis, what is small on 3bd and what is great on smdt, it is
Thoth.*

Of course, this fact also speaks against an explicitly expressed lunar month (at least in
the Middle Kingdom) and thus against any possible well-structured lunar calendar.

In fact, however, the most important day of each Egyptian lunation was probably day
29. This day was called *ḫwś šḥw*, which might be translated as the “Standing Guardian”,
with the most probable significance that somebody (probably an *imy wnwt* or “hour-
priest”) was observing at the end of the night on that day (it should be remembered that,
according to Krauss and other scholars, the Egyptian day started at dawn, at the moment
of *ḥd-šḥ*), trying to see the last crescent of the moon. If it was clearly visible, then the
next day would still be day 30 of the current lunation, but if, on the contrary, the last
crescent was not visible, then the next day would be *psḏntyw* of the following lunation.
Further more, that day 29 was a prominent day could also be inferred from the list of
Feasts of Heaven in the Festival Calendar of the funerary temple of Ramses III at
Medinet Habu, where lunar days 29, 30, 1, 2, 4, 6, 10 and 15 are mentioned and exactly
in that order.

Nevertheless, it is highly probable that, at least from the New Kingdom onwards, the
ancient Egyptians considered that their lunations started by conjunction, *psḏntyw*, called
“neomenia kata selene” (new-moon according to the moon) in line 125 of Papyrus
Carlsberg 9.

Apart from the lunar day dates, there are frequent references in Egyptian documents
and monumental inscriptions that refer to important festivals associated with a particular
day of the moon. Frequently, this particular day of the moon (normally a *psḏntyw*) was
at the same time associated with a certain month of the civil calendar. This is obvious
for most of the “lunar” feast of the New Kingdom (Opet, the Procession of Min or
various Amun festivals), as clearly stated in the Medinet Habu calendar. However,
several doubts arise when the documentation on the Old and Middle Kingdoms or of the
Beautiful Feast of the Valley in the New Kingdom is considered. However, the
discussion of the Feast of the Valley is overtly controversial since the information
reported is often contradictory in nature and would need an essay in itself. We will thus
concentrate our discussion to the earlier periods.

In the Ilahun Archive, apart from the two mentions of *prt spdt* in day IV *prt* 16 (or
17) in the year 7 of Senuseret III (which we will discuss further in Section 4.8), there are
several mentions of some other feasts that has been classified as “lunar” by Luft in his
analysis of the data. The most important ones are the Proceeding of the Land (*hnt nt tš*),
Jubilation (*ihhti*), the Measurement of the Cord of the Nile-mile (*ššpt irtw*) and that of
Wagi (*wgy*).

There are more than seven entries for the feast of the Proceeding of the Land and,
when dates are reported, it was always celebrated between III *prt* 1 and III *prt* 17. This
means that it was very probably located at *psḏntyw* of the civil month III *prt* and was
thus probably expressed within the framework of the civil calendar. Regarding *ihhti*,
there were apparently two feasts of the same name but the most common and most
important was always celebrated on I *ḥḥt* and probably at the first *psḏntyw* of the civil
year. Finally, we have 6 dates for the feast of šspt itrw. This has normally been associated with prt spdš, on the basis of the argument that it might have been established with the latter as a reference point. However, the extant data show that the feast was celebrated between III 3ḥt 25 and IV 3ḥt 14, so we might then relate it to a feast celebrated at the smdšt (other important lunar day) of the lunation started in III 3ḥt, which would always fall exactly between III 3ḥt 15 and IV 3ḥt 14. Consequently, these three feasts were apparently well articulated within the framework of the civil year, in the same fashion as Easter is articulated within the Gregorian calendar. Hence, there is no need to claim any sort of lunar calendar to explain their behaviour.

The situation of the important “beautiful feast of wšgy” is further complicated. Unlike the others, which never had a fixed civil-based twin, there are news of a fixed wšgy feast in I 3ḥt 18, with its corresponding Eve on day 17, at least from the Middle Kingdom onwards. This situation originated probably during the last years of the Old Kingdom (6th Dynasty), when a new order is imposed on the festival lists, with wšgy before dḥwtyt. However, there was its moveable counterpart whose first mention must be the oldest feast list of the 4th Dynasty and which lasted at least until the end of the Middle Kingdom.

The wšgy feast was probably an important festival associated with wine, as shown by Merenre’s Pyramid Texts (utterance 442). As a consequence, it has been suggested that it may have been a vintage feast, associated with the cult of Osiris (and its celestial counterpart, sḥš). Curiously, when the other wšgy was fixed within the civil calendar, it was located close to thš (Drunkenness) and dḥwtyt (Thoth), both festivals clearly associated with wine and inebriation. Another connection between wšgy and the vintage might come from the Papyrus Berlin 10007 (recto), where an entrance of the moveable wšgy (in II šmwt 10+X), is followed two months later (in IV šmwt 1) by the performance of ḫtp nṯrḥḥ ḫḥ pt ḫr, where perhaps the “first divine offerings of wine” of the new vintage (after nearly two months of maceration) would be mentioned.

Unlike the custom in other Mediterranean countries, where it is normally in September, the vintage starts much earlier in Egypt because of the special climatic regime of the country, so that the grape harvest normally lasts from mid-July to mid-September. This means that a feast celebrating the vintage could be performed at any point within that period of time. In 2620 B.C., nearly at the beginning of the 4th Dynasty (more or less the moment when the first festival lists were recorded), mid-July Gregorian would have correspond to III 3ḥt 1 in the civil calendar and mid-September to the beginning of I prt. In Section 4.3 (see Fig. 4.12), we had provisionally assigned wšgy to month III 3ḥt.

In the archive of Abusir, there is a wšgy feast reported (besides the fixed one) at a date III ? 28, where ? could stand for either 3ḥt or prt. If it were III 3ḥt 28, it would correspond to mid-July around 2500 B.C. and thus we might be faced with a feast associated with the beginning of the grape harvest, before the maximum rising of the Nile flooding. If, on the contrary, it were III prt 28, we would need to move more than 250 years in Egyptian history (c. 2250 B.C., at the end of the Old Kingdom) for it to be located in mid-September and, consequently, we might be dealing with a feast at the end of the vintage, when the river was already very high. A date nearer to this second possibility sounds more promising because a feast would be better celebrated at the end of an agricultural event and, especially, because a date a little earlier of 2250 B.C. is much more probable than 2500 B.C. for the dating of the Abusir archive. How was the date of the feast calculated?
In the case of the Illahun archive, we clearly have two cases of the moveable \( w\text{y}_g \) feast in days II \( \text{saw} \) 29 of the 9\(^{th}\) year of a king and in II \( \text{saw} \) 17 of the 18\(^{th}\) year of yet another king. The kings are probably Senusret III and Amenemhat III. These dates have been assigned by Krauss and Luft to lunar day 17 (or 18) of the second full “lunar month” after the heliacal rising of Sirius (occurring in IV \( p\text{r} \)), considering that \( p\text{r} \text{ spdt} \) might have acted as a sort of zero point for the determination of at least this lunar event. Curiously, when the same experiment is proposed by Luft for the Abusir archive, the first full “lunar month” after \( p\text{r} \text{ spdt} \) is the one which is claimed. Besides, in the Old Kingdom, when the fixed \( w\text{y}_g \) was located within the civil calendar, days 17 and 18 of the first month of the year, \( \text{th} \), and not of the second, were chosen accordingly. At the present moment, I cannot offer an easy solution for this apparent dichotomy. I even doubt that \( p\text{r} \text{ spdt} \), which is never reported at this early period, was the harbinger of \( w\text{y}_g \) in the Old Kingdom, but rather \( t\text{p} \text{y} \text{ rnp} \). We have seen that this festival could be either the older name of \( p\text{r} \text{ spdt} \) or the name of the first lunation after the arrival of the flooding.

In any case, from my point of view, even if the determination of the date of the moveable \( w\text{y}_g \) feast through a Sirius-heralded lunar computus were finally demonstrated (associated with either the first or the second lunation after the heliacal rising), it would not enable as firm an affirmation to be made as that stressed by Depuydt in his review paper on the “Sothic Chronology of the Old Kingdom”, namely that \textit{the link of certain lunar dates (such as \( w\text{y}_g \)) to \( p\text{r} \text{ spdt} \), whatever it was, suffices to claim the existence of an original lunar calendar}, in the same sense as in the Gregorian calendar, the link of Easter with the full moon after the vernal equinox does not open the gate to the definition of a equinox-heralded lunar calendar.

However, although I have doubts about the use of \( p\text{r} \text{ spdt} \) to articulate a complete series of lunations (i.e. of lunar months within a Sirius-based lunar calendar) during most of the period of existence of ancient Egyptian civilization, there is indeed some striking evidence that it may have been the beginning of something, at least in the Ptolemaic period, when, as we have mentioned, many inscriptions related Sothis to the “beginning” of the “year”. This evidence, although scarce, would point to the possibility that in the Ptolemaic period \( p\text{r} \text{ spdt} \) was considered as the beginning (or herald) of a certain cycle of lunar festivals just as the spring equinox is the herald of Easter and other Christian feasts determined by the moon.

We hope in any case to have shown that, throughout most of Egyptian history, the vast majority of the lunar feasts within the Egyptian year (with the possible exception of the moveable \( w\text{y}_g \) and some doubts concerning \( h\text{b} \text{ int} \), the Feast of the Valley) were clearly expressed within the framework of the civil calendar, and that they were heralded by civil dates. Consequently, it is my contention that there is no need to claim for any sort of articulated lunar calendar (even in the case of \( w\text{y}_g \)) to explain the \textit{modus operandi} of the lunar festivals in the calendrics of ancient Egypt.

\textbf{4.8. Egyptian chronology, lunar dates and the Going Forth of Sopdet}

It is not the intention of this chapter to undertake a complete review of the role played by astronomical calculations in the determination of the chronology of ancient Egypt. Besides, this volume includes an additional essay (Chapter 5) dedicated to this topic. However, we have used a working hypothesis here which it is highly relevant to the issue. If the calendar in the Ebers medical papyrus had never been discovered, we would not have a Sothic date to fix the chronology of the beginning of the New
Kingdom. Can this “problem” be solved? The answer is probably yes. To do this, I shall rely basically on the work recently developed by Krauss on the lunar dates of the New Kingdom and of the Illahun archive.

Lunar dates have been considered problematic by the astronomer Bradley Schaefer, who has established that at least 15% of any lunar visibility (or invisibility) observation would be wrong simply by human (not atmospheric) failure. In a recent paper, he concludes that the current large uncertainties in predicting lunar visibility and in ancient Egyptian (astronomical) procedures do not allow for any possible astronomical solution of Egyptian absolute chronology with lunar dates. However, Krauss has shown, correctly from my point of view, that this contention is overly pessimistic.

Krauss’s main argument is that the date of a certain lunar phase (for instance last crescent visibility) depends not only on the synodic month, but also on the anomalistic and draconitic months which have different lengths and thus do not exactly repeat in cycles of 25 civil years. Consequently, the interplay of these and other factors makes the behaviour of the moon, every 25 year period, quite different from one period to those adjacent, resulting in a quite complicated pattern if Egyptian lunar dates are shifted in 25 year intervals (besides of the cumulative 1 hour shift in 25 years). A basic trait of the pattern shows that only about 70% of a set of lunar dates repeat in case of a 25 Egyptian year shift. However, because 150 years comprise an approximately common period of the synodic, anomalistic and draconitic months, more dates repeat at this interval, but with a cumulative relative error of a quarter of a day, which still leads to detectable differences in the patterns. It then follows from these facts that a large set of lunar dates ought to yield only one correct solution, i.e. a solution where at least 85% of the recorded dates are astronomically correct.

For the time of the New Kingdom, the solution is apparently quite simple. As Krauss argues, the time of Ramses II is fixed without any Sothic dates. There are synchronisms between Egypt, Assyria, Babylonia and Hatti. It is a fact that Ramses II was a contemporary of certain Babylonian and Hittite rulers, who were in turn contemporary with certain Assyrian rulers. The uncertainty of Assyrian chronology in the 13th and 14th centuries B.C. amounts to 10 years only and, in consequence, year 1 of Ramses II lies at 1290 B.C. plus or minus 30 years. Within this interval the lunar date from year 52 of Ramses II allows only the following possible solutions: year 1 should be either 1304 B.C., or 1290 B.C., or 1279 B.C. If one takes into consideration the Festival-of-the-Valley dates from year 7 of Tewosre and year 7 of Ramses III, which are lunar dates, it follows that only 1279 B.C. is compatible with these and other lunar dates. After that, lunar dates (like Megiddo’s) and the Elephantine Sothic date (see below and Figure 4.17) of the reign of Thutmose III can be used to fix year 1 of this king in 1479 B.C. (see Chapter 5 for more details).

According to several scholars (and the present experiment), the Sothic date of the Ebers papyrus cannot be used to bridge the gap between the 12th and the 18th Dynasties. As we will see below, the parameters of the Sothic date from Illahun are also problematic. Consequently, Krauss has only relied on the 21 lunar dates from the Illahun archive, which has been published by Luft. They span an interval of 42 years between year 9 of Senusreter III and year 32 of Amenemhat III. In his analysis, each 25 year period, from 2300 B.C. to 1300 B.C. (and some extra periods before and after), has been tested. As clearly shown in Figure 4.18 (see also the relevant discussion in Chapter 5), there is only one possibility that satisfies the condition that at least 85% of the recorded dates could be astronomically correct (there might be another, slightly above 80%, some 150 years later but this is too late, even with the shortest possible chronology). The
conclusive result of the analysis is that the first year of Senuseret III straddles 1837 and 1836 B.C.\footnote{Note added in proof: This has been recently challenged by Ch. Bennet in a most interesting paper dealing with lunar dates of the Ptolemaic and Roman periods. However, in the author’s opinion, his conclusions are overtly pessimistic.}

How does this solution fit into the Sothic chronology? Apparently not very well. Using the well known Sothic date of the Illahun archive, and apparently also some lunar dates, Luft had recently fixed that IV  prt 17 of year 7 of Senuseret III would have been the 17\textsuperscript{th} of July of 1866 B.C. This would locate the 19 year reign of Senuseret III from 1872 to 1854 B.C. Indeed, in his handbook of Egyptian chronology, von Beckerah has thrown the weight of his authority behind this date and declared it to be \textit{the earliest absolute date of Egyptian History}. Obviously, we apparently face a problem.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure417}
\caption{A fragment of a list of offering and festivals from the temple of Khnum in Elephantine (the original in now in the Louvre Museum). It includes the earliest uncontrovertial New Kingdom date of the heliacal rising of Sirius (\textit{prt spdt}) in III \textit{šmw} 28 of an unknown year of a king who is almost certainly Thutmose III. Photograph by J. A. Belmonte.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure418}
\caption{Histogram of 21 lunar dates from the archives of Illahun, from year 9 of Senuseret III to year 32 of Amenemhet III (12\textsuperscript{th} Dynasty), matching the actual behaviour of the moon as a function of time, in intervals of 25 civil years from 2311 to 1386 B.C. The only possibility above the 85\% line of good hits (theoretically, the maximum one associated with human eye and brain capacity) might set year 1 of Senuseret III in 1837/36 B.C., independently of Sothic chronology. Solid lines indicate the percentage of those cases in which old crescent visibility would have been observable without reasonable doubt and dashed lines those cases in which the calculated height of the crescent would have been within the zone of uncertain visibility. From Belmonte (2003). An updated version can be seen in Figure 5.2.}
\end{figure}
Currently, we have a large set of “Sothic dates” (mentions of \textit{prt spdt} in a civil calendar context), although only some of them would be useful for chronological purposes. It could be interesting to make a summary of them, in a rough chronological order:

1. The two mentions of \textit{prt spdt} at the Illahun archive (see below), dated in the reign of Senuseret III.
2. The 1592 B.C. actual observation of the heliacal rising at Djebel Tjauti, near Thebes, in II $\dot{\text{smw}}$ 20 of year 11 of an unknown king, recently reported by the Darnells.
3. The disputed mention of \textit{prt spdt} in the controversial calendar of the Ebers medical papyrus.
4. A block at the Open Air Museum in Karnak, presumably dated to the reign of Amenhotep I. Apparently, \textit{prt spdt} is located between two feasts celebrated in I \textit{prt} 3 and I \textit{prt} 20.
5. A second block, related to the previous but not so easily dated, where \textit{prt spdt} is located between IV \textit{prt} 1 and an unknown day of I $\dot{\text{smw}}$ (see Figure 4.19).
6. The \textit{prt spdt} entrance on the Buto Stele, undoubtedly made in the reign of Thutmose III. The day of crossing of Sothis is placed between two feasts celebrated in I $\dot{\text{smw}}$ 4 and I $\dot{\text{smw}}$ 30.
7. The 1432 B.C. heliacal rising of Sirius at Elephantine, in III $\dot{\text{smw}}$ 28, in an unknown year of a king which is almost certainly Thutmose III. This is from a festival calendar of the temple of Khnum at Elephantine (see Fig. 4.17).
8. The Cosmology of Nut at the Osireion in Abydos, built in the reign of Seti I. The heliacal rising of Sirius can be dated in IV \textit{prt} 16.
9. The Ramessean astronomical ceiling where \textit{prt spdt} is not explicitly mentioned but the simultaneity of this with \textit{wpt runct} can be implicitly understand (see Fig. 4.15).
10. The festival calendar of Ramses III at Medinet Habu. According to this calendar, \textit{prt spdt} occurred in I $\dot{\text{hft}}$ in this period.
11. The Canopus Decree, where there is an attempt to fix \textit{prt spdt} in II $\dot{\text{smw}}$ 1 (First of Payni), as occurred in 238/237 B.C., probably in Memphis.
12. The date of instauration of the Alexandrian Calendar. It indicates that in 25 B.C., \textit{prt spdt} took place in III $\dot{\text{smw}}$ 25.
13. The accredited and famous report of the Roman scholar Censorinus in his \textit{De Die Natali Liber} (XXI, 10). The heliacal rising of Sirius and the First of Thoth (I $\dot{\text{hft}}$ 1) coincided in 139 A.D., probably in Alexandria. This is the pivotal date for the Sothic approach to Egyptian chronology as the end of a Sothic cycle of, theoretically, 1461 wandering civil years.

Of these, only the last ones are completely reliable but are from a period when Sothic dating is not needed. In contrast, none of the dates in the period when the chronology is not fixed by independent sources is completely reliable (i.e. before Thutmose III). As we have seen before, the case is especially dramatic for what has been considered to be the most important of all Sothic dates in Egyptian historiography, since the discovery of the Illahun archives more than a century ago.

The problem is that the information actually compiled at the archive is controversial in nature. On the one hand, in a letter dated in III \textit{prt} 25 of the 7\textsuperscript{th} year of Senuseret III,
the Prince of the Overseers of the temple, Nebkaure, informs the chief lector priest Pepyhotep, that the heliacal rising of Sirius will occur in that year in IV prêt 16 (i.e. he is making a prediction). But on the other hand in another section of the same document of the archive, the offerings for the feast of the heliacal rising of Sirius (ḥbyt nt prêt spdt) are brought to the temple in IV prêt 17.

**Figure 4.19.** (left) A fragment of a calendar of festivals in an out-of-context block in the Open Air Museum in Karnak. Found inside one of the temple pylons, it has been tentatively ascribed to the reign of Amenhotep I. However, the list includes a rare and controversial mention of prêt spdt (4th preserved line) between IV prêt 1 and an undetermined day of 1 šmw (perhaps 1); too early a date for the heliacal rising or Sirius in the reign of this king. See the text for further discussion. Photograph by J. A. Belmonte.

**Figure 4.20.** (right) Map of Egypt showing the dates of the heliacal rising of Sirius (Egyptian prêt spdt) in July for different geographical locations in the country, in the 4th month of prêt of the 7th regnal year of Senuseret III (1830 B.C. according to Krauss). At that stage, the southern limit of the country was fixed at Buhens, where the rising ( prêt spdt) occurred 10 days earlier than in Buto, the sacred city on the Delta.

Normally, the offerings for a feast arrived at the temple one, or even two, days before the proper day of the festival. So, if the offerings arrived in IV prêt 17, prêt spdt must have been scheduled in IV prêt 18 or 19 (or even later). Consequently, Luft and Krauss have argued for a correction of the original date, where a scribal error would have written 16 where actually 18 (or 19, both entries are possible) should have been written. After this correction, Luft obtained his date of 1866 B.C. for the heliacal rising and the 7th year of Senuseret III, mentioned before, which is in open contradiction with Krauss’s estimation from lunar dates of 1830 B.C. as the date of Senuseret III’s year 7. To solve this problem, Krauss has proposed that the date of the feast of the heliacal rising of Sirius was not actually observed locally but rather predicted, within a framework of a permanent four civil year cycle, and calculated for the southern frontier of the country, i.e. Elephantine. According to his proposal, the actual heliacal rising of Sirius would have taken place in IV ḥḥt 18 in Elephantine on July the 9th of 1830 B.C.
This situation is illustrated in Figure 4.20, where the Julian dates of the heliacal rising in 1830 B.C., for different locations within Egypt, are presented. However, with this figure in mind, there would be another striking possibility. During the seventh year of Senusret III, the actual frontier of Egypt was not located at Elephantine but more than two hundred kilometres further to the south, at Buhen. The heliacal rising of Sirius actually would have taken place on IV prt 16 at that locality in 1830 B.C. So, we could play with the idea that, considering the local character of this astronomical event, the date of the rising would have been predicted for the actual day of the rising in the extreme southern limit of the country (Buhen at that moment) and that the actual feast would have been locally celebrated several days later and not necessarily at the exact date of the astronomical event. This might explain why the hbyt mt prt spdt were actually brought to the temple in Illahun in IV prt 17, thereby avoiding the necessity of blaming the scribe, a common practice in Egyptology when the data do not fit the wishes of the investigator.

To discuss other problematic Sothic dates, we now skip forward in time and space from the archives of Illahun of the Middle Kingdom to the ancient city of Buto, in the marshes of the western Delta. Buto was a very old city already existing in pre-dynastic times and was well known as the city of the cobra goddess Wadjet. The archaeological site is dominated by two huge mounds, remains of the ancient quarters of Pe and Dep. Between the two, the rests of the temple of Wadjet has been discovered but the excavation has only reached the foundations of New Kingdom buildings and most of the stone work dates from the Late Period. Indeed, one of the most interesting discoveries on site is the so-called Stela of Buto, dating from the reign of Thutmose III (c. 1479-1425 B.C.). This man-sized slab contains a royal decree regarding the restoration of the temple under Thutmose and the calendar of feasts established accordingly. This calendar is presented in Figure 4.21.

This feast calendar has been the cause of a major controversy because the heliacal rising of Sirius (number 6 of our list) is located between two dates of I šmũ, in apparent contradiction with what one would expect from the widely accepted chronology of the New Kingdom, which would instead situate prt spdt at the end of this calendar season, during the reign of Thutmose III. As a consequence, von Bomhard claimed for a complete revision of the chronology of the beginning of the New Kingdom, while Spalinger, when analysing the calendar of festivals, avoided this slippery point.

However, Krauss has recently argued that if one concludes that the rising of Sothis in the time of Thutmosis III happened in the 1st month of Shemu, because the entry is positioned between two 1st month of Shemu entries, one gets into severe chronological problems. Between year 7 of Sesosiris (or Senusret) III and year one of Thutmosis III at least 302 years are accounted for. 302 years move the rising of Sothis from IV Peret 16 to III Shemu 1, which means that in the time of Thutmosis III, the rising of Sothis took place after III Shemu 1. An equivalent conclusion follows from the Elephantine block (see Fig. 4.17), which gives III Shemu 28 as rising date of Sothis [c. 1432 B.C., in the second half of the reign of Thutmose III]. There is no Egyptological doubt that the block originated in a building of Thutmosis III. Under these circumstances one has to conclude that the position of the Buto date does not mean that the rise of Sothis took place in the 1st month of Shemu in the time of Thutmosis III. The text itself says in any case only that Sothis rises on her calendar day(s). Similar problems are raised by the two Sothic dates which are mentioned on unpublished blocks in Karnak from the time of Amenhotep I. In one case, the line with the entry "rising of Sothis on ..." is positioned between entries which concern the 1st month of Peret. In the other case "rising of Sothis
on her day(s)" comes after an entry in the 4th month of Peret and before an entry in the 1st month of Shemu. The problem, as I see it, is not one of calendars and astronomy, but of organizing the texts of steles and wall inscriptions.

We will try to demonstrate here that these dates are indeed a “problem” of calendars and astronomy, but without the need for any change in the accepted chronology, by the use of Egyptian grammar, archaeoastronomy and a bit of serious speculation.

Figure 4.21. The Festival Calendar of the Stele of Buto (wpt rnap at the first row), dating to the reign of Thutmos III (c. 1450 B.C.). The second line from the bottom contains a reference to the heliacal rising of Sirius (pr.t spd.t) between two feasts celebrated in I šnw 4 and I šnw 30. This has created a profound controversy because pr.t spd.t presumably occurred in III or IV šnw during the reign of Thutmos III. This problem could be solved if the text actually reflected a heliacal rising prediction related to the heliacal setting of Sirius in I šnw at that particular period. See the text for further discussions. Photograph by J. A. Belmonte.

The Egyptian-Spanish Mission of Archaeoastronomy (see Chapter 8) has found that the temple of Wadjet at Buto was orientated towards the western half of the horizon to a declination of $-18\frac{1}{4}^\circ$. Interestingly, during the reign of Thutmose III, who is known to have restored the temple, the declination of Sirius was of the order of $-18\frac{1}{4}^\circ$. Considering that there is certain evidence that Wadjet, among other goddesses, was related to Sothis, at least from the New Kingdom onwards, the Mission has suggested that the temple at Buto would actually have been orientated to the setting of Sirius at the time of Thutmose III. And this is the nub of the question. Could the temple be related to the heliacal setting (not rising) of Sothis on the western horizon during the reign of this king?

The phenomenon of the heliacal setting of stars was known in ancient Egypt by the term šni dwt, “Encircled by the Duat”, at least from the New Kingdom onwards, if not earlier. From Fig. 4.21, we can extract the text associated with pr.t spd.t. This reads as follows:
No date is explicitly mentioned and the sentence contains the particle \( \langle = \rangle \), \( r \), used for a future action or to describe a future job. In contrast, in the mention of \( \text{p} \text{r} \text{t} \ \text{sp} \text{d} \text{t} \) at the festival calendar of the south wall of the Million Year temple of Ramses III at Medinet Habu, we can read:

\[ \text{The Heliacal Rising of Sopdet happens in her day.} \]

On this occasion, the particle used to describe the action is \( \langle = \rangle \), \( m \), typical of the present tense, and a date is explicitly mentioned, First month of the Inundation. Hence, while the sentence at Medinet Habu can be read as \textit{First Month of the Inundation, the Heliacal Rising of Sopdet will occur in her days.} The former is an explicit statement. The latter, however, seems to be a statement of predictive character. Our hypothesis is that the best moment to make the “prediction” that the heliacaal rising of \textit{Sopdet} will occur in the near future would have been at the moment of her heliacal setting nearly seven Egyptian decades before.

As a matter of fact, we have seen above that a heliacal rising of Sirius took place in III \( \text{\textit{smw}} \) 28 in the year 1432 B.C. at Elephantine. From simple astronomical considerations, this means that the heliacal setting of the star at Buto occurred, with one or two days’ margin of error given varying atmospheric conditions, at I \( \text{\textit{smw}} \) 25. Hence, for the entire reign of Thutmoses III, the heliacal setting of \textit{Sopdet} at Buto happened roughly between I \( \text{\textit{smw}} \) 13 and I \( \text{\textit{smw}} \) 27. This is perfectly contained in the interval between I \( \text{\textit{smw}} \) 4 and I \( \text{\textit{smw}} \) 30, as described by the festival list of the Buto Estela. So, we believe that the astronomical event actually emphasized at this singular monumental inscription was the heliacal setting of \textit{Sopdet}.\footnote{Note added in proof: This reasoning would be equally valid if Thutmoses III dates are to be reduced by 11 years.}

Now, it is the turn of the two dates at the isolated, and out of context, blocks of Karnak (numbers 4 and 5 if the list). One of them (see Fig. 4.19) contains a reference to \( \text{p} \text{r} \text{t} \ \text{sp} \text{d} \text{t} \) between two feasts celebrated at IV \( \text{p} \text{r} \text{t} \) (1) and an uncertain date of I \( \text{\textit{smw}} \). It reads as follows:

\[ \text{The Heliacal Rising of Sopdet will happen in her day.} \]

Again, no date is explicitly mentioned and once more the particle \( \langle = \rangle \), \( r \), is used in this short sentence. The second mentions \( \text{p} \text{r} \text{t} \ \text{sp} \text{d} \text{t} \) between I \( \text{p} \text{r} \text{t} \) 3 and I \( \text{p} \text{r} \text{t} \) 20. The inscription is broken at the end but the evidence suggests that it was almost identical to the previous one. As in the case of Buto, the inscription of the two blocks ought to be read as a prediction that the \textit{Heliacal Rising of Sopdet will happen in her day.} Once more, we play with the idea that this prediction could be related to the moment of the heliacal setting of the star.

The astronomical analysis permits us to calculate that the heliacal setting of Sirius in Thebes occurred between I \( \text{p} \text{r} \text{t} \) 3 and 20 for an interval between c. 1976 B.C. and 1908 B.C., with a margin of a couple of years. This interval contains most of the reign of Senuseret I, whichever chronology we consider. Senuseret I was the founder of the temple of Karnak and it would be logical to assume that this festival calendar (as the contemporaneous White Chapel) was prepared for that original temple. Once more, the festival list would include a reference to the interval of the heliacal setting of \textit{Sopdet},
and, by inference, of her heliacal rising seven decades after. The former *prt spdt*
mention, contained in a much wider interval, allows for the dates of the heliacal setting
of Sirius, according to the same astronomical considerations, a longer uncertain
temporal spectrum of not less than 120 years and a maximum of 240, including part of
the reign Amenhotep I. On this occasion we tend to agree with previous assignations of
the blocks and would date the corresponding festival lists to the reign of Amenhotep I.

As a matter of fact, we have tentatively found a reasonable explanation for a serious
challenge to the standard chronology of ancient Egypt by simply performing an
alternative reading of three controversial inscriptions and taking into account that the
setting of Sirius on the horizon, and its heliacal setting, could respectively have been an
important landmark, and time-marker, for ancient Egyptians.

As a matter of fact, lunar and Sothic dates work reasonably well when fixing the
chronology of ancient Egypt as far as the beginning of the Middle Kingdom. For earlier
epochs, as we will see in other chapters of this volume, the discussion remains open.

### 4.9. Conclusions

In the previous sections, we have been able to find, or at least to glimpse, simple
solutions for many endlessly discussed problems of Egyptian calendrics. I am convinced
that we have been successful in our purposes because we have been completely freed
from the Ebers syndrome.

The Ebers Medical Papyrus is, from the palaeographical point of view, a New
Kingdom copy of an earlier document with medical receipts, which had been ascribed
by the Egyptians to the legendary king Athothis of the First Dynasty. In the verso of the
papyrus, another hand later wrote the famous calendar in a hieratical script that has also
been considered typical of the New Kingdom, although this datum would be
controversial. It was discovered somewhere in Thebes in the 1860s, becoming available
to the researchers since 1862. From its discovery, the calendar was a key point in any
discussion on Egyptian calendrics, receiving almost as many interpretations as scholars
who have investigated it.

The structure of the “calendar” can be seen in Figure 4.22, where a facsimile of the
original (in Leipzig University) is presented. From right to left, and from top to bottom,
it consists of:

- A horizontal row (D), where a typical dating formula is encountered (year 9),
  which, surprisingly, does not start at the upper-right corner of the text as would
  have been expected. The reading of part of the name of the king (G) had been the
  subject of controversy in the past. However, most scholars agree to read ḫntr-
  rfr, Djoserkare, the throne name of Amenhotep I, which would place the calendar
  at the beginning of the New Kingdom rather than in the Middle Kingdom.
- A vertical column (A), with the 12 names, as we have demonstrated, of the
  months of the civil calendar but in a strange order, starting with the 12th
  month, *wpr nrtpt*.
- A column (B), with dates in the civil calendar, using seasonal names and starting
  with the month III *šmw* (equivalent to *ipt-hmt=s*). The digit symbol C, following
  the symbol for day (*sw*) is normally read as 9, but it has been suggested that it
  could also be read as *psḏntyw*.
- An entrance (E), where the heliacal rising of Sirius (*prt spdt*) is mentioned in
  apparent association with *wpr nrtpt* and with III *šmw* 9.
- A column of dots (F), just below the heliacal rising entrance.
As can be seen, the structure is really complicated as it relates seasonal and proper names of the months of the civil calendar in a way that is not at all clear and, at the same time, it apparently offers one of those rare jewels for chronologists, a Sothic date. One of the most important problems of the calendar is the complete absence of the epagomenal days, which should have been present between IV šmwt 9 and I ḫt 9. Actually, the second date should have been I ḫt 4, providing the first column is a set of hypothetical feasts controlled by the moon or of lunar months. Of course, once more the solution has been to blame the scribe for an inexcusable fault. As far as I am concerned, of the 14 or so traditional proposals to explain the Ebers calendar, Depuydt’s proposal of days 9 as points of time and not intervals seems to me the most reasonable. In this case, we might then even retain the chronological importance of the Sothic date.

However, the most recent opinion on the Ebers calendar has been that reported by Krauss in his most useful handbook on “Ancient Egyptian Chronology”, co-edited with E. Hornung and D. Warburton. For him it *can be explained as the Sothis-based lunar year of the Ilahun type, adapted to a regnal year in order to make known and commemorate the very rare coincidence of a royal accession day (that of Amenhotep I) with the beginning of an intercalary lunar month in which Peret Sopdet occurred.* In my opinion, if this very complicated argument and the lunar computus of the Ilahun archive, previously discussed are the master proofs of the existence of the Sirius-heralded lunar calendar, the hand of the Ebers syndrome is indeed very large. Significantly, my impression is that there is no satisfactory and simple answer for the question of what the Ebers calendar represents. In conclusion, we will have to agree with Meyer who, even one century ago in his *Ägyptische Chronologie* (published in 1904), seemed to have given up all hope that the enigma of the Ebers calendar might ever be solved.

Therefore, if we forget the Ebers enigma, the operation of Egyptian calendrics can still easily be explained with a unique calendar, the civil one, created in the first half of the third millennium B.C. with a duration of 365 days yielded by detailed solar observations, an internal structure dictated by basic mathematical and astronomical concerns, and a seasonal and monthly structure basically inherited form an older Nile-based lunar calendar. A series of lunar feasts, frequently articulated within the civil calendar or within a lunar computus strongly related to it, were indeed present. As a matter of fact, the *Egyptian calendric system is much simpler than usually maintained.* This is what I have tried to show within the paragraphs of this essay. The reader has now the last word.

![Figure 4.22. Facsimile of the hieratic original of the Calendar in the Ebers Medical Papyrus, defining the different areas that are relevant to any attempt at interpretation: the month name column (A), the civil date column (B), the number nine (9) column (C), the regnal year row (D), the rising of Sirius (E) and the associated dot column (F) and, finally, the problematic signs of the king’s name (G). See the text for further discussion.](image)
4.10. References


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