

DNA, Wine & Eclipses: the Dakhamunzu Affaire

Juan Antonio Belmonte

Instituto de Astrofísica de Canarias
38200 La Laguna, Tenerife, Spain
jba@iac.es

Abstract

In a recent book, Dodson (2009) has presented an updated impression of the Amarna period, in heavy contrast to the ideas lately defended by Krauss (2008) and other authors such as Reeves (2002) or Gabolde (1998; 2005). Dodson uses the recent archaeological and epigraphic sources to offer a state of the art version of this fascinating historical period where he defends Ankhnesenamun as the Dakhamunzu of the Hittite texts (the Egyptian queen who wrote to king Suppiluliuma asking for a husband), and the filiation of Tutankhamun as son of Nefertiti and Akhenaten. Dodson keeps the old chronology situating the ascent to the throne of this latter king c. 1553 BC. However, in the last few years there has been a crucial revolution of various aspects in the understanding of the Amarna period. This revolution includes: new evidence from Hittite sources which make Tutankhamun a contemporary of Mursili II (Miller 2007), a new length for the reign of Horemheb (van Dijk 2008), and the important data yielded by DNA analysis of the Amarna period family (Hawass et al. 2010). All this new information has been gathered together with the astronomical evidence of this period: the hypothetical solar orientation of Akhetaten main temple at the moment of the foundation of the city and a possible eclipse of the Hittite sources. These new data have allowed the implementation of a new theory which offers a completely different picture of the period and a new chronology for the late 18th Dynasty (see also Belmonte 2012).

KEYWORDS: archaeology, archaeoastronomy, chronology, DNA, Amarna period

POVZETEK

Pred kratkim je Dodson (2009) podal najnovejša spoznanja o obdobju Amarne, ki močno odstopajo od idej Kraussa (2008) ter drugih avtorjev, kot so Reeves (2002) in Gabolde (1998; 2005). Dodson je na podlagi najnovejših arheoloških in epigrafskih virov podal novo verzijo tega fascinantnega zgodovinskega obdobja, v kateri zagovarja, da je Ankhnesenamun pravzaprav ista oseba kot Dakhamunzu iz hetitskih tekstov (egiptovska kraljica, ki je pisala kralju Suppiluliumi s prošnjo za moža) in da je Tutankhamun sin Nefertiti in Akhenatena. Ustoličenje slednjega Dodson, v skladu s staro kronologijo, postavlja v čas okoli 1553 pr. n. št. Toda v zadnjih letih je prišlo do revolucionarnih sprememb v razumevanju amarnskega obdobja: gre predvsem za nove hetitske vire, po katerih sta bila Tutankhamun in Mursili II sodobnika (Miller 2007), za drugačno dolžino kraljevanja Horemhe-

ba (van Dijk 2008) ter za pomembne rezultate analize DNK družine amarnskega obdobja (Hawass et al. 2010). Astronomski podatki, ki ta nova dognanja nadgrajujejo, vključujejo hipotetično solarno orientacijo Akhetatenovega glavnega templja v času osnovanja mesta in možni mrk, omenjen v hetitskih virih. Vsa ta nova spoznanja so omogočila postavitev nove teorije, ki podaja povsem drugačno sliko tistega časa ter spremenjeno kronologijo pozne 18. dinastije (glej še Belmonte 2012).

KLUČNE BESEDE: arheologija, arheoastronomija, kronologija, DNK, obdobje Amarne

State of the question

A text inscribed on one of the border steles (the X, but also in the K) reflects the first visit of king Akhenaten to the site of his new city, the 'Horizon of the Disc' or Akhetaten, in order to perform the foundation ceremonies on the 13th day of the 4th month of Peret of his 5th year of reign. Presumably, This moment was also the one chosen to hold on the ceremony of the stretching of the cord that would give rise to the location and orientation of the chief temple of the new city, known today as a the small temple of Aten (Luc Gabolde 2009). The main axis of the temple points to a single element of the landscape, a valley that recalls the hieroglyphic sign for mountain. This topographic reference dominates the geographic environment of the great circus of cliffs where the city was erected. The text suggests that this element is perhaps the 'horizon of the disk' itself, which would be in the origin of the name of the city (see Figure 1).



Figure 1: The axis of the small temple of the god Aten, the solar disk, in Tell el Amarna is oriented to a particular notch on the horizon where the sun rises at the end of February and October, perhaps in representation of the ancient name of the city: Akhetaten, the 'Horizon of the Disk'. Adapted from Belmonte (2012).

tations of Ra-Horakhty, became the supreme deity of the country. In year 5, he founded a new city, Akhetaten, where he moved his court shortly afterwards. In that period, the king changed his 'Son of Ra' name from the traditional Amenhotep to Akhenaten, 'the one who is beneficial to the disk'. In those years, Akhenaten and Nefertiti had a total of 6 daughters. Meritaten, the eldest one, would have been born around year 4.

Subsequently, around Akhenaten's year 15, queen Nefertiti disappears from the scene, either by natural death or a fall in disgrace, and Akhenaten chose a close relative as coregent (a younger brother or a secondary son of his, according to different variants) who died shortly after a very brief reign, after the death of Akhenaten in year 17. This king, known as Semenkhkare (also Neferneferuaten) would have had the eldest daughter of Nefertiti and Akhenaten, Meritaten, as great royal wife, and would unsuccessfully try an approach to the clergy of Amun. After his death at an early age (in his twenties), and after various vicissitudes, he would be buried in tomb KV55 in the Valley of the Kings.

Once Semenkhkare was dead, the throne would have passed to other very young, almost a child, son-in-law of Akhenaten: Tutankhaten (a son of the King, according to Dodson), married the princess Ankhesenpaaten. Soon after, the young royal couple would have changed their names to Tutankhamun and Ankhesenamun and left the court of Amarna for Thebes (or Memphis). Tutankhamun would have carried out the return to traditional cults and have died very young, around the age of 18, after only 9 years of reign.

After the death of the king without children, his widow Ankhesenamun would take a surprising decision: she decided to write (as Dakhamunzu) to her people's worst enemy and the most powerful ruler of her time, Suppiluliuma, king of the Hittites, asking for a son to become her husband and king of Egypt. After many doubts, the Hittite King would have sent his son Zannanza to the south, to learn soon after that he had been killed. The actual powers of Egypt, in particular the 'god's father' Ay and general Horemheb, had dismantled the plot of the dowager queen. The former would be proclaimed Pharaoh, perhaps forcing the young widow to marry him. After a short reign of 4 years, Horemheb succeeded Ay and made every effort to erase the traces and memory of all his predecessors.

However, since the beginning of the seventies there have been many voices which have been raised against these ideas proposing new alternatives. These were published in a series of articles initiated by the groundbreaking writings of Harris (1974), who confirmed the existence of a female king with the name of Ankh(et)kheperure Neferneferuaten. These new hypotheses postulated substantial changes in the dynamics of the period, coming first to the proposal that the dowager queen who wrote to Suppiluliuma would be the powerful, and still-alive, Nefertiti upon the death of her husband Akhenaten. This hypothesis and others that followed did not reach the general public. The discussion was reduced to the academic circles who engaged in endless arguments where the same evidence was sometimes used defend an idea but also its opposite, and where new arguments were defended with greater ferocity the weaker they were.

Actually, the general opinion has not changed much so that the Hittitologist Trevor Bryce, one of the leading specialists in the field and author of reference manuals on the Hittite Empire (Bryce 2005), has claimed the following on the subject of the dowager queen: 'the Pharaoh whose sudden death (sic) brought to this petition was called

Niphururiya (sic) in the annals. This is the precise way of expressing in cuneiform Tutankhamun's prenomen Nebkheperure. Though a number of researchers have attempted to identify the concerned Pharaoh with Akhenaten, the case of Tutankhamun remains with difference as the strongest'. The puzzle is of such extent that Miller (2007) has argued that 'there is currently no reconstruction of the period that fits all the available evidence at the same time'.

However, the key terms here are the two names mentioned in the Hittite sources: Nibkhururiya and Dakhamunzu. On the one hand, the name Nibkhururiya has been seen as the transcription into cuneiform script of the name of accession to the throne as Dual King of Egypt (*nesu bitty*) of Tutankhamun, Nebkheperure, and this has been the majority's opinion to date. However, a considerable number of prestigious specialists returned, at the end of the 20th Century, to the hypothesis that the term should refer to the name of Akhenaten as Dual King, Neferkheperure. The debate was still plainly open at the time of starting this research. On the other hand, there always has existed a consensus in identifying Dakhamunzu not as a name but as the Hittite transcription for the Egyptian term 'Ta Hemet Nesu', i.e. 'The wife of the King', to whom the source also mentions as 'queen of Egypt'. Another complicated issue is the personality behind Dakhamunzu within the complicated history of the Amarna period. There have been various candidates:

1. Ankhesenamun as Nebkheperure's widow, the traditionally accepted and, apparently, only apparently, the easiest one.
2. Queen Nefertiti as widow of Akhenaten, but just as Great Royal Wife.
3. Nefertiti as ruler Ankhetkheperure Neferneferuaten upon the death of her husband when she would have taken the throne as 'King' Semenkhkare (proposed by Harris in the early 1970s).
4. Nefertiti as Ankhetkheperure, but on the death of Semenkhkare, a variant of the previous one.
5. Meritaten as widow of her father Akhenaten, proposed by Krauss in the seventies for the first time. This is the most breaking hypothesis, but has now been abandoned by its mentor who now defends the idea of....
6. Nefertiti as regent queen upon the death of her husband.
7. Meritaten as Ankhetkheperure, but upon the death of her husband Semenkhkare.
8. Kiya, a dark queen of the period. A practically abandoned theory and...
9. The most recent, proposed by Allen (2009), for whom Dakhamunzu was princess Neferneferuaten Tasherit, fourth daughter of Akhenaten and Nefertiti, converted in coregent of her father and acting as queen Neferneferuaten, widow of her father. This idea, while suggestive, is very difficult to maintain due to various historical problems (e.g. a small girl writing to the most powerful king of his time) and will not be further discussed.

Each of these ideas has had its champions and its fierce detractors so that the debate reached a climax in the first decade of the 21st century with the publication of three books of prestigious Egyptologists (Nicholas Reeves 2002; Marc Gabolde 2005; and Aidan Dodson 2009), to which the work of Krauss (2007) should be added. These works

include absolutely incompatible exclusive theories (see Figure 2), despite all of them are supposedly based on the same facts and refer again and again to the same evidences.

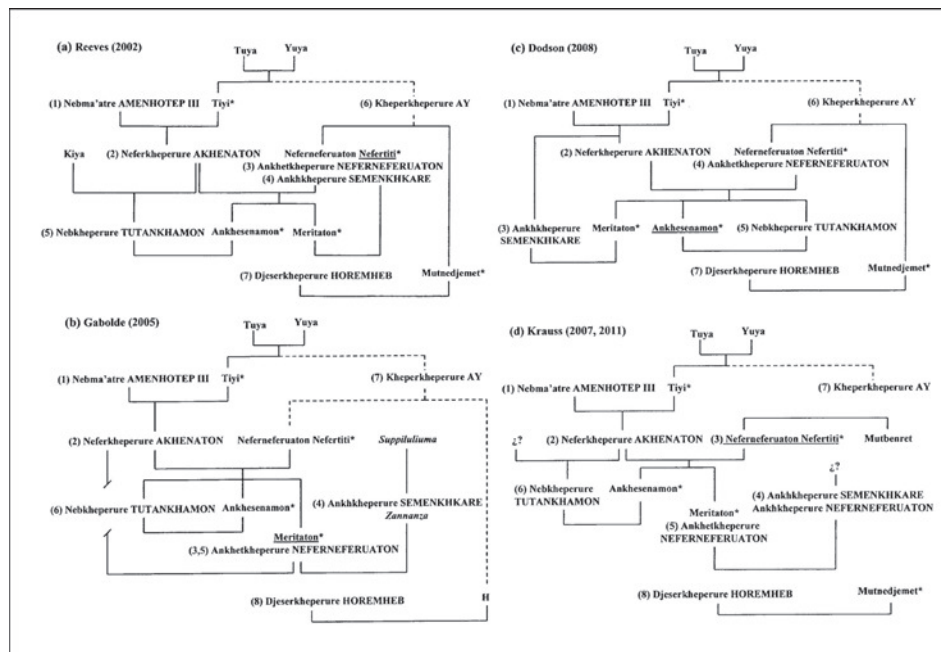


Figure 2: Family tree of the Amarna period according to four different analyses advocated by renowned Egyptologists during the last decade. The name of the person identified with the Dakhamunzu of the Hittite texts according to each of the authors is underlined. The numerals indicate the order of the sovereigns (uppercase). Note the disparity of opinions. The asterisk indicates a 'great royal wife'. See the text for more details.

For example, one of the proposals with more predicament today, to the extent that it can be found in the most recently published manual on the subject (Laboury 2011), the one of Marc Gabolde (1998, 2005, 2009), could be summarized as follows: once her father and husband, Akhenaten, has died, 13-year old queen Meritaton, alias Dakhamunzu, would have planned a plot to set aside her younger brother Tutankhaten, still a child, from the throne which rightfully would corresponded to him. She would on the way deceive the king of the Hittites when she lied about the fact that there was no son of the late king. She thus would bring a Hittite prince to reign next to her with the name of Semenkheperure, who was probably murdered shortly after. Once this obscure personage was dead, she culminated her usurpation of power clothing herself with the royal titles as 'king' Neferneferuaten, ruling alone for at least three years.

On the contrary, according to Reeves (2002), Dakhamunzu would be the queen Pharaoh Ankhethkeperure Neferneferuaton, alias Nefertiti (see Figure 3), who in a certain sense would have usurped the rights of succession to a son of the king, Tutankhaten,

born to a secondary wife (possibly the evasive Kiya, now deceased), who at this moment was in Memphis under the care of his foster-nurse Maya. Consequently, he was easy to hide from the eyes of the Hittite ambassador. The usurpation, however, would not be complete since the reigns of Tutankhaten and Ankhetkheperure would run in parallel. Once the queen Pharaoh was dead, or removed, in year 4 of king Nebkheperure, he would change his name to Tutankhamun, thus putting an end to the heresy. The rest, according to Reeves, is already known history.

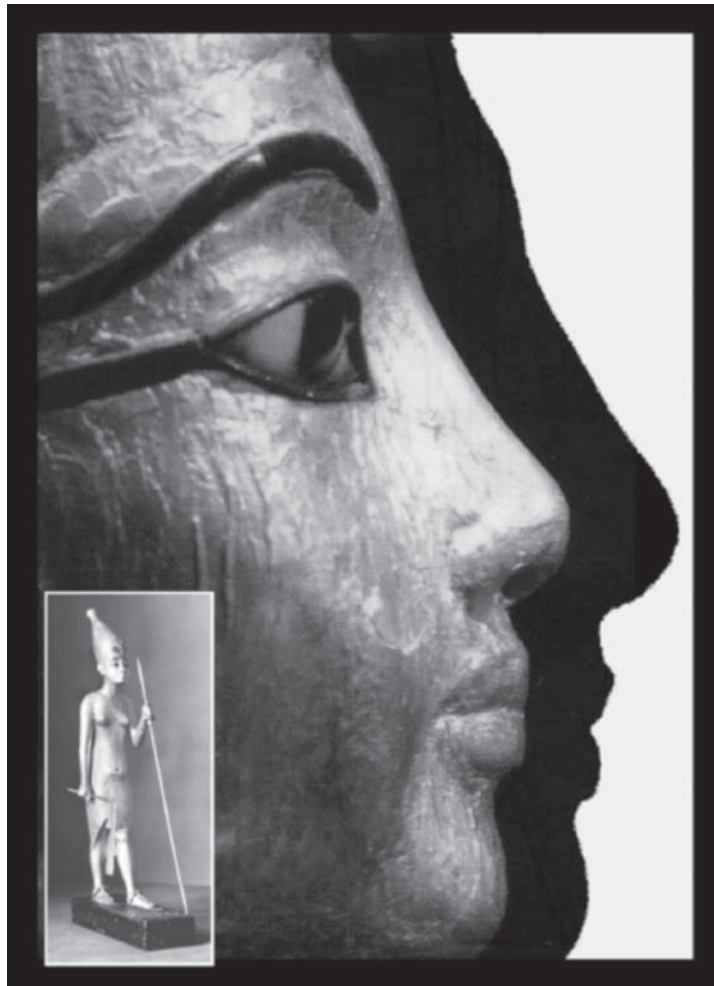


Figure 3: Face profile of a golden statuette (bottom left) found in the tomb of Tutankhamun (KV62) that certainly represents a female king (possibly Ankhetkheperure), compared to the one of the famous bust of Nefertiti, showing an amazing resemblance. Diagram of the author.

Finally, Krauss's (2007) nuclear hypothesis is that the great royal wife Nefertiti Neferneferuaten would have been promoted to an almost royal rank in a moment difficult to specify at the end of the reign of Akhenaten. She appears represented in a number of steles with a clear female anatomy and wearing the blue crown upon her head in the company of her husband. This new position would be, however, lower than the one of a true Pharaoh. All these small monuments remained unfinished, suggesting that they were made shortly before the death of Akhenaten, or even after his death, in an attempt to justify a powerful but still questionable status for Nefertiti. In other words, these steles make an obvious reference to a changing and perhaps unstable political situation.

Once her husband had passed away in the late summer of year 17, after having reigned in Akhetaten for at least 13 years, the queen would have assumed power in the capital, acting as regent for a possible candidate for the throne who is difficult to ascertain. She would have taken the opportunity to devise her plot and write to Suppiluliuma as Dakhamunzu, i.e. 'the wife of the king' Nibkhururiya who had just died. Her assertion that there was not a son of her lord could mean that the existing children of the king (at least Tutankhaten, perhaps Semenkhkare) were not 'legitimate' but secondary children of Akhenaten, and therefore were not in the immediate line of succession.

Between bickering and dimes, time passed and either the plot was discovered and aborted, or perhaps the regent queen died, and Zannanza was murdered. At this moment the throne would be occupied by the son-in-law of Nefertiti, and husband of her eldest daughter Meritaten, under the name of Dual King Ankhkheperure, Son of Ra Semenkhkare Djoserkheperu, as attested in the decoration of the tomb of Merire ii.

Subsequently, Krauss argues that Semenkhkare changed his name to the one of Neferneferuaten for unknown reasons, assuming as belonging to a male all those names and titles of this ruler where feminine endings do not appear. The new name of the king would be a tribute to queen Nefertiti (although, curiously, she had plotted against him shortly before) and showed his fidelity to the worship of the Sun disk. This king would have ruled at least 3 years, as attested by the labels of various products found at Amarna –wine jars in particular–, and by a hieratic inscription in the Theban tomb of Paury which refers to the god Amun. In this period, the king would have also tried an approach to the clergy of this deity and a return to old traditions.

Semenkhkare/Neferneferuaten would have died in his third year of reign, and his 16-year old wife, Meritaten, imitating her mother, would have assumed power. However, this time she gave herself an almost complete list of royal titles as Dual King Ankhkheperure, Son of Ra Neferneferuaten 'akhet en his', i.e. 'who is beneficial to her (deceased) husband' (Gabolde 1998). This queen Pharaoh must have been on the throne enough time as to prepare magnificent funerary regalia that would be usurped shortly after by her successor Tutankhamun. In this period, the inscription where Tutankhaten appears as 'son of the king' would have been registered, which might suggest Ankhkheperure could have acted as a regent of her younger brother who was still a child.

After her death, or disappearance, Nebkheperure Tutankhaten would have ascended to the throne with Ankhesenpaaten as great royal wife, leaving Akhetaten after his first year of reign. He also changed his name of Son of Ra to Tutankhamun, clearly

reflecting his return to the orthodoxy. In this line of argument, Krauss supports the new highest dates for the reign of Horemheb (14/5).

Krauss's hypothesis is smart in the sense that it explains most of the variables and the existing evidence for the period. Otherwise, he is not conclusive in those questions where the subject is not clear, as the ownership or not of the KV55 body either to Semenkhkare or Akhenaten. However, Krauss does not analyze the nature of the name of Semenkhkare, which as suggested by Gabolde (2005) appears to be a chosen name and not a birth name. Besides, his reasoning does not explain the fragment of a wooden box found in the access to the tomb of Tutankhamun (KV62) where the titles of Akhenaten, Neferneferuaten, and the great royal wife Meritaten appear together (see Figure 4), unless Akhenaten was dead and his name had been added for respect.

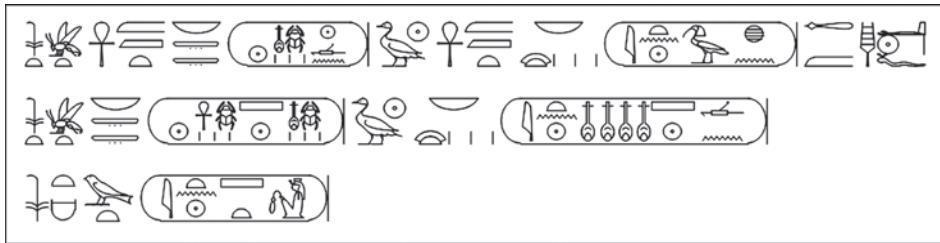


Figure 4: Titles of the three rulers consecutively referred in a fragment from a box found in the access to the tomb of Tutankhamun (KV62). According to the more logical reading of the inscription, queen Meritaten would have acted as a great royal wife of the coregents Akhenaten, her father, and Neferneferuaten, and therefore her identification with the latter makes is almost impossible. Graph of the author.

However, my largest concern on the hypothesis of Krauss is that it openly confronts to the ‘principle of economy’, one of the formulations of Ockham’s Razor: ‘the solution to a problem that needs fewer variables is more likely to be true’. The idea of Krauss (Figure 2) needs three rulers of the same name, Neferneferuaten, succeeding to the throne one after the other: a regent queen acting with the powers of a sole ruler, a king, and a queen Pharaoh. Perhaps, as we will discuss later, all them may actually have been just a single person.

The new evidence

The annals of the Hittite King Mursili II, son and second successor of the great Suppiliuma, contain the mention of a solar omen that could have resulted in a threat to the life of the king. This omen allegedly took place while the king was campaigning in the land of Azzi, to the northeast of Anatolia in his 9 or 10 year of reign. It is a well known fact from Hittite texts, that eclipses were considered as omens of the death of the sovereign, and as a rite of avoidance, they used the figure of the substitute king. Therefore, it sounds reasonable to see an eclipse of the Sun in this omen and consequently analyzed all possibilities within a proper reference time frame.

In the traditional chronology, the beginning of the reign of Mursili II is settled shortly after the affaire Dakhamunzu that would supposedly have occurred after the death of Tutankhamun c. 1324/3 BC. Hence, Mursili is normally assigned dates between c. 1321–1295 BC, while his father's reign was fixed between c. 1360 and 1322 BC lasting close to a length of 40 years, since it is known that he was a contemporary of Amenhotep III.

Within these premises, there was a total eclipse produced in June 24 1312 BC that would be a serious candidate for the solar omen which would have been visible in northern Anatolia, (see Figure 5). An advantage of this eclipse is that the eclipse would have darkened the skies over the land of Azzi regardless of the value of ΔT under consideration, and there is even a possibility that it had been total in the Hittite capital, Hattusha.

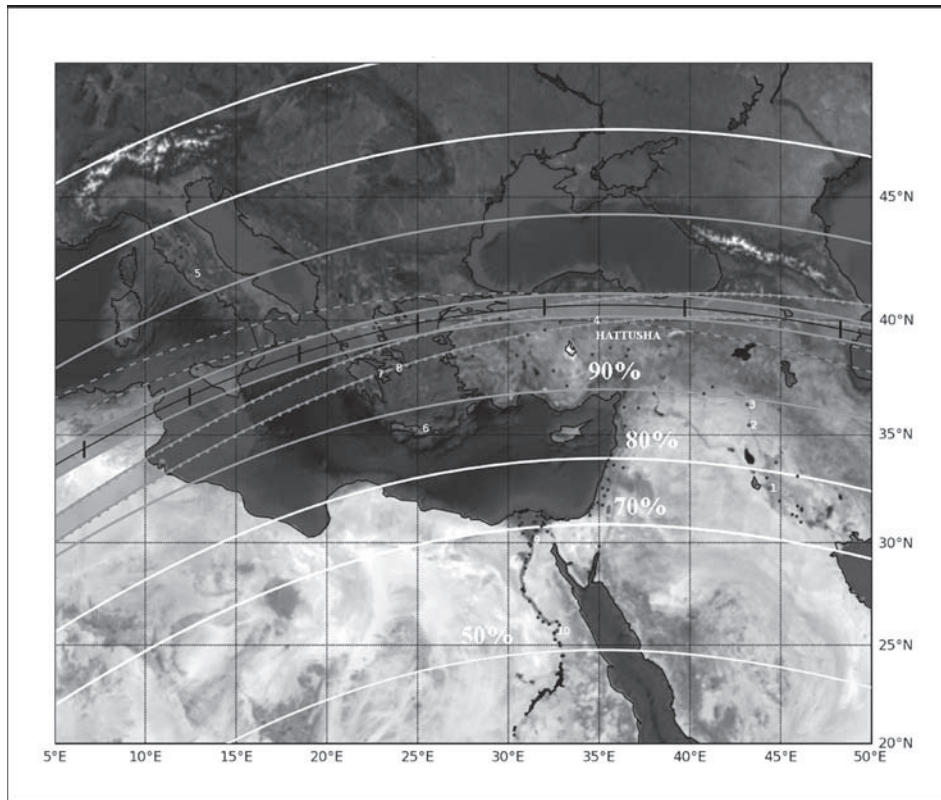


Figure 5: Graphical simulation of the band of totality of a solar eclipse occurred on June 24 1312 BC, which was visible in northern Anatolia, and might be the bad omen mentioned in Hittite sources in the year 9 or 10 of the reign of Mursili II. Note that this result is independent of the value of ΔT under consideration. Image of the author, adapted from a graphic courtesy of Rita Gautschy [<http://gautschy.ch/~rita/archast/archast.html>]

Therefore, there was a perfect astronomical event that may allow the setting of a point of reference for the Hittite chronology and, incidentally, for the rest of their neighbouring countries, including Egypt. However, the traditional chronology cannot be sustained anymore and we would have to see how to fit this astronomical date within the new time frame. However, before doing that, we are going to study in detail a new finding that has been added to the discussion, but not from the world of Egyptology, but from the seemingly distant Hittitology studies.

Miller (2007) has presented a new translation of a historical Hittite text (KUB 19.15+Kbo 50.24) found in the annals of Mursili II where there is an epistolary exchange between this sovereign and a high-ranking Egyptian individual called Armaya. Apparently, this person is not the king because he is never referred to by Mursili as LUGAL or LUGAL.GAL, which is the terminology used in Hittite diplomatic correspondence to refer to kings or great kings. The letters reflect border problems, extending for a significant period of time between years 7 and 9 of Mursili II, and clearly indicate that the two sides were not on very good terms,

The hypothesis defended by Miller, and supported by classical sources, is that Armaya must be equivalent to the future king Horemheb who was acting as a sort of regent or viceroy, and as Commander in Chief of the Egyptian armies in Asia, before he became Pharaoh. There is no record of any individual of this name who could write to the great king of Hatti, before or during the reign of Horemheb, who was not the king himself. Therefore, Ockham's razor forces to accept Armaya as the Hittite term for Horemheb and that he was not the king of Egypt in years 7 and 9 of Mursili II. This meant a chronological revolution because, among other things, forces that Tutankhamun reportedly died during the reign of Mursili and not that of Suppiluliuma.

As Stempel (2009) has stated, the evidence defined through the new translation of this important text still will have opponents, but as they will not be able to contradict the arguments of Miller, their voices should not play any role in the debate from now on. One thing that has become clear is that the equation that equals Nibkhururiya with Tutankhamun (and for practical purposes, also with Semenkhkare) must be excluded, after the works of Miller (2007) and van Dijk (2008), which demonstrate that the Generalissimo Horemheb and the Hittite King Mursili II were contemporaries and the reign of the former must be reduced to 14/5 years, respectively.

The identification of Nibkhururiya with Neferkheperure Akhenaten must be considered a proven fact, and therefore Dakhamunzu should be Nefertiti after the death of Akhenaten, or perhaps Meritaten, although this second possibility is much less probable as it will be shown.

The arrival of DNA

Between 2007 and 2009, a multidisciplinary team, led by the Egyptologist Zahi Hawass and the molecular biologist of the University of Tübingen Carsten Pusch. (Hawass et al. 2010), has carried out a very interesting and novel research project on a group of mummies of the Amarna period that could have been related in one way or another with king

Tutankhamun. The research was done by two independent laboratories, one in the Cairo Museum of Egyptian Antiquities and one in the Faculty of Medicine of Cairo University, and included a team of international experts acting as external evaluators of the research process.

The DNAs obtained from the mummies were sequenced and 8 independent haplotypes, or genetic autosomic markers, were compared, plus 16 sections of the DNA of the Y chromosome (which is transmitted from male to male) and an indeterminate number of markers of mitochondrial DNA (which is transmitted only by females). Chromosome sequences were compared for a total of 4 men (3 of them well known: Tutankhamun, Amenhotep III and his father-in-law Yuya, and one unknown: the controversial body of KV55) and five women (one of them known: Lady Yuya, mother of queen Tiyi, and 4 unknown: the old lady and the young woman that were found in the tomb of Amenhotep II –KV35EL and KV35YL, respectively– and two severely damaged mummies of young women, possibly from late 18th Dynasty, found in KV21). Two female foetuses found in the tomb of Tutankhamun (KV62) must be added to the list.

The results of the analysis of the DNA of the Y chromosome demonstrated that Amenhotep III, Tutankhamun and the individual from KV55 shared the same parental descent lineage, so they were almost certainly of the same family. However, the autosomic markers would be the ones that would provide the most valuable information, driving to the following conclusions: (1) KV35EL is almost surely a daughter of Yuya and Tuya and therefore must be queen Tiyi, as had been suspected for a long time. (2) Tutankhamun was a son of KV35YL and the KV55 male, who in turn (3) was a son of Amenhotep III and Tiyi. In addition (4), KV35YL was very probable also a daughter of Amenhotep III and Tiyi and, therefore, a full sister of the KV55 male, and indeed of Akhenaten. Finally, (5) the two female foetuses found at KV62 were quite possibly daughters of Tutankhamun and perhaps, also daughters of the KV21A lady that had signs of being queen Ankhesenamun. The big question that remained was who were the male of KV55 and the young lady of KV35 (aka KV35YL).

In addition to the genetic analysis, a bone analysis of most of the mummies was carried out by computerized tomography. Among them was queen Tiyi, who gave an age of around 50 years. However, KV35YL gave an estimated age between 25 and 35 years, slightly higher than the one previously estimated. It is not known who might be this high-rank princess who would give birth to future king Tutankhamun. Nefertiti should, in principle, be dismissed since, even in the very unlikely event that she could be a daughter of Amenhotep III and Tiyi never mentioned in the sources, this premise is highly unlikely because Nefertiti is never named with the title 'king's daughter', which was ostensibly used by those queens who also were daughters of a previous king. Under these circumstances, the hypotheses of Gabolde and Dodson, who make of Tutankhamun a son of Nefertiti, should be quarantined.

Amenhotep III and Tiyi had four known daughters: Sitamun, Isis, Henutaneb and the elusive Nebetiah. Two of them were 'great royal wives' of their father. It would also be reasonable to consider the case of the king's daughter Baketaten, perhaps another child of Tiyi, and the only one present in Amarna reliefs, who arrived as an 8 year old

child but who could well have given birth to Tutankhaten with about 16 years of age around the year 12 or 13 of the reign of her brother and have died in her twenties before the ascent to the throne of her son who never mentioned her.

The new bone analysis (Hawass et al. 2010) of the KV55 male revealed a beginning of arthritis in the lower limbs, and bone problems in the spine, that would give an age closer to 40 than to 25 as it was presupposed for decades, although the margin of error of this type of estimates is still very wide and these statements have recently been questioned. In any case, this new age range, coupled with the fact that he was a son of Amenhotep III and Tiye, meant that the most viable candidate for the body of the KV55, according to Hawass and his team of molecular biologists, was no other than Akhenaten.

This implies that Akhenaten was the father of Tutankhaten through his full sister, Lady KV35YL, who should therefore be a queen (it is unthinkable a lower rank for a daughter of Amenhotep III married with the king), but a queen not confirmed so far either by the epigraphic sources or in the archaeological record. This would also mean that the king had a son 'of his own body', a legitimate heir, to succeed him after his death. This fact raises more than one uncertainty about how to solve the Dakhamunzu affair between the two possible candidates: Neferneferuaton Nefertiti or her daughter, and Tutankhaten sister, Meritaten. There are indeed a series of unsolved questions within the present context.

A new hypothesis

In March 2010, the independent researcher Kate Phizackerley published an article on the web, intended to create controversy, but prepared in a very diligent way, about the material published by Hawass and his team on Tutankhamun's family genetic markers. The author does not usually rely on internet material because of the difficulty in evaluating the offered information, which lacks of any kind of peer review process. However, this work caught my attention from the outset by its seriousness.

My surprise would be substantial when I realized that what was written in Phizackerley's paper not only were sensible statements but that this was a potentially revolutionary material that could alter –in fact altered– all mental schemes elaborated during months of hard work. This positive opinion about the article was not only mine but also of a number of specialists for whom the new analysis not only better interpreted genetic data but also fit to the historical facts. Phizackerley discoveries are not many but are crucial for our analysis. Figure 6 describes the global DNA analysis results, as were published in the original work of Hawass et al. (2010), including Phizackerley's arguments, which are mostly impeccable.

INDIVIDUALS		GENETIC MARKERS															
		D13S317	D7S820	D2S1338	D21S11	D16S539	D18S51	CSF1P0	FGA								
Tuya (KV46)		9	12	10	13	19	26	28	35	11	13	8	19	7	12	24	28
Yuya (KV46)		11	13	6	15	22	27	29	34	6	10	12	22	9	12	20	25
Tiyi (KV35EL)		11	12	10	15	22	26	28	29	6	11	19	22	9	12	20	28
Amenhotep III (KV35)		10	16	6	15	16	27	25	34	8	13	16	22	6	9	23	31
Male (KV55)		10	12	15	15	16	26	29	34	11	13	16	19	9	12	20	23
Female (KV35YL)		10	12	6	10	16	26	25	29	8	11	16	19	6	12	20	23
Tutankhamon (KV62)		10	12	10	15	16	26	29	34	8	13	19	19	6	12	23	23
Female (KV21A)		10	16	6	13		26		35	8		10			12	23	
Female (KV21B)		10				17	26			11	13				12		
Female Fetus I (KV62)		12	16	10	13	16		29		8			19		12	23	
Female Fetus II (KV62)		10		6	15		26	29	35	8	13	10	19		12	23	

Figure 6: Results of the study of autosomic DNA carried out in several mummies of the late 18th Dynasty by Hawass et al. (2010), including the ideas of Kate Phizackerley (highlighted in gray tones). From the analysis of the alleles of the former, the affiliation of Tutankhamun through his parents, the male of the KV55 tomb and the female KV35YL, who in turn would be brother and sister, can be proposed. Of the latter, it can be argued that if the two KV62 foetuses were the daughters of Ankhesenamun (perhaps but not necessarily KV21A) and she, in turn, was a daughter of Akhenaten and Nefertiti, then the male of KV55 can not be Akhenaten. Alleles in italics are a prediction, and were not identified in the original DNA sample. See the text for more details. Diagram of the author, adapted from the original data of Hawass et al. (2010).

The basic idea is the following: if the two female foetuses are daughters of Tutankhamun (what seems certain) and his wife Ankhesenamun (likely as well as reasonable), then the body of KV55 cannot be Akhenaten! The reasoning is simple and has to do with the haplotype (genetic marker) D7S820. Both foetuses have pairs of alleles (10,13) and (6,15), respectively, for this marker. If Tutankhamun was their father, who has the pair (10,15), this obliges that their mother must have the pair (6,13), as every unborn child will inherit one allele from each of her parents. This has been indicated in italics in Figure 6 associated with Lady KV21A, who, as we have seen, is believed to be Ankhesenamun. However, it should be noted that this is a prediction and not a result of the original genetic study that did not provide any result for KV21A in this marker. The mother of the girls, if she was Ankhesenamun, must have inherited any of these two alleles (6) or (13) of her father, presumably Akhenaten. Consequently Akhenaten must have had in his genetic background one of the two. However, the male of KV55 has a pair (15,15). Therefore, he cannot be Akhenaten. The reasoning is simple and brilliant.

The obvious conclusion is that Tutankhamun was the son of a stem of Amenhotep III and Tiye, which must therefore be a brother of Akhenaten, possibly a younger one. Who could be this unknown individual? Phizackerley's proposal is simple and reasonable and it had already been suggested by Allen (2009): the younger brother would not be other but Semenkhkare, the enigmatic king of the period who, on the other hand, had already repeatedly been assigned the body of KV55 (a body for which the age at death is far from having been agreed). It is highly probable that she is right.

Who would be the mother of Tutankhamun? Nothing changes: she remains to be Lady KV35YL. If we only take into account the genetic evidence, she most likely remains (a simple calculation shows a probability of c. 90%) as a full sister of Akhenaten and the KV55 male (i.e. Semenkhkare). However, Phizackerley shows that we can not ruled out the possibility of a granddaughter of Amenhotep III and Tiye, suggesting her identification with Meritaten. The equation would be perfect since Tutankhamun would be a son of the enigmatic young royal couple of the Amarna period formed by Semenkhkare and Meritaten. However, in my opinion, the researcher could be wrong in this particular case because it is virtually impossible from the historical point of view that Meritaten was the mother of Tutankhamun because she would have been around 9 years old at the time of the alleged birth of her son.

However, Krauss (private communication) has called my attention to the fact that the ages of the daughters of Akhenaten are usually calculated on the basis of the epoch that each of them appears represented in reliefs and mentioned in the sources. This is an inference that is far from being proven. For this reason, it is remotely possible that Meritaten, or even the second daughter Maketaten, had been born long before their first appearance, even before the advent to the throne of her father. That could make either of them the mother of Tutankhamun. In particular, Krauss suggests that Maketaten could be the mother of the young prince who died when giving birth to him, as suggested by certain representations of the Amarna royal tomb. Perhaps Maketaten could be Lady KV35YL and initially was betrothed with Semenkhkare, who later joined Meritaten after the death of her younger sister. However, the absence of Semenkhkare in the images of the funeral of the young princess contradicts this opinion.

Finally, there is a statistical argument which makes that possibility fairly unlikely. While it is true that genetically speaking Lady KV35YL may be a daughter of Akhenaten and Nefertiti, this will oblige that she would have inherited all paternal alleles of each of the haplotypes only from her grandfather Amenhotep III and none from her grandmother Tiye; a possibility of one vs. eight. It should be added that Nefertiti should have passed to her daughter all her alleles inherited from Yuya and Tuya, which would confirm her as their granddaughter, but none of her other genetic pole. This seems again unlikely. In fact, when most of the variables are taken into account, the probability that both things happen at the same time is smaller than 6%, which does not invalidate the hypothesis but makes it very improbable.

Therefore, it is still better to assume that Lady KV35YL is a young daughter of Amenhotep III and Tiye but that, instead of having been married with her brother Akhenaten, she would have been the wife of her younger brother, the man of the body of KV55,

possibly Semenkhkare. This solves one of the problems that had been raised: the existence of a queen in the period of Amarna, wife of Akhenaten and in addition mother to a male heir, of which there is no record at all. The princess could marry her brother and give birth to Tutankhaten much earlier than her husband, if he is Semenkhkare, came to the throne of Egypt, either as a co-ruler of Akhenaten, as seems reasonable, or as an independent king as suggested by Krauss and others. In the first case, she could have been in the shadow of the great royal wife Meritaten, who brought the rights to the throne to Semenkhkare; in the second, it is very possible that she was already dead before that moment.

I would like to stress that this historical framework (see Figure 7) is based on two premises: (1) the female foetuses are daughters of Ankhesenamun, indeed in addition to Tutankhamun, and (2) that she actually was a daughter of Akhenaten. If any of these assumptions fail, the building crumbles. We will see that there is additional evidence in Phizackerley's analysis of the first, while the idea that Ankhesenamun was not a daughter of Akhenaten is a mere historical speculation, possible but improbable. The new evidence comes from details of the diagram of genetic markers that had once more escaped their initial investigators.

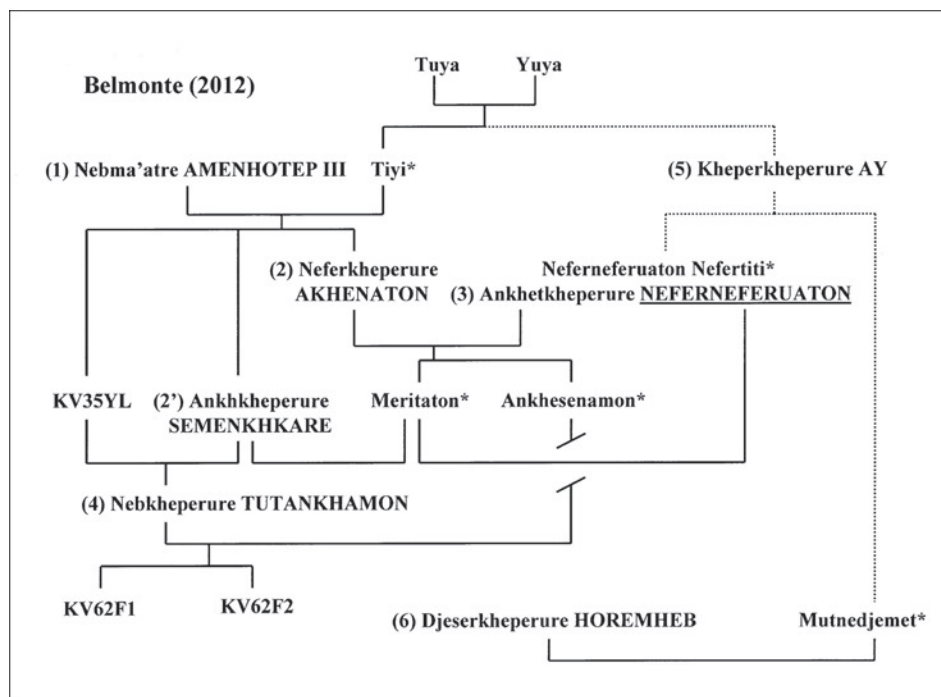


Figure 7: Final work hypothesis reflecting the family tree of the Amarna period, including the new proposals from DNA studies: this is the most likely analysis as defended in this essay. The most reasonable solution to the enigma is that Ankhethkheperure Neferneferuaten, possibly Nefertiti, was the Dakhamunzu of the Hittite texts (although her daughter Meritaten cannot be a priori ruled out). From Belmonte (2012).

Thus, for example, studying allele (13) in D7S820 marker, and allele (35) in D21S11 (marked in light grey in Figure 6), as well as the international distribution of these alleles in the current populations, including that of modern Egypt, Phizackerley suggests that both Lady KV21A (remember that she is probably Ankhesenamun as indicated also by the pair of alleles predicted for the first of these markers including (13)) and her potential daughters, the two female foetuses, may be descendents of Tuya by an independent route to the one of Tiye. This is consistent with the theories making of Nefertiti a granddaughter of Tuya, perhaps through her father who could have been the 'god's father' and future king Ay. He would supposedly be a son of Yuya and Tuya and, therefore, a brother of queen Tiye. This could only be confirmed if the mummy of Ay could be identified and also included those alleles in the corresponding markers.

Finally, Phizackerley shows by the analysis of allele (16) in the autosome D13S317 that it is possible that Lady KV21A, perhaps queen Ankhesenamun, and one of her no-born daughters have descended from Amenhotep III by an independent route to the line established by Semenkhkare (the male of KV55) and his son Tutankhamun, the baby's father. This is only feasible if the transmitter of the allele D13S317-(16) had been Akhenaten who, once again, and for the second time, cannot be identified with the body of KV55 who has the pair (10,12). Although this argument is not as strong as the previous one, because Nefertiti could have independently provided allele (16) to her daughter, it substantially reinforces the new ideas, and makes futile the hypothetical adultery of Nefertiti.

Therefore, the more logical historical framework, as it appears to us once Phizackerley's ideas have been analysed, and applying the principle of economy, could be summarized as follows, once we add the archaeological and epigraphic evidence analysed throughout this essay (Figure 7):

Around year 3 of the reign of Amenhotep IV, who soon after changed his name to Akhenaten, queen Nefertiti entered the scene, giving birth shortly after to her first daughter, princess Meritaten. In year 5, for reasons not yet established, the king founded a new capital, Akhetaten, where the royal family moved in the following years. During this period, prince Semenkhkare, younger full brother of the king, married his sister princess KV35YL, who we must identify with one of the daughters of Amenhotep III and Tiye, perhaps Baketaten, the only one of them mentioned in Amarna (although it has been suggested that she could instead be a daughter of Akhenaten by Kiya, Laboury 2001: 322). Shortly after, around year 10 or 11, the princess had a son by the name of Tutankhaton (sic). His mother could die shortly after (in their twenties) and the little prince was given to the care of a maiden named Maya, perhaps in Memphis, where it is possible that the young family lived (this last is a historical speculation).

The reign of Neferkheperure Akhenaten reached a peak in year 12 when the great durbar is celebrated. This was a festival which, however, supposed the decline of the royal family in the form of a plague, possibly brought by a foreign delegation. In the following years, several members of the royal family died and the situation became worrisome, perhaps dangerous. Given that the royal couple had only begotten daughters, Akhenaten decided to join his younger brother Semenkhkare to the throne in order to

stabilize the situation and guarantee the succession. Semenkhkare also had a small son, a fact which also guaranteed the future. This child is indeed Tutankhuaton, the 'son of the king' Semenkhkare. Akhenaten associated his brother, the new king Ankhkheperure Semenkhkare Djoserkheperu, with Meritaten, his eldest daughter, which, in the context of the new reign, assumed the title of great royal wife.

Unfortunately, once again, the plans of Akhenaten were distorted and his young coregent died after a short period in which he hardly had time to leave a mark in history: a vineyard to his name, a few faience rings, some friezes and little more. Given the increasingly critical situation, Akhenaten decided to associate his wife and companion of a lifetime to the throne, queen Neferneferuaton Nefertiti (name adopted c. year 8) who took the crown (in particular the blue one, with which she is frequently represented). At an undetermined moment (possibly at the death of her husband, although this is debatable) the sovereign adopted the name of Dual King Ankh(et)kheperure mery(t) [plus diverse names of her husband], Son of Ra Neferneferuaten mery(t) [plus diverse names of her husband], sometimes with feminine endings, others without them. In this period, Meritaten would continue with her functions as great royal wife, a position that she possibly kept after the death of her father.

After the death of her husband Nibkhururiya (Neferkheperure), in year 17, Nefertiti, as Dakhamunzu, wrote to the Hittite king Suppiluliuma asking for a son to become king of Egypt in her company. In that letter, Dakhamunzu informed the Hittite king that she and her late husband have not had sons, a fact which is corroborated by the Egyptian envoy Hani shortly after. This is rigorously true since the young prince Tutankhuaton is not the son of the royal couple and is not therefore in the direct line of succession. However, the plan was disrupted and the Hittite prince Zannanza was killed along the way without stepping on Egypt.

Ankhetkheperure then took absolute power and began to count her own regnal years, using different sovereign nicknames in successive years. She also adopted at an undetermined moment the epithet 'beneficial to her [deceased] husband'. This new name will be the one that would accompany her nomen Neferneferuaten in the elements manufactured for her royal funerary regalia.

After her third year of government, the sovereign disappeared and the 'son of the king' Semenkhkare, prince Tutankhuaton, ascended to the throne with the name of Nebkheperure Tutankhaten, married to princess Ankhesenpaaton, daughter of the deceased sovereign, possibly at her instigation to guarantee the succession. However, her husband's nephew and son-in-law, or rather their advisors and tutors, are responsible for erasing the memory of the sovereign usurping her monuments, notably the funerary regalia.

In order to confirm his right to the throne, the young king, or his advisers, brought to Thebes the bodies of the father, the mother and the grandmother of the king –i.e., Semenkhkare, Lady KV35YL and Tiye, respectively–, who possibly were buried in Amarna, and made them re-buried in a tomb without decoration in the Valley of the Kings, KV55. Nebkheperure seals scattered around the place demonstrate this. Among the materials brought from Amarna is part of the regalia of his grandmother and of the recycled funerary atrezzo (coffin and canopic vessels) of a secondary wife of his uncle

Akhenaten (apparently initially recycled for the latter), which could be used to bury his father Semenkhkare in a precipitated way.

At a later date, KV55 would be sacked, the mummies of the mother and the grandmother of Tutankhamen displaced (they would end as we know in KV35 after do not know how many vicissitudes), and the coffin of Semenkhkare profaned and his names in the cartouches deleted, giving path to the mystery of his identity. Other possibility is that only the corpse of Semenkhkare was moved to KV55, with a heterogeneous funerary regalia, while his sister-wife and his mother would be directly transferred to the tomb of Amenhotep III in the West Valley, from where they would be transferred once more centuries later, along with the mummy of the latter, to their final resting place in KV35. The truth is that, without more data, little more can be discerned between these two possibilities, although recent evidence suggests the latter hypothesis as the most plausible one (Laboury 2011: 349).

In year 4 of his reign, Nebkheperure changed his Atonian name by one more in touch with the new times, Tutankhamun. His wife would do the same, being renamed Ankhesenamun. In his 9 or 10 years of reign, Tutankhamun would not have any son, only two abortions buried with him in KV62, and at the time of his death, his great-uncle, and maternal grandfather of his wife, the 'god's father' Ay would rise to the throne under the name of Kheperkheperure, as last alive male member of the royal family and father of the 'king' Ankhetkheperure. After a short reign of little more than 4 years, Ay died and the throne passed to his possible son-in-law, Horemheb, married to Mutnedjemet, alleged sister of queen Nefertiti (here a doubt remains because Mutnedjemet is never named as 'king's daughter or sister'). After a reign of 14 or 15 years, Horemheb died and was buried in his tomb in the Valley of the Kings with numerous amphorae of wine from his last vintage. Ramesses I ascended to power and the rest is known history.

We may wonder what happened with the body of Akhenaten (if he is not the male of KV55 as has been defended here). This is mere historical speculation but the most reasonable is to think that he would remain in Amarna, in his tomb of the Royal Valley, and that the body would be possibly destroyed when the tomb was looted, their funerary regalia scattered, and his sarcophagus broken in small fragments, in order to erase from memory the 'enemy of Akhetaten'. In my opinion there is little hope of recovering it. With respect to the queen Pharaoh Ankhetkheperure, alias Nefertiti, we must be happy that part of her magnificent funerary regalia and furniture possessions have come to us because they were usurped for his successor, Tutankhamun. This is more of what can be said for many other kings of Egypt. And her body? Perhaps one day the sands will unveil their secrets.

This section can not be completed without coming back to other theories that have been previously discussed. According to the new findings, Gabolde's and Reeves's proposals, notably the one on Semenkhkare –as Zannaza and Nefertiti, respectively–, would have to be abandoned altogether. Dodson's ideas must be severely reformed to conform to the new evidence presented here. However, from Gabolde's hypothesis we must keep the question of why a sovereign adopted two names of coronation, as pre-nomen and nomen, when ascending to the throne. It is obviously the case of Semenkhkare.

One possible answer is that the prince had originally a name that remembered the cult of the traditional gods, in particular to the partners of the Theban triad, as for example Ahmose (the oldest brother of Akhenaten, who predeceased his father Amenhotep III, was named Thutmose). In order to ascend to the throne he had to replace it with a new name, more appropriate to the new times, which only included the name of the solar demiurge.

With respect to the theory of Krauss, it can not be fully abandoned. It is possible, although unlikely, that Nefertiti acted as Dakhamunzu when she only was regent queen, as neither Semenkhekare nor Tutankhaton were her children or of her husband. Only once the plot was discovered, Ankhkheperure Semenkhekare would have ascended to the throne and would have been associated to the 'heir' of the throne, princess Meritaten, as great royal wife. Besides, his right to the throne as the brother of the previous king would be obvious. Subsequently, the new king could change his name to Neferneferuaten, perhaps after the death of his mother-in-law. All in all, this theory has yet to explain various aspects that do not fit.

However, in the light of the new evidence, it is difficult to accept that, at the death of king Semenkhekare-Neferneferuaten, his legitimate son and heir, Tutankhaton, already 10 years old, did not directly ascend to the throne of Egypt, i.e. without intermediaries. This would leave very little space for the activities of Semenkhekare's widow, 'king' Ankhkheperure Neferneferuaton Akhet in His, alias Meritaten, her rise to the throne and for the elaboration of such expensive funerary regalia that would be usurped shortly after by his cousin and stepson, condemning her to oblivion. Here, Ockham's razor should take precedence.

Conclusion

The research centred on the Dakhamunzu enigma needs a cocktail of various evidences to find a viable solution. The contribution of archaeology and chronology has been crucial to set the length of the reigns, in particular that of Horemheb. Astronomy has provided the pillars on which the time-frame is settled, particularly when combined with epigraphy. Both disciplines have placed in their proper context the reign of Mursili II through the identification of a solar eclipse of the year 1312 BC as the bad omen, mentioned in the sources, and through a correct reading of the annals which makes Mursili a contemporary of generalissimo Horemheb, and therefore of king Tutankhamun, whose reigns would have been almost parallel. Finally, molecular biology has allowed the determination of family ties among the individuals involved in the affaire with a very high degree of probability.

The results of this approach are summarized in Figure 7 and Table 1 where the family tree and the chronological framework of the era, that seem to be more probable in the light of recent scientific advances, are presented.

Table 1: New chronological table proposed for the last rulers of the 18th Dynasty and the beginning of the 19th, based on the most recent genetic, archaeological and historical evidence, the correlation with the Hittite rulers and five astronomical dates: three lunar ones, a solar alignment and a solar eclipse. In this context, the sovereign Ankh(et)kheperure Neferneferuaton, name of ascension to the throne of Nefertiti, would be Dakhamunzu in all likelihood.

King	Years	Dates	Great Royal Wife
Nebma'atre Amenhotep III	37	(1378-1342) ⁻³	Tiyi
Neferkheperure Akhenaten	17	(1341-1325) ⁻³	Nefertiti Neferneferuaten**
Ankhkheperure Semenkhkare	?	(1328* ^{-?}) ⁻³	Meritaten
Ankh(et)kheperure Neferneferuaten**	3	(1324-1322) ⁻³	Meritaten
Nebkheperure Tutankhamun	10	(1321-1312)	Ankhesenamun
Kheperkheperure Ay	4	(1311-1308)	Tuy
Djeserkheperure Horemheb	14	(1307-1294)	Mutnedjemet
Nebphetire Ramses I	2	(1293-1292)	
Menma'atre Sethy I	11	(1291-1280)	
Usirma'atre Ramses II	67	(1279-1213)	

(*) Tentative date based on the decoration of Merire ii tomb. (**) The same person.

Certainly, this does not mean that this is THE answer to the enigma, definitive and indisputable, and it would not be surprising that when reading these lines, new findings have nuanced or corrected the doubts that could arise from the current model. For example, if it is confirmed that Lady KV21A is Ankhesenamun and it could be scientifically demonstrated that she was not a daughter of Akhenaten, and not as a simple historical speculation, then the whole building could collapse. Although I consider this possibility as unlikely, it can not be 100% ruled out.

It should be noted that radiocarbon dates estimated by Manning (2006), for samples of animal bones of the Amarna period, placed this period between 1336 and 1320 BC, in absolute agreement with the dates proposed in table 1. These dates are very similar to those proposed by Krauss and Warburton (2009) who only show discrepancies in the personalities of the individuals involved in the aftermath of the affaire Dakhamunzu, immediately after the death of Nibkhururiya Akhenaten. Astronomy supports the new chronology but does not help to decide on the independent reign of Ankh(et)kheperure or if she was queen Nefertiti resurrected or not, although the reconstruction raised here suggests so.

In particular, it is suggestive to be able to confirm the time frame when the alignment of the Temple of Aten was performed during the foundation ceremonies of the new city of Akhetaten in year 5 of Akhenaten, around 1337 BC (Figure 1). Also suggestive is the confirmation of the total eclipse of the sun of June 24 1312 BC –on dates close to the summer solstice, a singular milestone in the Hittite world– as the bad omen cited in year 9 or 10 of Mursili II in the Hittite sources (Figure 5).

This essay has tried to show how the observation of the sky, associated with the latest advances in archaeology and epigraphy, and together with a young science such as molecular biology, can be combined to solve an enigma, the one of Dakhamunzu, which has been in the head of a whole plethora of brainy Egyptologists for generations. I think that the objective has been achieved, or maybe not?

When this paper was going to print, the author had a most interesting epistolary interchange with Marc Gabolde. He has proposed a very interesting, possible but with very low probability, genetic scenario (still unpublished) in order to save his ideas from the preliminary results of DNA. According to him, on the one hand, Lady KV21A would be queen Mutemwia, Amenhotep III's mother, and a hypothetical sister of Yuya, and, on the other hand, KV35YL would be a daughter of a couple formed by a sibling of Tuthmosis IV and Mutemwia –thus a brother or sister of Amehotep III– and one of Yuya and Tuya, respectively. Hence the male of KV55 and KV35YL (Akhenaten and Nefertiti, respectively, according to Gabolde's new proposal) would not be brother and sister but very close cousins sharing all four grandparents. If any of the two little daughters of Tutankhamun was not a child of Ankhesenamun, his hypothesis for the period would still be possible. However, Gabolde will still need to explain how a very young, and extremely cynical, Meritaten was able to deceive Suppiluliuma and hide his brother and legitimate heir Tutankhaten from the king ambassador's eyes.

As suggested by Krauss, we must take it easy because it seemed that every single Egyptologist that has been trapped by the Amarna period is as crazy as king Akhenaten himself.

References

- Allen, James P. 2009. The Amarna succession. In: P. J. Brand & J. van Dijk (eds.), *Causing his name to live: studies in Egyptian history and Epigraphy in Memory of W.J. Murnane*. Leiden, pp. 92-108.
- Belmonte, Juan A. 2012. *Pirámides, templos y estrellas: astronomía y arqueología en el Egipto antiguo*. Barcelona: Crítica.
- Belmonte, Juan A. & Shaltout Mosalam, 2009. *In search of cosmic order, selected essays on Egyptian archaeoastronomy*. Cairo: SCA Press.
- Bryce, Trevor. 2005. *The kingdom of the Hittites*. King's Lynn: Routledge.
- van Dijk, Jacobus. 2009. New evidence of the length of the reign of Horemheb, *JARCE* 44: 193-200.
- Dodson, Aidan. 2009. *Amarna sunset*. Cairo: AUC Press.
- Gabolde, Luc. 2009. L'horizon d'Aton, exactament?, *Cahiers de l'Egypte Nilotique et Méditerranéenne* 2: 145-57.
- Gabolde, Marc. 1998. *D'Akhenaton à Toutankhamon*. Lyon: CIAHA 3.
- Gabolde, Marc. 2005. *Akhenaton. Du mystère à la lumière*. Paris: Gallimard.
- Gabolde, Marc. 2009. Under a deep blue starry sky? In: P.J. Brand & J. van Dijk (eds.), *Causing his name to live: studies in Egyptian history and Epigraphy in Memory of W.J. Murnane*, Leiden, pp. 109-21.
- Harris, John R. 1974. Nefernefruaten regnans. *AO* 36: 11-21.
- Hawass, Zahi, Gad, Y.Z., Ismail, S., Khairat, R., Fathalla, D., Hasan, N., Ahmed, A., Elleithy, H., Ball, M., Gaballah, F., Wasef, S., Fateen, M., Amer, H., Gostner, P., Selim, A., Zink, A., Pusch, Carsten M. 2010. Ancestry and pathology in King Tutankhamun's family. *JAMA* 303: 638-47.
- Hornung, Erik, Rolf Krauss & David A. Warburton (eds.). 2006. *Ancient Egyptian Chronology*. Leiden: HdO 83.
- Krauss, Rolf. 2007. Eine Regentin, ein könig und eine Königin zwischen dem Tod von Achenaten und der Thronbesteigung von Tutanchaten. *AoF* 34: 294-318.

- Krauss, Rolf & Warburton, David A. 2009. The basis for the Egyptian dates. In: D.A. Warburton (ed.) *Time's up! Dating the Minoan eruption of Santorini*. Athens, pp. 15-138.
- Laboury, Dimitri. 2011. *Akhénaton*. Paris: Pygmalion.
- Manning, Sturt. 2006. Radiocarbon dating and Egyptian chronology? In: Erik Hornung, Rolf Krauss & David Warburton (eds.), *Ancient Egyptian Chronology*. Leiden: HdO 83, pp. 327-56.
- Miller, Jared L. 2007. Amarna age chronology and the identity of Nibhururiya in light of a newly reconstructed Hittite text. *Altorientalische Forschungen* 34: 252-93.
- Phizackerley, Kate. 2010. DNA shows that KV55 mummy probably not Akhenaten. <http://www.kv64.info/2010/03/dna-shows-that-kv55-mummy-probably-not.html>
- Reeves, Nicholas. 2002. *Akhenaton, el falso profeta de Egipto*. Madrid: Oberón.
- Stempel, Richard. 2007. Identification of Nibhururiya and the synchronism in the Egyptian and Hittite chronology in the light of newly reconstructed Hittite text. *Göttinger Miszellen* 213: 97-100.

