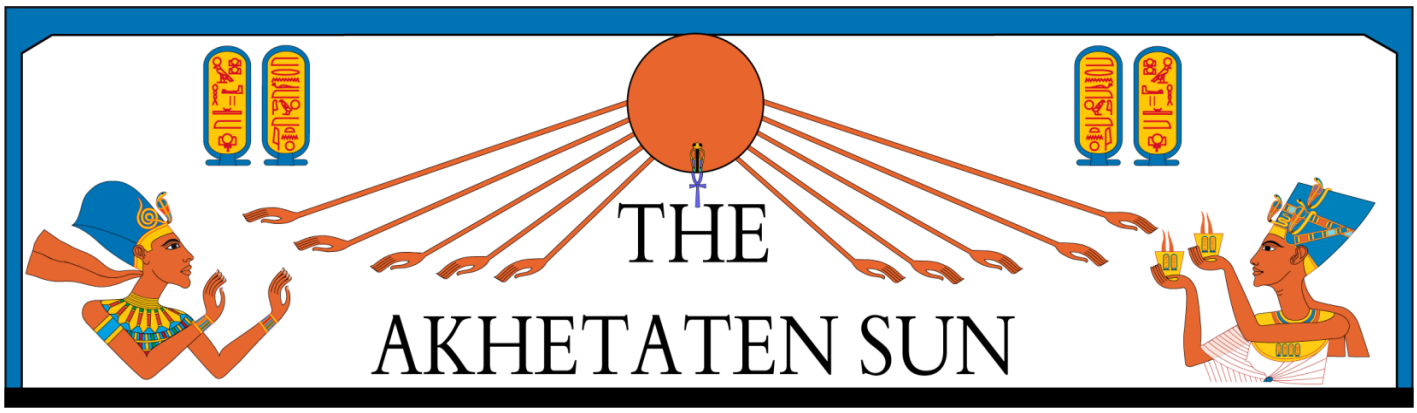

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Officers and Directors

The President's Papyrus

Greetings Amarnaphiles,

Best wishes and happy New Year to all our members! I do not know what will happen on the political front around the world, but I am certain that 2019 will not be any less exciting than 2018 was when it comes to new discoveries in Egypt.

Speaking of which, just look at the array of articles in this latest Sun. We are most honored to be able to publish a very fascinating article by noted author and Egyptologist, Dr. Aidan Dodson. And of course, we are most fortunate, once again, to have another wonderful article by Professor Barry Kemp and Researcher Paul Docherty about the Great Aten temple.

Furthermore, we are also delighted to have an article by our very own Vice President, David Pepper, about the daughters of Akhenaten and Nefertiti.

Think about it! Your membership in this organization entitles you to receive cutting edge, up to date, information about the Amarna period. This is made possible by your membership dues and donations. What we do as an organization is only possible by your continued interest, support and loyalty to the Foundation's mission.

On behalf of the TARF board, I thank you.

With best wishes always,

Floyd

The search for the mummies of Akhenaten and Nefertiti

By Aidan Dodson

When one studies New Kingdom Egypt, one has, almost uniquely for one studying pre-modern history, the uncanny opportunity of looking at the actual, long-dead, faces of many of the key protagonists in the events of the Eighteenth through Twentieth Dynasties. Most of the mummies in question come from the two great 'royal caches' found in the late 19th century (TT320, near Deir el-Bahari, and KV35, the tomb of Amenhotep II in the Valley of the Kings), which revealed most – but not all – of the kings reigning between Taa at the end of the Seventeenth Dynasty and Rameses IX in the Twentieth. Among the 'missing' kings (as identified at the beginning of the 20th century) were Akhenaten (in spite of a brief mistaken reading, in KV35, of the name of Merenptah as his), Smenkhkare, Tutankhamun, Ay and Horemheb. A few queens were also found in KV320, but none later than Ahmes-Nefertiry, wife of Ahmose I. Thus, the bodies of Akhenaten and Nefertiti became part of a 'wanted' list of ancient royalty, a popular desire to find them being elevated by the ever-increasing profile for the 'Amarna' kings that began in the early 20th century, and sees no sign of abating as the 21st century progresses.

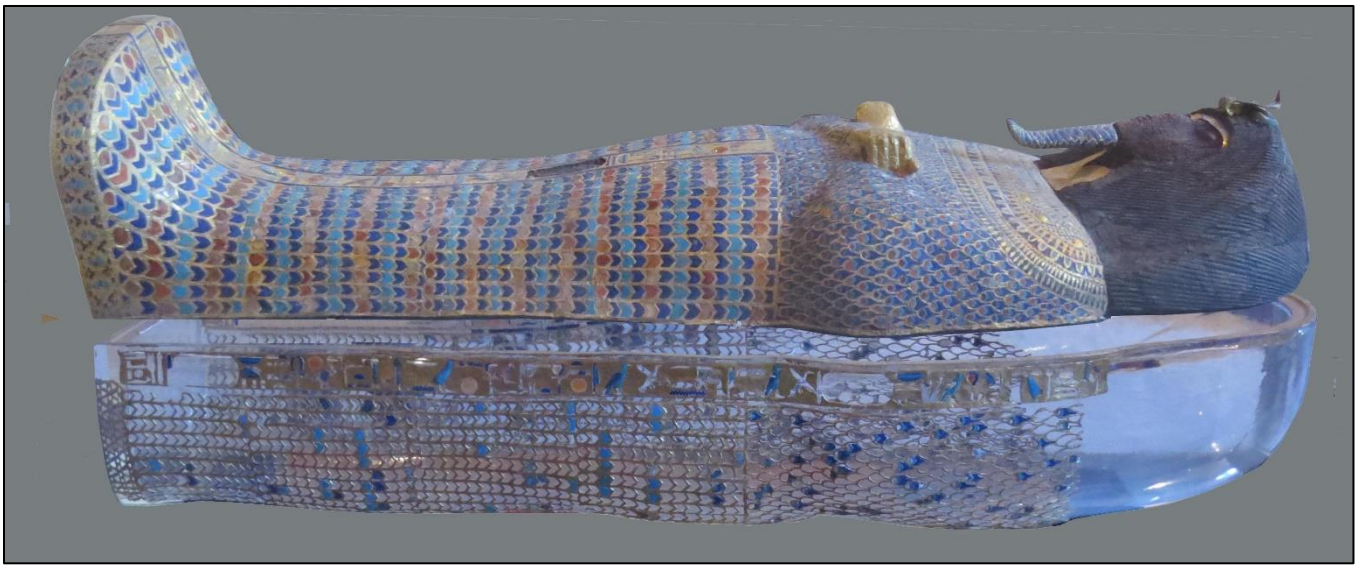


Figure 1: The coffin from KV55, Egyptian Museum, Cairo – photo Aidan Dodson

For many, the search for Akhenaten came to an end in 1907, when tomb KV55 was found in the Valley of the Kings. This now-notorious deposit contained (among other things) a dismantled funerary shrine of Queen Tiye, wife of Amenhotep III and mother of Akhenaten, a set of 'magic bricks' in the name of Akhenaten, a gilded and glass-inlaid wooden coffin (Fig. 1), from which all names and the face mask had been removed, containing a mummy, and a set of canopic jars, from which the texts had been erased. The deposit had been badly damaged by water-penetration, and the mummy largely skeletonised (Fig. 2). A cursory examination of the latter by an obstetrician who happened to be in the Valley of the Kings proclaimed the body to be that of a woman, and the tomb was published under the title *The Tomb of Queen Tîyi* in 1910.

However, the anatomical report in the book, by Grafton Elliot Smith, assessed the remains as those of a man who had died in his late 20s. Although this would have required Akhenaten to have come to the throne around the age of ten, begun his religious revolution around twelve, and founded Amarna around sixteen, most took the view (encouraged especially by the magic bricks) that the body was that of Akhenaten, a conclusion made widely available by Arthur Weigall's influential (if distinctly romanticised) biography of the king, first published in 1910. Others wondered whether, however, the body might rather be that of Smenkhkare, the obscure, and apparently short-lived co-regent and/or successor of Akhenaten, for whom such a life-span would be less problematic.

Either way, in 1925, the KV55 individual was shown by Douglas Derry to certainly have been a close relative of Tutankhamun, found in 1922, and whose mummy he autopsied; this conclusion was reinforced by blood-grouping tests undertaken in the 1960s. Derry then undertook a full-scale re-examination of the KV55 remains in 1931, lowering the age at death to around 23 years which, if correct, would make an identification with Akhenaten even less likely than Smith's assessment – especially given that Akhenaten's eldest daughter would on this basis have to have been born when he was only seven years old! Accordingly, the remains were for some decades generally regarded by most as those of Smenkhkare, a view further reinforced by a 1966 examination by Reginald Harrison, which lowered the age yet further to around twenty.

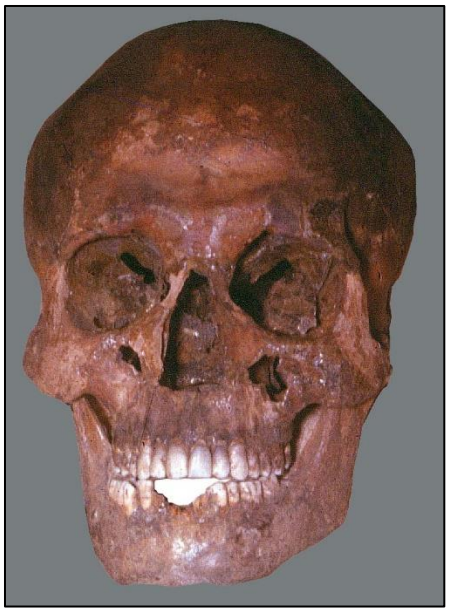


Figure 2: The skull from KV55, photo Martin Davies

The presence of the magic bricks of Akhenaten (and the shrine of Queen Tiye) was explained by Cyril Aldred in 1968 as being the result of the tomb originally having contained the mummies of Akhenaten, Tiye and Smenkhkare, but with the first two later removed elsewhere. Aldred dated this to the early Ramesside Period (with Nicholas Reeves later suggesting the reign of Rameses IX), but recent assessments of the ancient flooding of the centre of the Valley of the Kings by Stephen Cross indicates that KV55 must have been covered by a flash-flood soon after the death of Tutankhamun. Hence, the desecration of KV55 would seem to have taken place around the time of Tutankhamun's funeral. As noted below, the mummy of Tiye ultimately found its way to the tomb of Amenhotep II (KV35), but it seems not unlikely under this scenario that Akhenaten's may have been destroyed.

The possibility that the body might after all be that of Akhenaten was resurrected by a new examination by Fawzia Hussein in 1991, which raised the potential age to 35. However, her report was never published, and two more examinations in 2000/1 concluded once again that the person had died no later than their early twenties. Yet, in spite of this broad consensus across a range of separate examinations over a nearly a century, the age was reassessed as '35–45' following CT-scanning in 2010, thus apparently 'proving' the body to be Akhenaten (or at least not ruling this out). However, no discussion of how this new age-range was arrived at, and why it differs so greatly from almost all previous examinations, was included in the publication, and no such data has yet been published. Rebuttals were, however, immediately forthcoming; one issue is that while CT scans have allowed access to parts of still-fleshed mummies never previously accessible, the skeletonised state of the KV55 body makes it difficult to see how CT scans can have so wholly superseded the results of direct examinations of the bones.

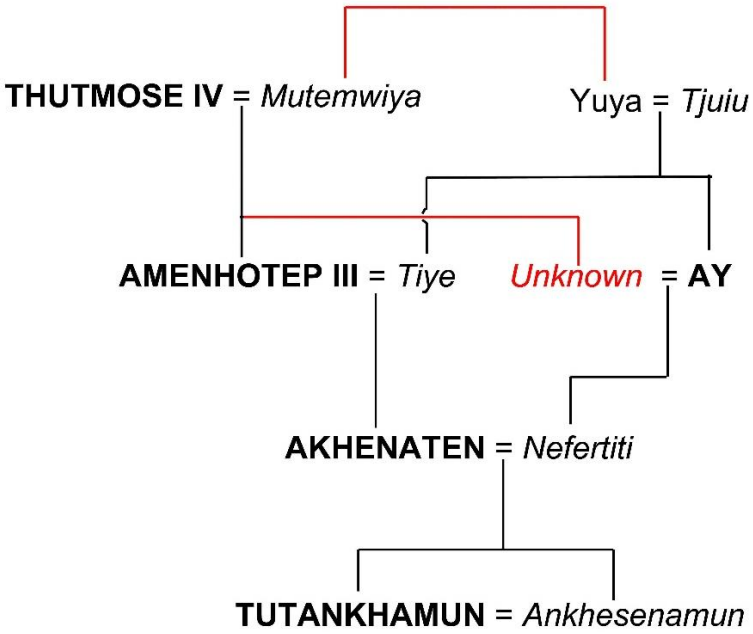
In addition, the coffin in which the mummy was found presents problems for those arguing that the latter belongs to Akhenaten. It seems clear (although denied by a small number of scholars) that the coffin had been made for Akhenaten's later-disgraced junior wife, Kiya, and then elaborately re-worked to hold a king. It is difficult to produce a credible scenario for this to have resulted in a coffin for Akhenaten, who will have had no need for such a recycled piece – yet for the ephemeral Smenkhkare such an emergency provision following sudden death would seem quite reasonable.

The CT scanning of the KV55 remains was done in conjunction with a series of DNA determinations on mummies known, or surmised, to date to the late Eighteenth Dynasty. As a result, a series of conclusions were published in 2010. However, these have been questioned on two grounds. First, there is a school of thought that denies that it is possible to extract any meaningful DNA from material of this age and/or nature, and that all results must, by definition, be the result of contamination. The latter view might be supported by the fact that some remains tested nominally as 'controls' turned out to apparently be royal family members. On the other hand, the results seem to produce results difficult to see as merely the outcome of the presence of modern DNA. Nevertheless, if one does assume that the extracted DNA is 'real' there is a further problem in that the full range of options for their interpretation was not all set out in the publication.

The KV55 remains were concluded to be those of a son of Amenhotep III and Tiye, and taken with the re-aging to represent proof that they were those of Akhenaten. Nowhere was it pointed out that Akhenaten would have shared a DNA profile with any full-brother – and that this has long been a leading suggestion for Smenkhkare's origins. The KV55 individual (or his brother, to follow the point just made) was also assessed as being the father of Tutankhamun – and by a woman whose remains are represented by the so-called 'Younger Lady', found in the tomb of Amenhotep II (KV35).

This mummy had been proposed as being none other than Nefertiti by Marianne Luban in 1999 and by Joann Fletcher in 2004, although in the face of scepticism, the present writer preferring to see the body as one of a member of the family of Amenhotep II. However, the published interpretation of the DNA data was that the 'Younger Lady' has been a full sister of Tutankhamun's father – and there is absolutely no indication that Nefertiti was a sister-wife of her husband. Indeed, the fact that on no occasion does she use the titles of 'King's Daughter' or 'King's Sister' makes it all-but-certain that she was not.

But the idea that Akhenaten had a sister-wife is also problematic: it seems incredible that such a person would be wholly unknown to history at a point in time when the broader royal family was more prominent on the monuments than at any other time, with both Nefertiti and Kiya (also certainly not a royal sister) appearing on numerous temple walls (as well, in the former case, the walls of tomb-chapels). However, just as the published report had failed to highlight the possibility that the KV55 body could not only be that of Akhenaten, but also a brother of his, it also did not point out that – as Marc Gabolde has now been able to demonstrate – the genetic results of a brother-sister coupling can be identical to those of three generations of first cousins to the same degree.



Now, in many discussions of the potential origins of Nefertiti, she has been posited as a daughter of Ay, who in turn is often argued to have been a brother of Tiye: this would indeed make her a first cousin of Akhenaten. Going back through the generations, for the genetics to work, Nefertiti's mother would have had to have been a sister of Amenhotep III. Of course, there is no evidence for such a woman – but unlike 'Akhenaten's sister-wife', she would have lived (and probably died) long before Nefertiti (or her putative father Ay) had any reason to feature on the monuments. The final generation would require Yuya to be the brother of Mutemwiya, mother of Amenhotep III. While this is currently without proof, it is another relationship that has been suggested by Egyptologists on and off for decades. Accordingly, given the lack of any sign of a sister-wife of Akhenaten, the 'three-generation-first-cousin option' seems the less-improbable option, meaning that – assuming that the DNA determinations are 'real' – Tutankhamun's mother seems likely to have been Nefertiti, and that the 'Younger Lady' represents her remains.

The idea that Nefertiti was Tutankhamun's mother has, however, long been resisted by scholarship, essentially owing to absence of Tutankhamun from the parade of (female) children so often shown with Nefertiti and Akhenaten. This has resulted in Kiya being put up as a 'consensus candidate – seemingly ignoring the fact that where Kiya is shown with a child, it is a solitary girl – meaning that logically she labours under exactly the same disability as Nefertiti over being Tutankhamun's mother.

In any case, such argumentation fails to acknowledge the fact that royal sons are ***never*** shown with their parents on official monuments before the Nineteenth Dynasty, when they explode onto the walls of the temples of Rameses II. Prior to this, the only time a prince is seen in a public context is where he appears as an office-holder (e.g. Crown Prince Thutmose, eldest son of Amenhotep III, as High Priest of Ptah at the Serapeum at Saqqara); otherwise, attestations of princes are restricted to private memorials of their tutors. In contrast, royal daughters *are* sometimes shown on public monuments prior to this time, in particular on the monuments of Amenhotep III (e.g. at Soleb). Yet Prince Amenhotep (to become Akhenaten) is never shown with his sisters, and no-one has ever used this fact to question his maternity by Tiye!

One feature of the mummy of the 'Younger Lady' is the damage that it has suffered. Most of this is consistent with the attentions of tomb robbers, who removed almost all wrappings from not only her body, but also those of the other two mummies found alongside hers in a side-chamber of KV35. One has been identified on DNA grounds as Queen Tiye, while the other, a male youth, may belong to the Prince Webensenu, son of Amenhotep II, known to have been buried in the tomb. The latter has not been subject to DNA testing, and there seems no basis for the speculation that it might be Crown Prince Thutmose who, as Memphite high priest, will most probably have been buried at Saqqara like later holders of the office. However, the facial damage has been determined by CT scanning as having taken place around the time of death, with the implication that her death was both violent and grisly. An examination of the circumstances of this occurrence are beyond the scope of this article, and will be covered in detail in the present writer's book on Nefertiti, currently in preparation for publication in 2020.

Figure 3: The head of the 'Younger Lady', and its facial reconstruction by Elisabeth Daynès, photos Aidan Dodson

The question of the whether the 'Younger Lady' might be the long-sought mummy of Nefertiti was the subject of an episode of the American television series 'Expedition Unknown' in early 2018, and the producers suggested that a new forensic reconstruction of the mummy's head could be a useful exercise (one had been done by Joann Fletcher in 2004), so that it might be compared with existing images of Nefertiti. From the outset it was recognized that this could not 'prove' anything, but would nevertheless be interesting in seeing what, if any, resemblance there might be between the face of the mummy and the various sculpted representations of Nefertiti. The result was a face not-inconsistent with the latter – but certainly not 'proof' either way.

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Aidan Dodson is Hon. Professor of Egyptology in the Department of Anthropology & Archaeology at the University of Bristol, UK, and a former Simpson Professor of Egyptology at the American University and Chair of Trustees of the Egypt Exploration Society. Amongst his over twenty books have been two studies of the Amarna Period, while *Nefertiti, Queen and Pharaoh of Egypt: her life and afterlife* is in preparation for the American University in Cairo Press.

The three mummies found in a side-chamber of KV35, as arranged on modern stretchers, and not in their original location, for photography during Joann Fletcher's examination of them in February 2003. The positions of the two female mummies reversed (here the 'younger lady' is on the right) as compared with when found in 1898. While the two women's mummies are now in the Egyptian Museum, the boy (center) has been left in the tomb. Photo Julio Etchart/Discovery Channel.

The solar observation and offering platform at the front of the Great Aten Temple - *by Barry Kemp and Paul Docherty*

In the December 2017 issue of the *Akhetaten Sun* (volume 23, no. 2, pp. 11–18), Kemp presented the results of cleaning the final strip of ground in front of the stone temple which had been erected from Akhenaten's year 12 onwards. The strip runs along the axis of the temple towards the gateway that must have stood between the pair of stone pylons. It had previously been excavated by John Pendlebury and planned by his architect, Ralph Lavers, during December 1932. When exposed again, it was surprising to see that whilst Lavers' plan is essentially correct, it does not indicate that the various parallel strips of block-impressions were at different levels. Once this is realised, the whole structure takes on a different character, that of an ascending central strip flanked by the foundations for balustrades. In other words, a long staircase had run along the axis, ending at something which had stood between the pylons.

In writing almost immediately following the end of the December 2017 season, it seemed prudent to be hesitant in drawing conclusions, particularly that the offering-platform (reached by a staircase which is prominent in some of the tomb pictures) actually stood between the pylons and not, as the pictures seem to imply, further into the temple, in the outermost court of offerings. One reason for being cautious was the survival of a solid 'lump' of masonry, incorporating original limestone blocks, standing above the foundations of the staircase about 3 m from the western end of the foundations. After the end of the Amarna Period, workmen had systematically removed all stonework, leaving the foundation layer of gypsum concrete 'clean'. The lowest layer of blocks had adhered to a thin bed of mortar, and lifting them had often required the use of levers which had been anchored in holes cut into the foundation layer against the side of individual blocks. The demolition must have been hard work but had been pursued thoroughly. Thus, it was unusual to find an area of original blocks left in place. Moreover, it was clear that a further layer of concrete had been laid over them, raising the possibility of a change of plan as the temple was built, the original foundations for a staircase having been covered over in favour of a smooth pavement.

The plan for the recent fall season (October and the first two weeks of November 2018) did not include further excavation, but allowed our team of builders from the village of El-Tell to resume the job of reconstructing the outline of the temple in fresh limestone blocks. The opportunity was taken to have the western end of the approach to the temple brushed clean of the layer of dust and sand which had been put back to protect it. Daily study of the 'lump' in different lights and from different angles eventually brought an answer to why the ancient workmen tasked with demolishing the temple had left it behind. The foundations are laid over a thick bed of sand rather than over undisturbed desert. Where the 'lump' stands, the foundation bed has subsided by a very small amount, perhaps also because the gypsum mix had been slower to dry. The limestone blocks had sunk a little way into the gypsum. When the demolition men reached this spot, it must have proved impossible to lift the blocks in question without breaking them. So they were left in place, accidentally preserving more of the overlying masonry.

With this little problem cleared up, the interpretation becomes straightforward. The cross-section at this point must be typical for the full length of the original stonework apart from a gently rising level (Figure 1). In the centre was the strip of concrete on which the staircase itself would have rested. It was made twice as thick as the strips on either side. As the stairs rose eastwards, so the thickness and thus weight of the overlying blocks would have increased, but this would have been true for the flanking blocks which supported the balustrades. One explanation for taking extra care with the central strip is that the stairs themselves were of a denser material. A material known to have been used at Amarna for stairs or steps was alabaster (travertine). Fragments of alabaster carved with figures of captives have been found towards the front of the Great Aten Temple, although in a layer which probably comes from the earlier building. Geologist Jim Harrell tells us that the density of alabaster is twice that of limestone, so that blocks of a given size in alabaster would be twice as heavy as those in ordinary limestone. Knowing this, the builders provided extra support at foundation level.

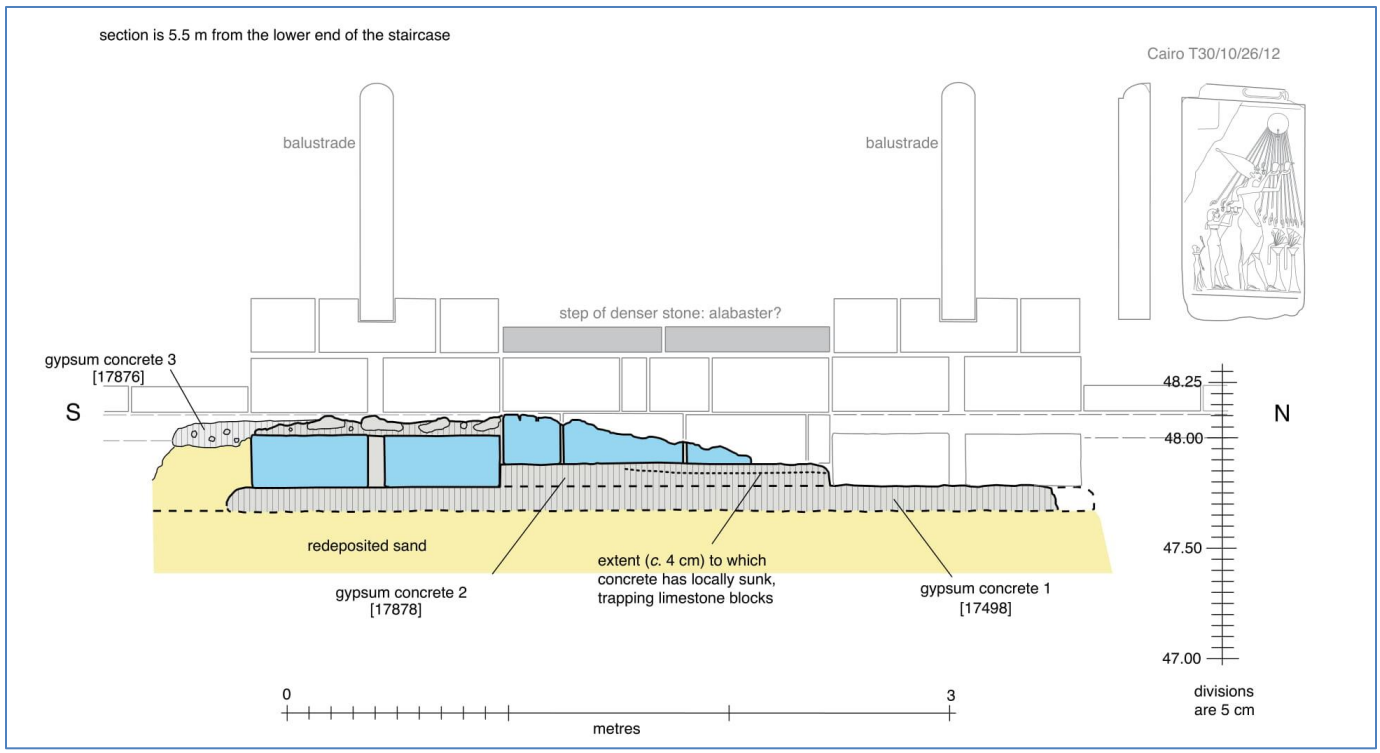


Figure 1: Section across the foundations of the staircase in front of the stone pylons at the Great Aten Temple, with reconstruction of how it might have continued upwards. The height of the balustrade slabs is taken from the slab in the Egyptian Museum, Cairo T30/10/26/12. It probably derives from Petrie's excavations at Amarna, but whether from the Great Aten Temple or from the Great Palace is debatable. It was decorated on only one side and so might represent half of the original thickness. Balustrade thickness varied considerably: one granite piece from the temple (S-12563) was only 8.5 cm thick.

It looks as though balustrades stood on either side of the staircase. Balustrades are a distinctive feature of Amarna stone architecture, and seem normally to have been made in stones that were harder to work than the ordinary limestone that was commonly in use. We have recovered from the front of the temple probable balustrade fragments in indurated limestone, quartzite of various colours, granite and basalt. The way the slabs were set in place had been preserved (on a small scale) in the shrine which occupied the central room in the house of the priest Panehsy just outside the southern enclosure wall of the Great Aten Temple, towards the east end. Some of the decorated blocks of the shrine were found loose and were taken to the Egyptian Museum, Cairo, after their discovery in 1926, and were subject to a restoration (and are still on display). The foundations from the ascending stairway were also found, and in their original place. They included stonework from the beginning of the balustrades. These pieces seem not to have been sent to the Museum and are certainly not to be seen now at the house. But a record survives in drawings and photographs made at the time (Figure 2). These show that the balustrades (with a height of only 15 cm and width of 5 cm) fitted into a slot in support blocks that (at 22 cm wide) were about four times as wide.

Figure 1 is a reconstruction of a section through the ramp at the Great Aten Temple where the blocks and extra concrete layer are preserved towards the west end. The height of the balustrades is taken from the complete balustrade slab from Amarna now on display in the Egyptian Museum (T30/10/26/12). The angle of slope which appears in the reconstruction (Figure 3) is derived from the inner mud-brick ramp which descended from the mud-brick pylons at the front of the temple down to the earlier temple floor, and remains largely preserved. It gives a height for the platform at the end of the staircase of around 2 m. The angle of slope on the Cairo balustrade is slightly less.

Using these various sources, Paul Docherty (a specialist in archaeological photogrammetry and 3D reconstructions, see www.amarna3d.com) has prepared a series of reconstructions. One aim is to reconstruct what Akhenaten would actually have seen at dawn each day when standing on the platform.

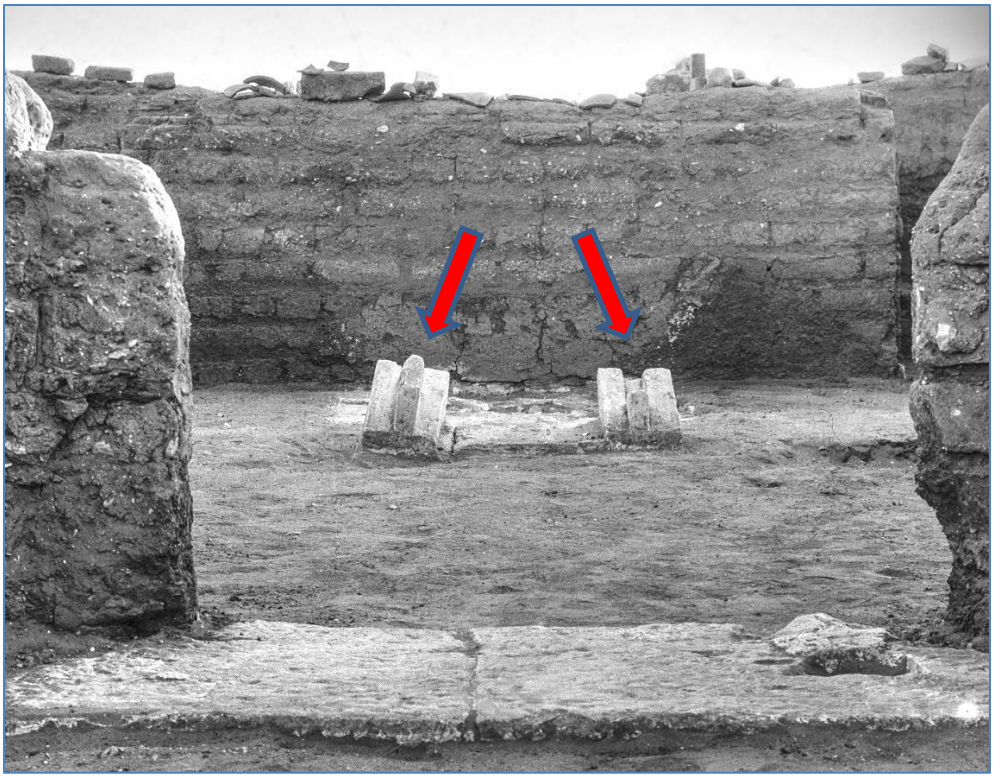


Figure 2. Remains of the shrine in the northern house of Panehsy. It shows the ends of the balustrades which flanked a staircase leading up to the shrine which had stood upon a platform. The low balustrades fitted into slots cut into anchoring slabs. View to the south. EES negative 26/05.

Art and texts from Amarna point to sunrise as the key moment in the daily cycle of the sun's passage and corresponding ceremonies within the temple. Sunrise brought to Akhenaten an intense sense of wonder, an emotional more than an intellectual response. This is something portrayed with great effectiveness in the twin scenes of sunrise at the temple carved on the walls of the royal tomb at Amarna (chamber alpha of the Meketaten suite), although these omit a depiction of the platform. The new location of the platform gives it a more commanding size and position. It placed Akhenaten at a point where the long vista of offering-tables (perhaps already bearing offerings set out in the half-light before dawn) appeared to stretch almost unbrokenly between him and the Aten.

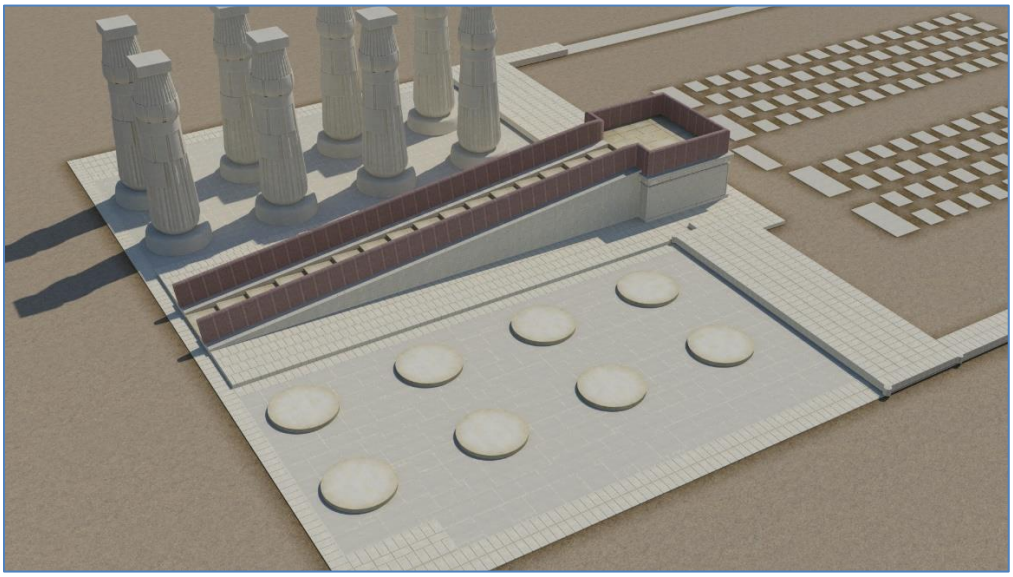


Figure 3*:* Reconstruction (by Paul Docherty) of the staircase and platform at the front of the Great Aten Temple.

To accomplish this, the model of the temple front was extended to include a basic representation of the 1st court of offering-tables, which was in turn extended further east to the full length of the Long Temple. The offering-tables have been kept as basic block constructions and the initial row began with four larger tables, two on either side of the temple axis. It may be that these were supports for statues. There is also enough in the foundations to conclude that there was a rectangular pedestal positioned between them, crossing the axis (marked on Figure 12, p. 13, of the *Akhetaten Sun* vol. 23/2). It may be that it supported a stela; therefore, this has been incorporated within the 3D model. It is not known to what height the temple walls would have risen; therefore, they have been raised to a notional height of 7 m with the intermediate pylons at 11-m heights.

Calculating the position of the sun for a specific time and date involves some complex mathematics. These have been embedded inside a lighting rig within the 3D modelling software (Autodesk 3DS Max) for ease of use. 3DS Max is a professional modelling, animation, and rendering software package which is used extensively in architectural visualisation. It is also widely used within the games and film/visual effects industry. When coupled with Autodesk AutoCAD, which is used for plans and technical drawing, they make for a powerful visualisation toolkit (both are developed by the same company, Autodesk).

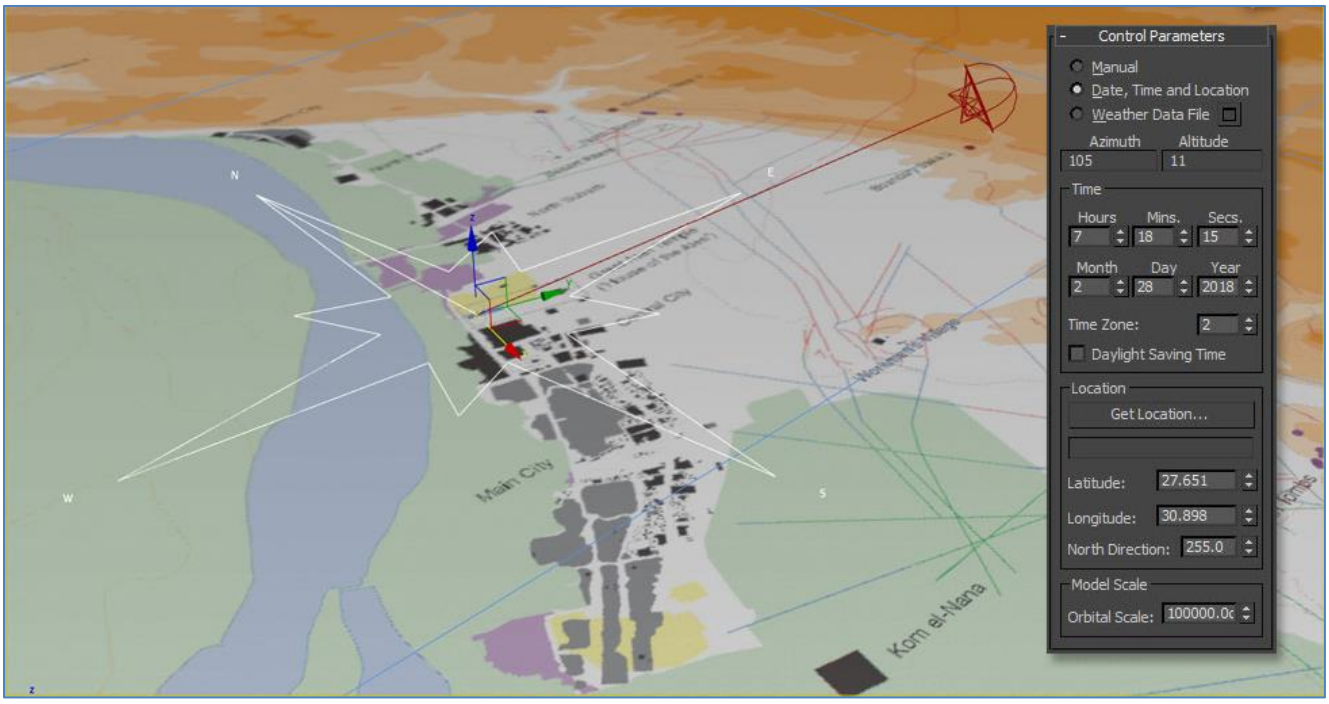


***Figure 4*:** The Daylight System interface and lighting rig

***Figure 5*:** Calibration check using a photograph from on-site (left) and the simulated sunlight and shadows (right)

The daylight rig comes as standard within 3DS Max and brings together photometric lighting and positional aids into one easy-to-use tool. The rig needs to know the world coordinates (in latitude and longitude) for the site, the north direction, and the time and date. This will generate the azimuth and altitude for the sun and position the directional light to match. The control interface can be seen in Figure 4 along with the lighting rig in the 3D viewport. To ensure that the simulated lighting is as true as possible to its real-world counterpart, the setup was calibrated using on-site reference photography. By taking a photograph of the modern stone block construction and matching the camera position within the software, we can determine via the lighting and shadows if the sunlight rig is positioned accurately. The comparison can be seen in Figure 5, where the stone blocks help to act as a measure for the shadows cast. The images show a very close simulation to the real world, which enables the use of the daylight rig with some confidence in its accuracy.

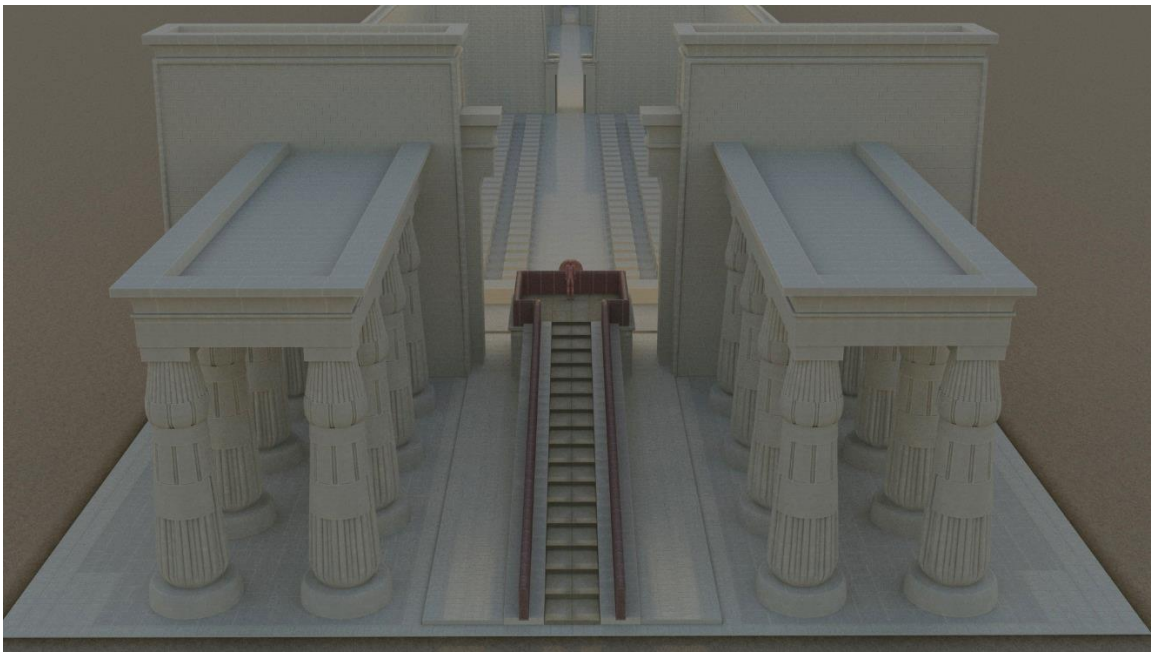


***Figure 6*:** View looking east along the temple axis at a simulated time of 06:40 on 12th October 2018. The small figure on the raised platform is representative of Akhenaten.

Figure7: View looking to the west along the temple axis at a simulated time of 06:40 on 12th October 2018

To check whether the cliffs would be seen within the temple, a master plan of the location (based upon a 1990, 1:50,000 map sheet) was imported into the software (also visible in Figure 4). A series of marker blocks were placed at the cliff ridge at between 160 and 180 m in height to simulate the elevation at those points. These markers could not be seen from within the temple until the wall height was dropped to 6 m, and even then the intermediate pylons did an effective job of masking them. Therefore, the wall height was fixed at 7 m.

To establish the view Akhenaten may have had at sunrise, a generic humanoid form with a height of 1.65 m was placed at the top of the staircase platform and a camera was positioned at eye level facing eastwards into the temple along its axis. Figure 6 gives an extended view of the temple front and the staircase with the 'Akhenaten' stand-in model. Figure 7 is the opposing view; notice the sunlight illuminating the white stone of the pylons. For clarity, the same time and date have been used in these rendered images.

The sunlight rig has a date range between 1583 AD and 3000 AD, which unfortunately does not cover the period of Akhenaten's reign. The reason for the date beginning with 1583 is due to the introduction of the Gregorian calendar in 1582 as our standard calendar. The removal of 10 days in October of that year makes it impossible to create a continuous solar path using one calendar. Some astronomy packages can be used for simulations spanning longer periods, but they do not have the 3D modelling and visualisation abilities found within 3DS Max. The problem could be addressed in the future if a more in-depth lighting study was to be performed using raw azimuth and altitude data fed directly into the lighting rig. For the purpose of this experiment, the sun position was animated for each day of 2018 and its trajectory can be seen in Figure 8 as a red band. What is apparent is that it is not central to the temple axis. By testing different astronomical events such as the dates for the solstices and equinoxes there seems to have been little thought of any specific temple alignment with regards to any sunrise. The only periods when the sun rises in line with the temple axis is during the end of February to the beginning of March and the first two weeks in October. These are close to the equinoxes so it may be that more work needs to be done on aligning the daylight rig to see if both equinoxes have significance to the temple construction.

Comparisons of points calculated externally using the online astronomical calculator CalSky (www.calsky.com) for the year 1341 BC show that the band does have a very slight shift towards a central position. Again, this would need further testing and simulation to see whether it is of any consequence. This shift may be due to the small range of sample points picked for testing and again the issues regarding calendar calibration.

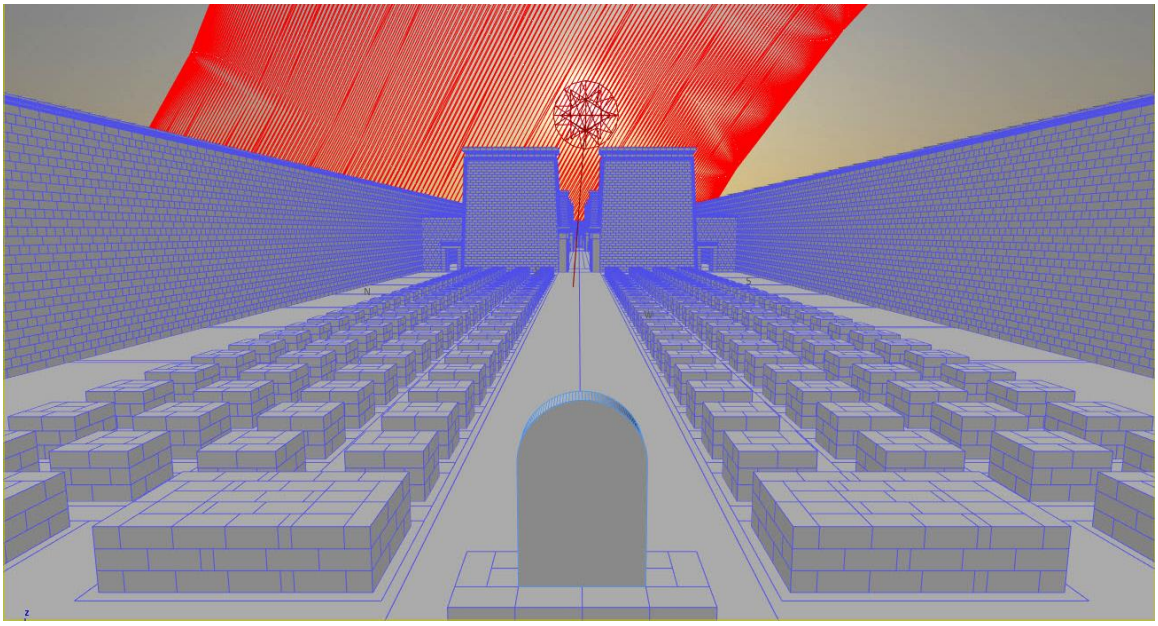


***Figure 8*:** The path of the sun (shown in red) over the period of one year. The 'compass' like object above the pylons is the photometric light which acts as the sun, shown here in transit.

The final part for this simulation is to enable atmospheric haze and set the camera's physical properties to match the aperture and exposure relevant to this kind of composition. The atmosphere is generated using a sky shading model which utilises a physical calculation of the light traveling through particles in the atmosphere, and as such, is connected internally to the position of the sun within daylight rig. The rendered images shown in Figures 9 and 10 give a representation of the view Akhenaten may have had from the staircase platform on two different dates. Although both images show the sunrise to be positioned central to the temple axis, the sun would have begun its rise earlier behind the northern pylons (the left pylons in both images).

Figure 9: Possible view Akhenaten may have had of the 1st court of offering-tables from the position of the raised platform between the first pylons at a simulated time of 06:40 on 12th October 2018.

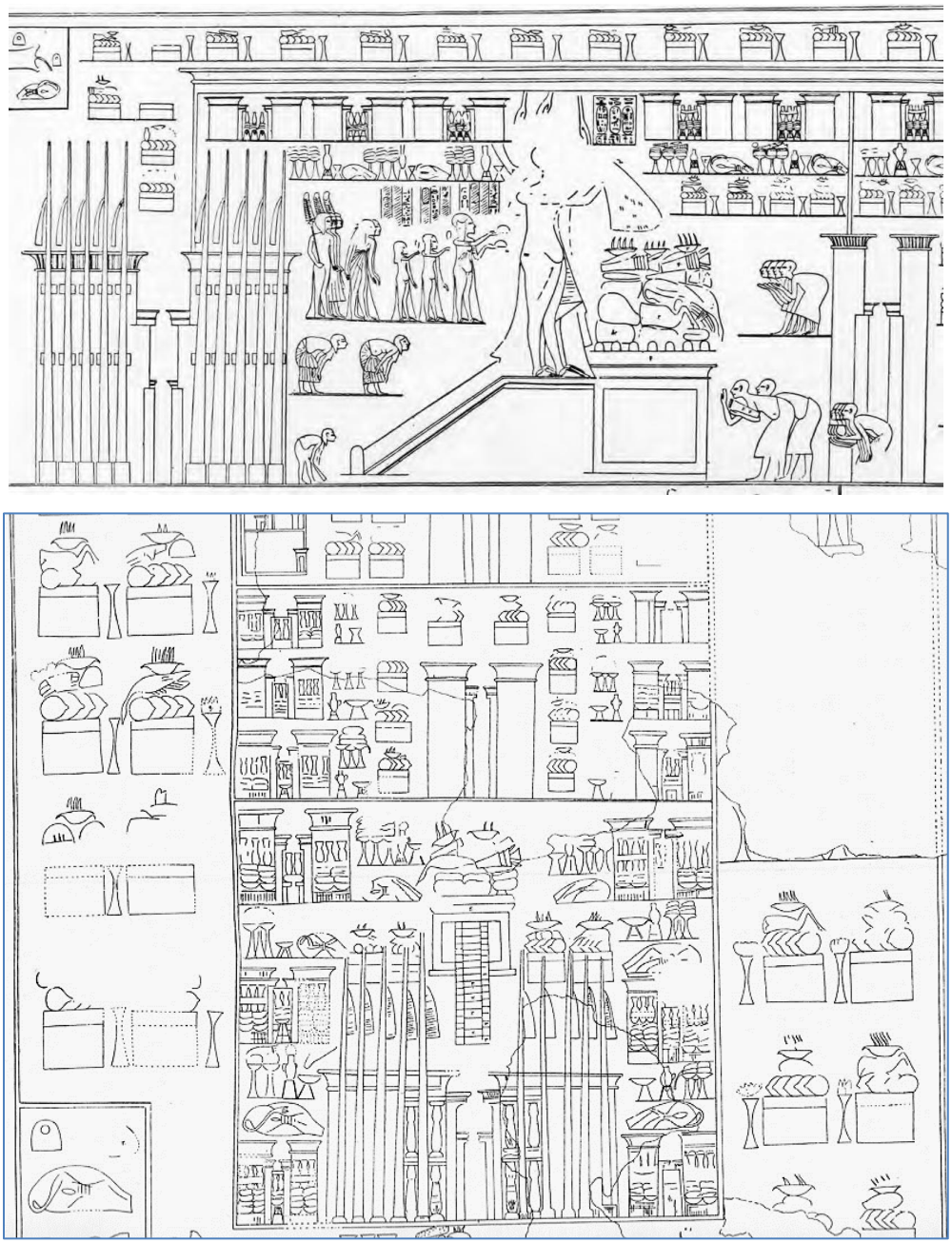
***Figure10*:** Additional view from the raised platform at a simulated time of 07:00 on 28th February 2018.

It is entirely possible that the dimensions of the pylons and associated architecture may have influenced the viewing conditions of the sunrise during Akhenaten's time. Some form of detailing in the architecture which is not present within any of the tomb paintings may have occluded the sunrise or enhanced it.

Unfortunately, with no surviving temple architecture to help in this matter, it is unlikely that we will ever fully understand whether there is a deeper architectural relationship between the sunrise and the temple.

Whilst every effort has been taken to ensure accuracy of the temple dimensions and the path of the sun within this simulation, there will always be some error due to the liberties taken during 3D construction. This simulation was intended as a visualisation aid, potentially leading to further study. For those interested in simulating astronomical orientations, the following paper by Zotti and Gröller gives a good introduction to the issues surrounding this type of investigation.

Zotti, G. and Gröller, M. E. (2005) 'A sky dome visualisation for identification of astronomical orientations', *Proceedings - IEEE Symposium on Information Visualization, INFO VIS*, pp. 9–16. doi: 10.1109/INFVIS.2005.1532123.



Two pictures in Amarna tombs of the main offering-place in the House of the Aten:
Above: in the tomb of Panehsy (after Davies, *The Rock Tombs of El Amarna, II, Pl. XVIII).*
Below: in the tomb of Meryra (after *Davies, The Rock Tombs of El Amarna I, Pl. XII)*

The staircase and offering-platform in the relief of the Great Aten Temple in the tomb of Meryra. Photo by Thomas Sagory.

Where the Amarna blocks came from: inside the limestone quarry behind the North Tombs. In the late 19th century it still contained the name of Queen Tiy. Photo by Barry Kemp.

Builders preparing the foundations for the southern set of large column emplacements at the front of the Great Aten Temple, November 2018. Photo Barry Kemp.

Mystery object from the temple. Front and back of a cake-like piece of gypsum. On the front surface, the figure of a man in a kilt sweeping a floor has been incised, although when complete it probably did not include the head. A dash of red paint has been added at the top. It is the best preserved example of a category of similar objects which depicted different shapes, sometimes hard to identify. Photo by Andreas Mesli.

The six daughters of Akhenaten & Nefertiti

by David Pepper

In 1847, Emile Prisse published drawings he made in Egypt as a supplement to Jean-François Champollion's 1835 book, *The Monuments of Egypt and Nubia*. Prisse's drawings inspired me to write this article. *The Akhetaten Sun* ought to have a write-up on Akhenaten and Nefertiti's daughters, since they are frequently shown in scenes from the Amarna Period.

Recently, Meretseger Books of Paris, France, posted a scan on of Prisse's book, *Monuments égyptiens* on their website [1]. In this book, Prisse supplemented Champollion's earlier publication with 100 chromolithographs of drawings he made at sites in Egypt. Among the drawings in Prisse's book are several scenes of Akhenaten, Nefertiti, and their two oldest daughters, Meryetaten, and Meketaten.

One drawing is from Karnak, two are from Amarna, and another is from Tuna el Gebel. Two of these drawings are reproduced below (Figures 1 & 3).

Prisse's drawings:

The scene of Akhenaten, Nefertiti, and two daughters drawn at Karnak (Figure 1) was drawn from fragments of talatat [2] blocks that were recovered from filler in the 10th Pylon. These blocks were either destroyed or lost, and the only records of them are Prisse's drawings. The blocks were probably originally from Akhenaten's Karnak Temple called the *Gem pa aten* (the sun disc is found), or its associated buildings, the *Hwt benben* (Benben Temple), the *Rud-menu* (Enduring Monument), and the *Teni-menu* (Exalted Monument) which were abandoned at the end of Akhenaten's reign.

In the Karnak scene, Akhenaten is shown on the left. To his right, in the center, is Nefertiti, and far right are two daughters, each holding a sistrum (a musical instrument that is shaken like a tambourine).

The inscription (detail in Figure 2) above the left-most daughter says ***nswt sa n ḥt f mr***, or "King's son, from his body, the beloved …", the rest is erased, as are the cartouches above the two girls. The title, 'King's son', got my attention. The two figures below holding sistras are clearly female, but the title of the left-hand figure is male. So, what's the story here?

I corresponded with Egyptologist Aidan Dodson, to get his thoughts about this oddity. He suggested that it is probably a copyist error. The copyist (Prisse) may have omitted the hieroglyphic letter 't", and the title probably should read ***nswt sat n ḥt f mr*** …, "King's **daughter**, from his body, the beloved …" Perhaps the block was damaged, or perhaps it was simply the artist's omission.

I then compared the Karnak drawing to Prisse's drawing of Boundary Stela 'S' at Amarna (Figure 3), which Champollion called 'Psinuala'. The Amarna drawing has the complete text above the two daughter's names. (photo of Stela S, Figure 4)

Here the inscription sketched by Prisse (detail in Figure 5) clearly reads *sat* ***nswt n ht.f mr(t.f) Mrytaten ms n hmt nswt Nfr nfrw Itn Nfrtity, ankh, wdja djet***, or "King's **Daughter** of his body, Meryetaten, whom he loves, child of Nefertiti, may she live, be prosperous, for eternity". The inscription above the smaller (younger) child is identical, except naming her Meketaten.

Prisse had arrived in Egypt in 1827 to work as a Civil Engineer, but by 1836 he was drawing and recording Egypt's ancient monuments. In an 1840 letter to Sir Gardiner Wilkinson, Prisse commented that he was trying to record scenes and inscriptions at Karnak Temple before their destruction by the 'Turks', who were dynamiting the temple to use its rubble in a cement plant.

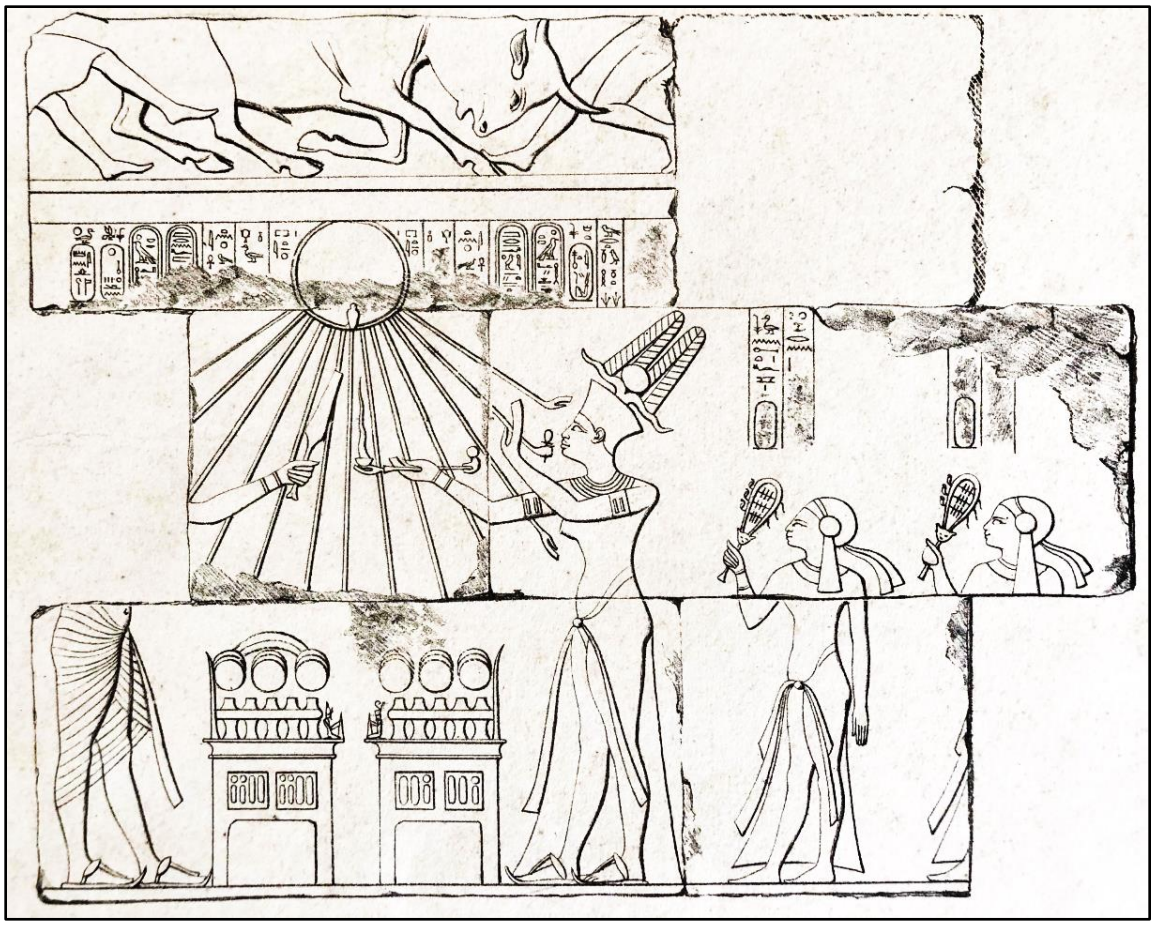


Figure 1: Karnak blocks, drawn by Emile Prisse [3]

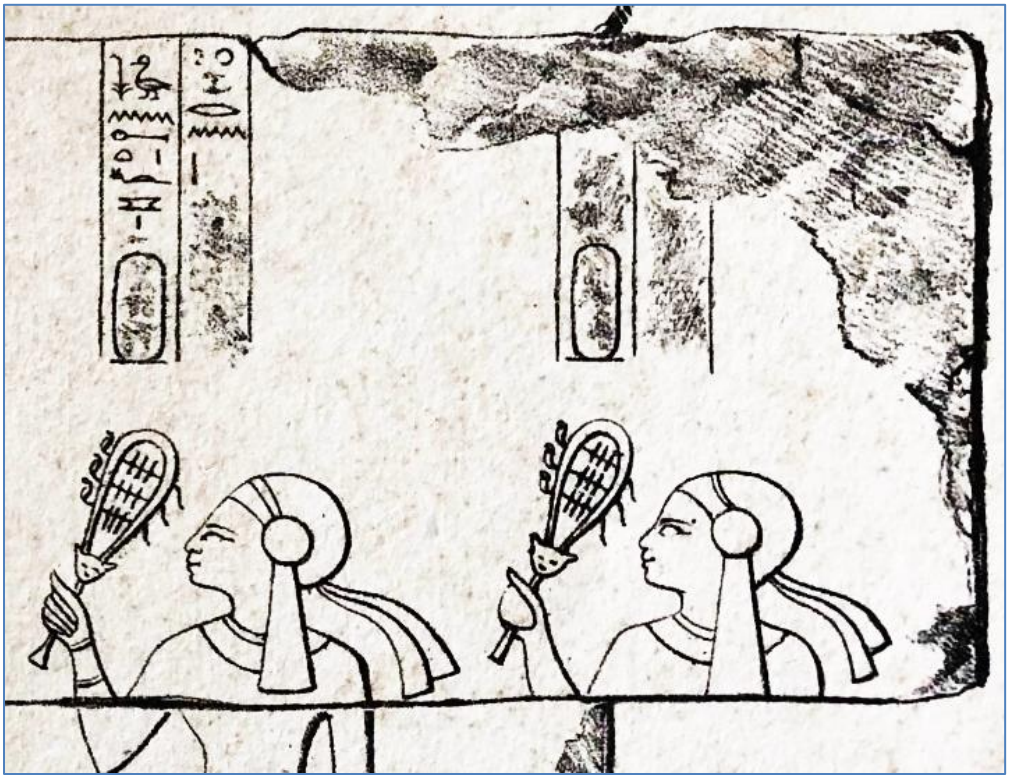


Figure 2: Detail of Karnak scene in Figure 1

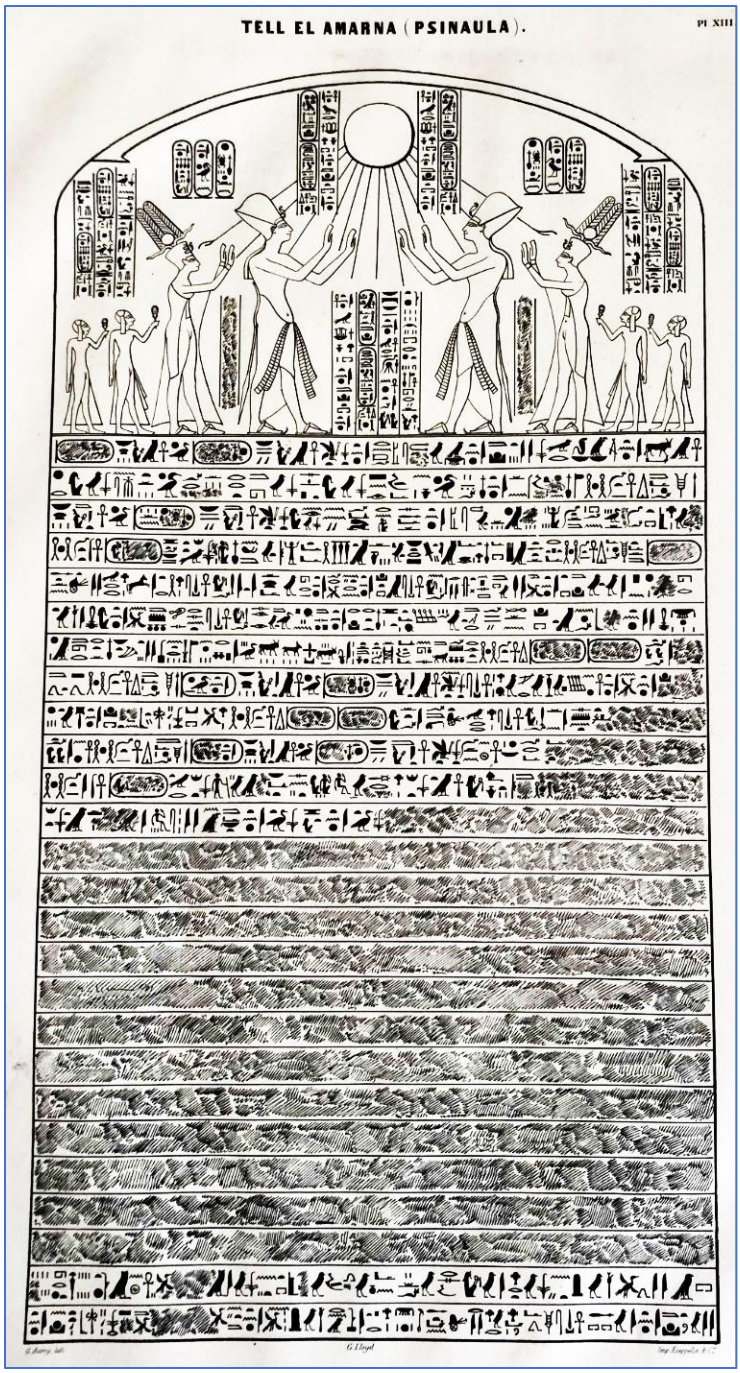


***Figure 3*:** Boundary Stela S, by E. Prisse [3]

Figure 4: Boundary Stela S photo [4]

In the 18th Dynasty, royal daughters were very important, as the oldest would usually marry the next king. Brother-sister marriages were, of course, not ideal, as they frequently resulted in genetic deformities and sterility. In close knit communities, like the inter-related royal families of Europe and ancient Egypt, anything closer than cousin marriages often spelled the end-of-the-line for a dynasty.

For this reason, as well as the very high infant mortality rates from malnutrition, disease, and unsanitary conditions, many of the children depicted in ancient Egyptian family scenes did not survive to become adults.

Figure 5: Detail on Prisse's drawing of Boundary Stela 'S' shown in Figure 3

THE THREE OLDEST DAUGHTERS:

An unusual, and unique, scene from a house shrine at Amarna shows Akhenaten and Nefertiti sitting with their three oldest daughters on their laps (Figure 6). Daughters were frequently depicted in early 18th Dynasty scenes, but no other scene is known where the king and queen show this level of affection. Each of the three daughters are named in the text on this carved stone altar.

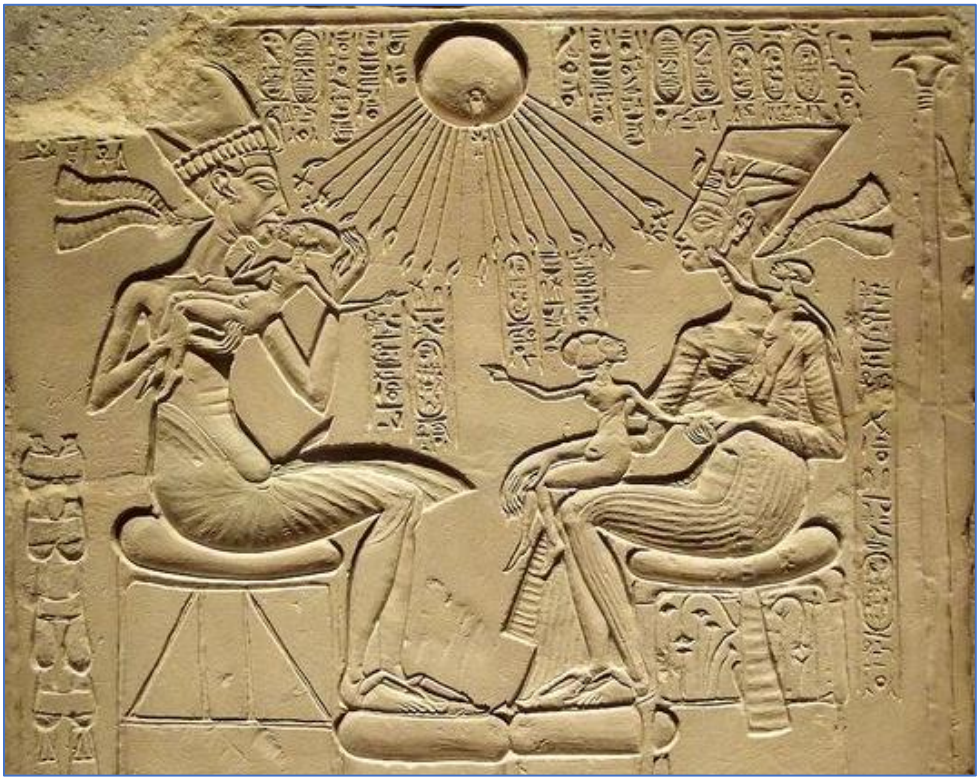


Figure 6: House shrine showing Akhenaten, Nefertiti, and three oldest daughters, Berlin #14145 [5]

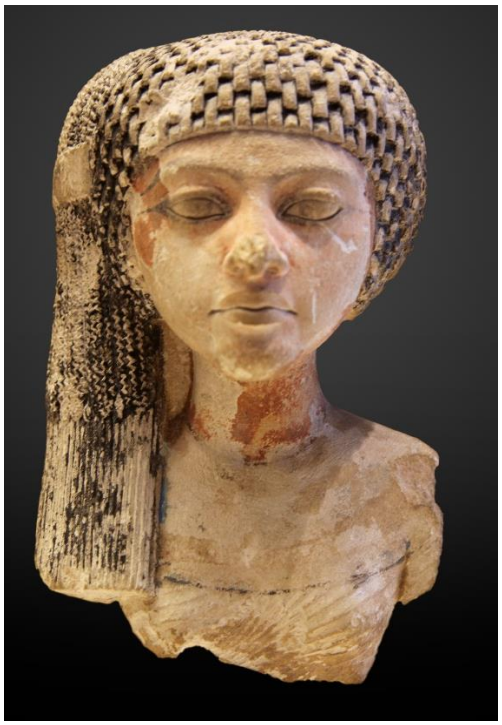


Figure 7: An Amarna Princess, thought by some to represent Meryetaten, Musée du Louvre, Paris

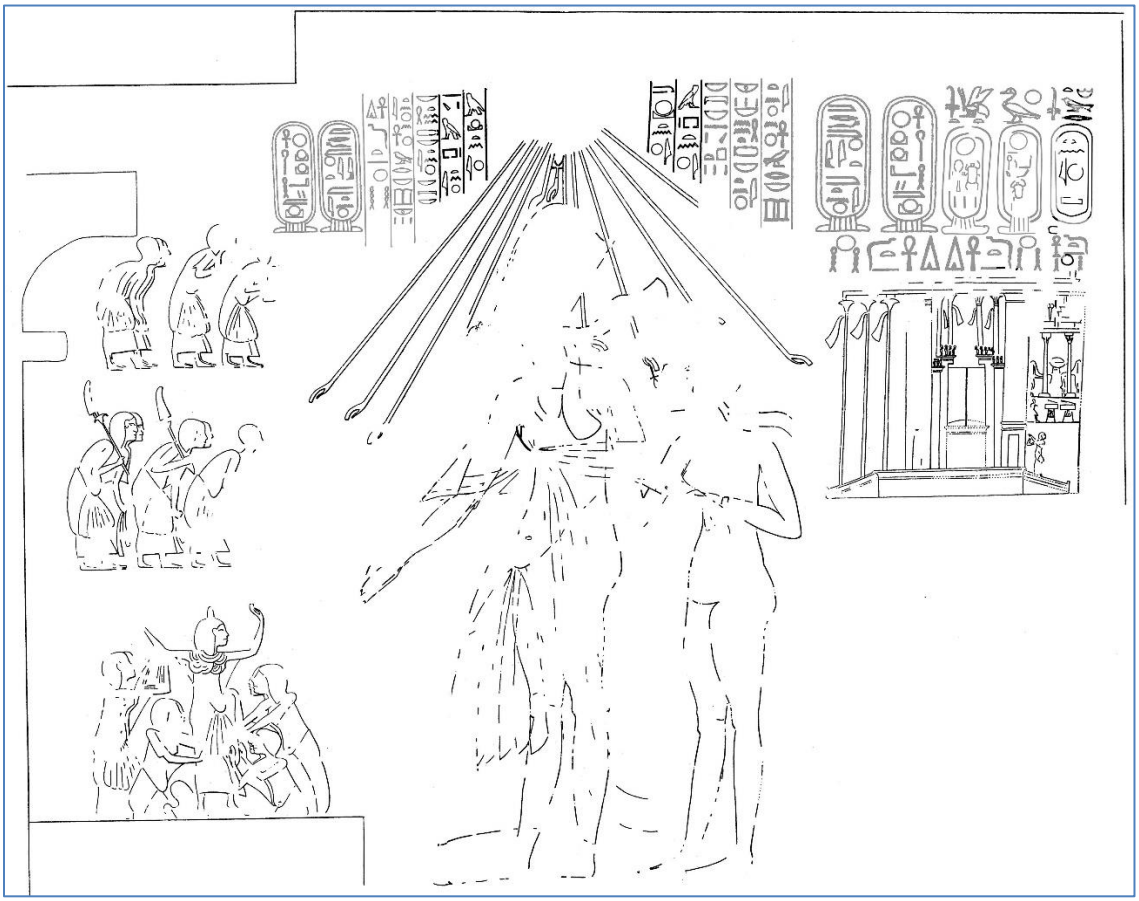


Figure 8: Meryetaten and Smenkhkare shown in the tomb of Meryre II. With the now lost cartouches in the upper right corner drawn in by Aidan Dodson on the basis of a squeeze (a reverse transfer using wet paper) now in Berlin, and the rest of lost text from the *Denkmaeler*.[6]

1. MERYETATEN:

Akhenaten and Nefertiti's oldest daughter, Meryetaten, which means 'She who is beloved of Aten', may possibly be shown in Figure 7. She was probably born in Thebes, perhaps before, or just as, Akhenaten ascended to the throne. Her name is sometimes spelled "Meritaten."

In the tomb of Meryre II at Amarna, Meryetaten is recorded as the Great Royal Wife of Smenkhkare (Figure 8), who may have ruled for a very short time after Akhenaten died in year 17. Smenkhkare may have been Akhenaten's younger brother, as postulated by Aidan Dodson in his article earlier in this issue, or perhaps he was Akhenaten's oldest son, although, if so, it is not known which of Akhenaten's wives was his mother.

An alternative theory is that Smenkhkare only reigned as co-ruler with Akhenaten, perhaps predeceasing him. Smenkhkare seems to have been succeeded by the short rule of a female king, Neferneferuaten (perhaps the throne name of Nefertiti). Some Egyptologists think that Neferneferuaten may also have co-ruled with Akhenaten.

In two of the Amarna Letters, Meryetaten is referred to as 'the mistress of (Akhenaten's) house'. The spelling of her name in cuneiform reads as 'Mayati', perhaps a clue to how her name was pronounced.

No records have been found of either the death or the burial of Meryetaten, or Smenkhkare.

2. MEKETATEN

Akhenaten and Nefertiti's second oldest daughter was Meketaten, whose name means 'Protected by the Aten'. She was probably born about Akhenaten's year 3, and is probably represented in one of the anonymous princess statues, like those shown in Figures 9 or 10.

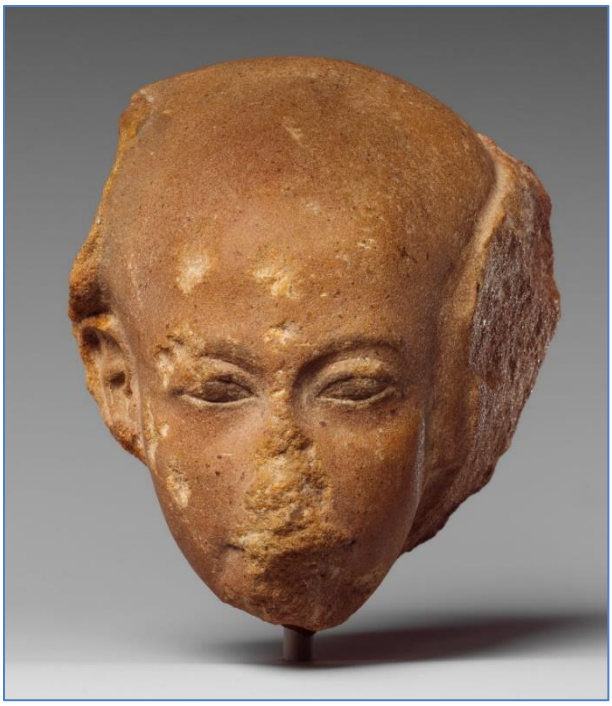


Figure 9: An Amarna Princess
Metropolitan Museum of Art, NY [7]

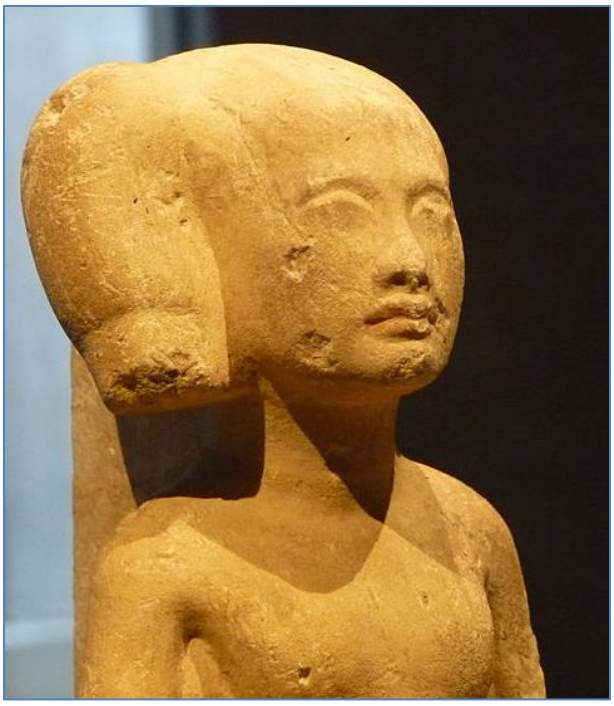


Figure 10: An Amarna Princess
Museum of Egyptian Art, Munich Germany

Meketaten is first depicted at the *Hwt benben* temple dedicated to Nefertiti at Karnak. At Amarna she's shown in several tombs, the most famous scene of which is in the Amarna Royal Tomb (Figure 11).

She died, probably unmarried, at about 11 years old, in year 14 of Akhenaten's reign. She was probably buried in the Royal Tomb at Amarna.

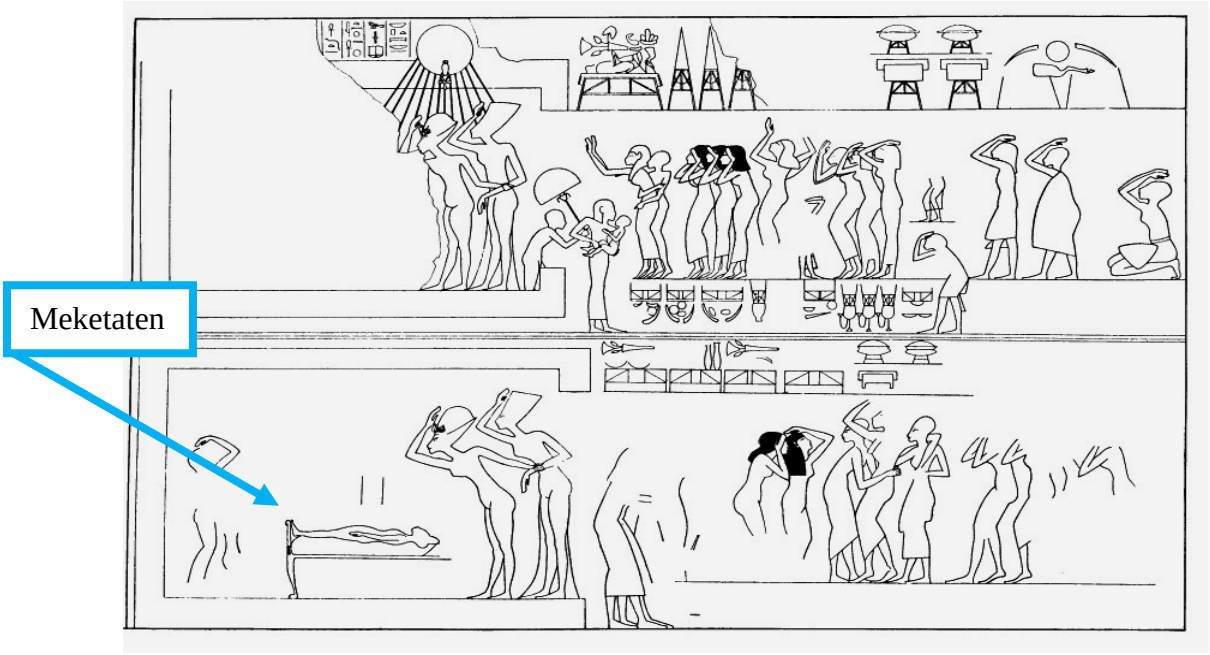


Figure 11: Meketaten on her deathbed, Amarna Royal Tomb room γ (gamma) [8]

3. ANKHESENPAATEN

The most famous of Akhenaten and Nefertiti's daughters was their third daughter, Ankhesenpaaten, whose name means 'She lives through the Aten'. Shown in Figure 12, she was born about year 4 of Akhenaten's reign.

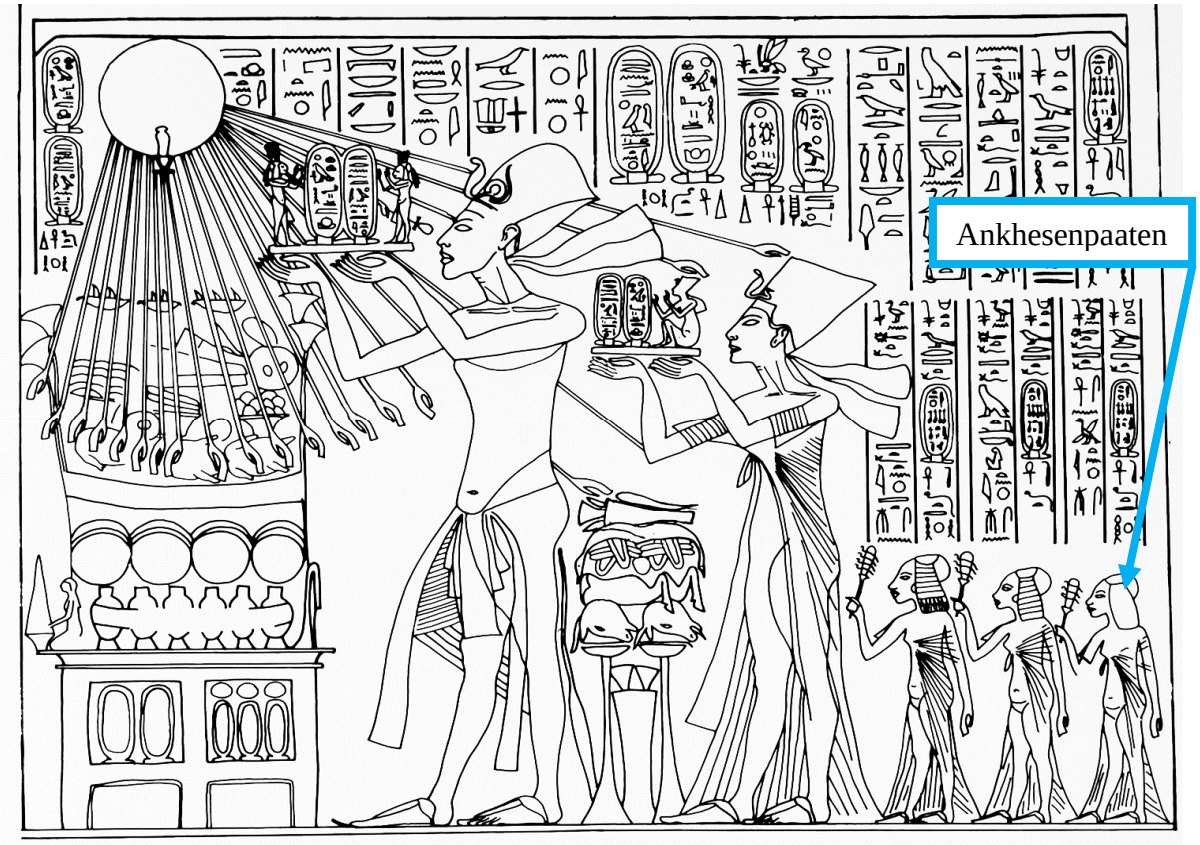


Figure 12: Akhenaten, Nefertiti, and their three oldest daughters, Meryetaten, Meketaten, and Ankhesenpaaten, from the tomb of Ipy [9]

After the brief rule of the female king, Neferneferuaten, Ankhesenpaaten's brother (or perhaps her half-brother), Tutankhaten, became king of Egypt at about 9 years of age. Soon after accession to the throne Tutankhaten married Ankhesenpaaten and thereafter changed his name, and that of his wife, to the now familiar Tutankhamun and Ankhesenamun (Figure 13).

Figure 13: Tutankhamun and Ankhesenamun [10]

After king Tut's death at around 19 years of age, Ankhesenamun seems to have married the next king, Ay, but the only reference to this marriage is a ring with double cartouches of Ay and Ankhesenamun, and she is not shown anywhere else as Ay's wife. Her tomb or mummy has never been identified.

THE THREE YOUNGEST DAUGHTERS:

In most tombs at Amarna, a maximum of four daughters are depicted: The three oldest, Meryetaten, Meketaten, and Ankhesenpaaten, and a younger fourth daughter, Neferneferuaten-Tasherit.

In Meryre II's tomb is a depiction (Figure 14) of Akhenaten's year 12 *Durbar*, a Persian term denoting an audience of dignitaries meeting with the king. Standing behind Akhenaten, who is seated on his throne, in the lower register (Figure 15) are Akhenaten and Nefertiti's three youngest daughters: Neferneferuaten-Tasherit, Neferneferure, and Setepenre.

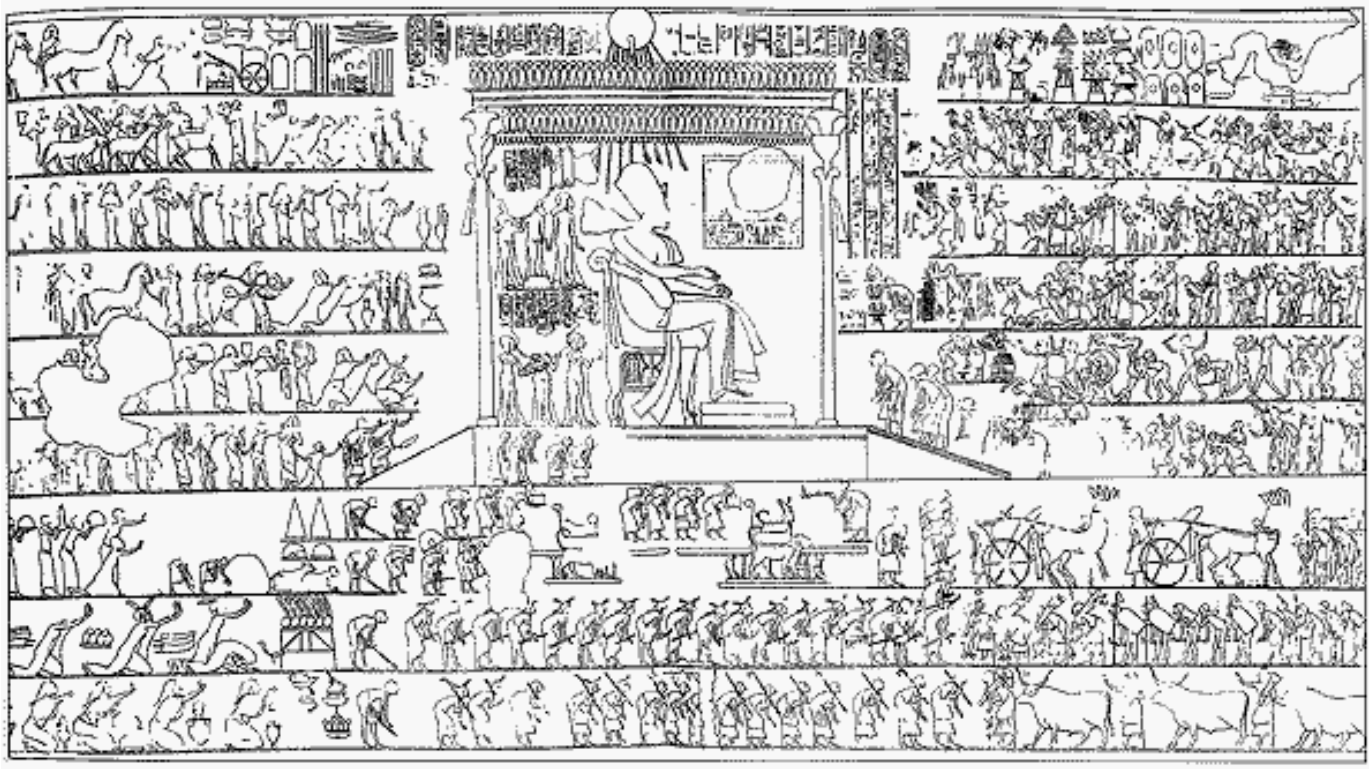


***Figure 14*:** Meryre II Durbar scene

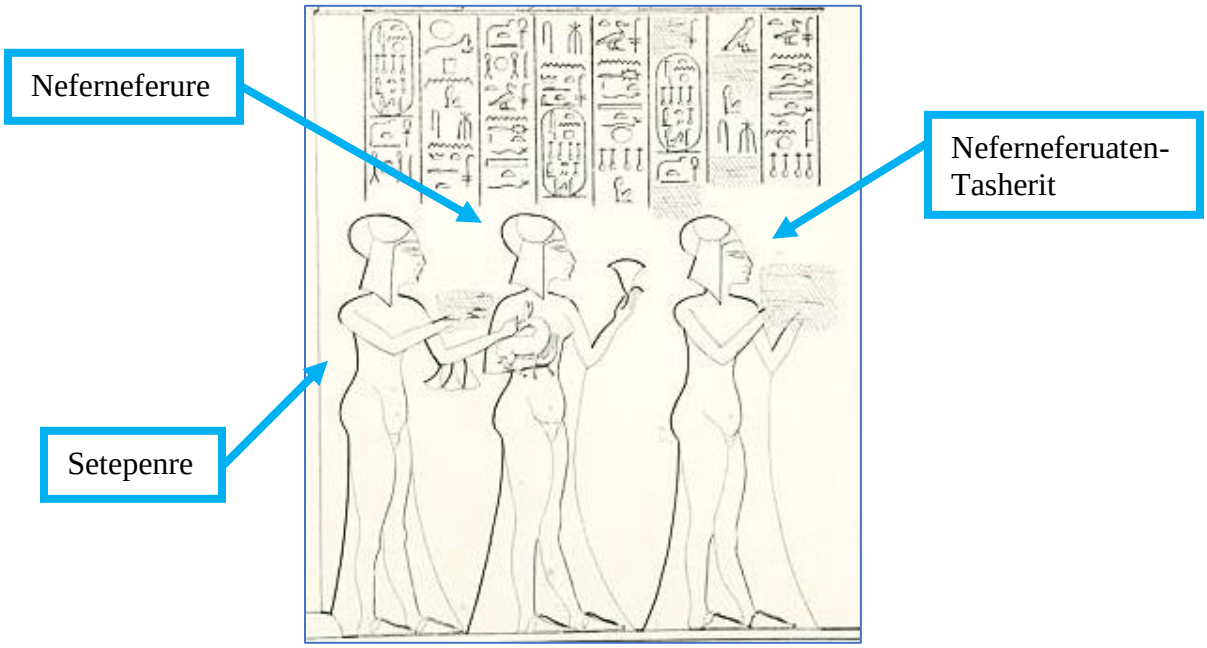


***Figure 15*:** Detail from Meryre II Durbar scene

4. NEFERNEFERUATEN-TASHERIT

Born around year 8 of Akhenaten's reign, Neferneferuaten-Tasherit was the fourth of the six daughters of Akhenaten and Nefertiti. *Neferneferuaten* means 'Most beautiful one of the Aten', and *ta-sherit* means 'the younger one'.

A scene in the Royal Tomb at Amarna, room γ (gamma) (Figure 16), shows Meketaten being mourned in a bower by Akhenaten, Nefertiti, Meryetaten, Ankhesenpaaten, and Neferneferuaten-Tasherit.

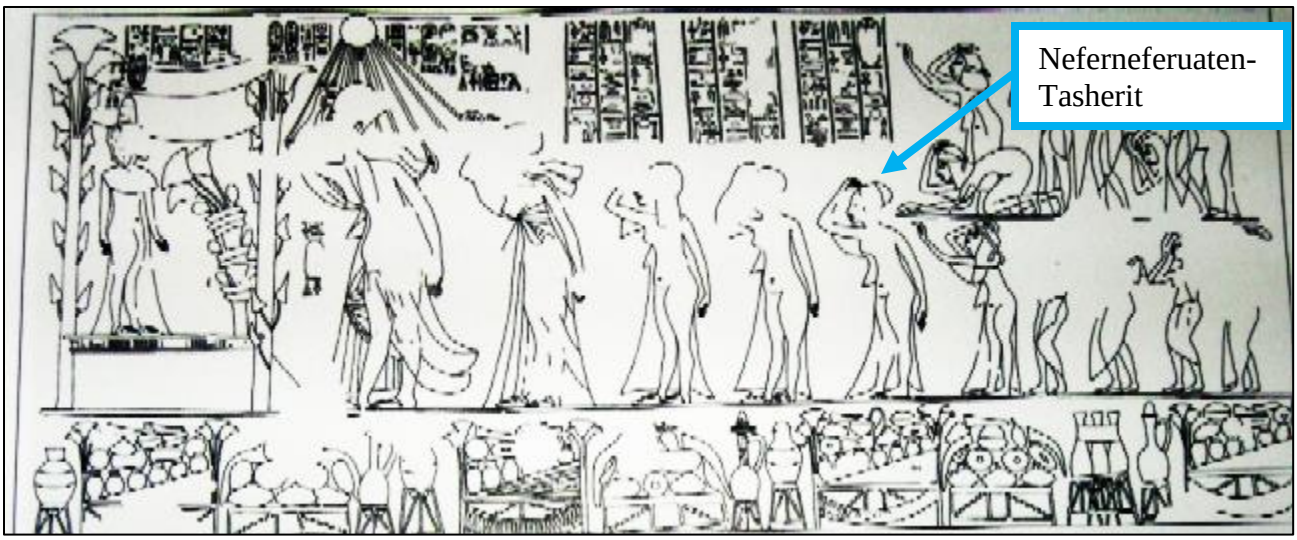


***Figure 16*:** Neferneferuaten-Tasherit and her family mourn the death of Meketaten

Neferneferuaten-Tasherit is also shown (Figure 17 on right) in a painted fresco from the King's House at Amarna. Figures 18 and 19 show the location of the scene of Neferneferuaten-Tasherit and her sister, Neferneferure, in the King's House. It is not known when Neferneferuaten-Tasherit died.

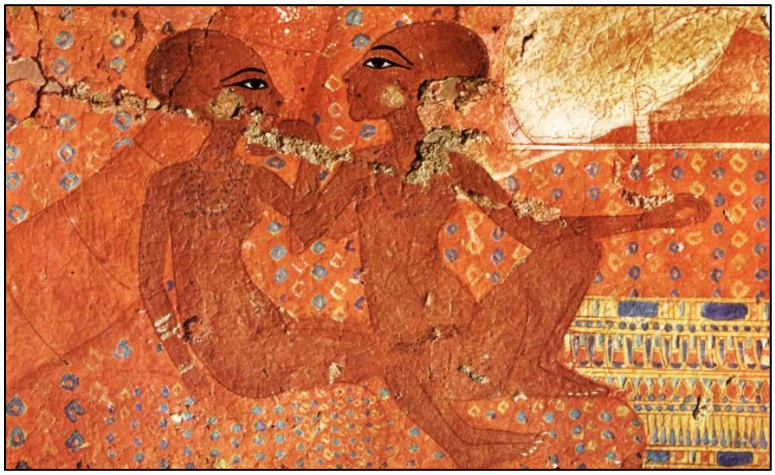


Figure 17: Neferneferuaten-Tasherit (right) with her younger sister Neferneferure from the King's House at Amarna

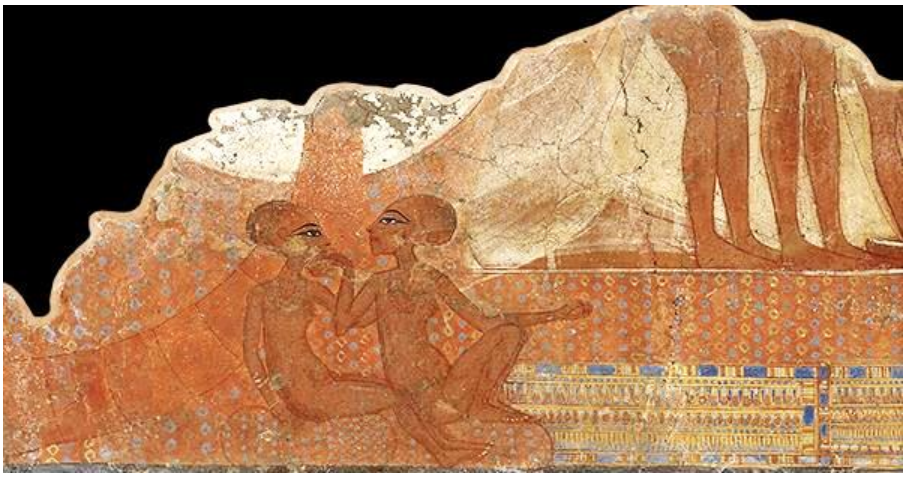


***Figure 18*:** "Princess Panel", now in Ashmolean Museum, Oxford [11]

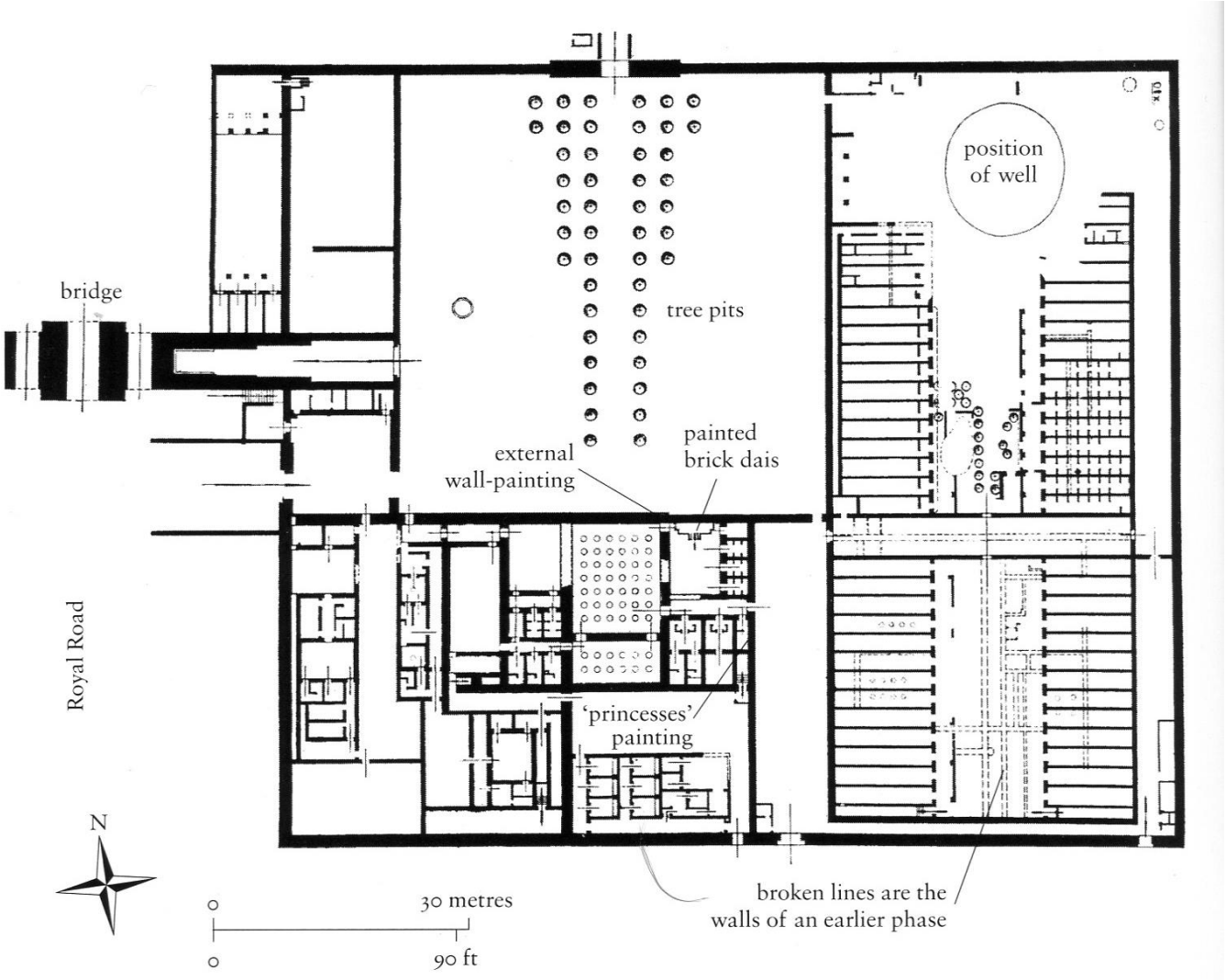


***Figure 19*:** Plan of the King's House, by Barry Kemp [12]

5. NEFERNEFERURE

Akhenaten and Nefertiti's 5th daughter was Neferneferure, whose name means 'the most beautiful one of Re'. She was born around year 8 or 9. Neferneferure is the other figure in the King's House scene (Figure 17 on left), shown sitting on a pillow with her older sister Neferneferuaten-Tasherit (Figure 17 on right). The King's House is the modern name for the building across the bridge from the Great Palace at Amarna. It consisted of an open court, a set of apartments, and a set of storerooms. Like most of the other structures at Amarna, its walls were mud-brick, plastered and painted, so very little is left of it.

In the scene of the death of Meketaten, four remaining daughters are shown mourning her, but the name of Neferneferure is plastered over, indicating that she also must have died at about that same time.

6. SETEPENRE

One of the earliest depictions of Setepenre, whose name means 'Chosen of Re' is from the King's House at Amarna. Very damaged, it shows her sitting in her mother's lap. Setepenre seems to have been born around year 9 or 10.

In year 12 she is shown on the *Durbar* scene, but her name is missing on a list of daughters inscribed in year 14 on wall C in room (alpha) in the Royal Tomb at Amarna, so she probably also died about year 14.

GROWING UP AT AMARNA:

The Great Palace was across the bridge and towards the river from the King's House. When first excavated, two areas of the Great Palace were named the 'North Harem' and 'South Harem,' but we now know they probably did not serve this function, but probably were ceremonial places.

During the 18th Dynasty, royal residences seem to have been divided into ceremonial buildings with reception areas and residences. The residences usually included a Royal Palace for the king, a Queen's Palace for the chief wife and her children, and a 'Harem Palace for lesser wives, their children and pharaoh's concubines. Usually, these were separate buildings, but sometimes they were separate wings of one large structure. These residences were usually surrounded with a wall, and apartments were built around a central pool, as is found at the Northern Palace (Figures 20 and 21).

The Northern Palace is a good candidate for the residential quarters of the queen and children, but again, there is no proof of this. Meryetaten's name and title (not in a cartouche) was carved on stonework at the Northern Palace, replacing the earlier name and title of Kiya, but it is not known why this was done. The 'King's House' had a depiction of the royal daughters on the 'Princess Panel' (Figure 18), now in the Ashmolean Museum in Oxford, but this building does not seem to have been a residence for the family. Also, the Northern Riverside Palace could have been a Royal residence, but it has mostly been destroyed by cultivation and the shifting position of the Nile river.

The most important officials of the court had their own houses, but lesser officials and servants resided along with the royal family in their 'palaces'. Since the king and queen traveled the length and breadth of Egypt on official duties, royal children were raised by women retainers such as wet-nurses and infant care specialists (nannies), *menat nswt*, and male tutors, called *mena nswt*. Both boys and girls in ancient Egypt were frequently depicted as naked until puberty, with shaved heads except for their side-lock of hair. Except in the hottest of weather, they probably did wear clothes much of the time, as Egypt can be cold during the winter months and at night. The daughters of Akhenaten and Nefertiti are often shown wearing diaphanous gowns like their mother.

Tutoring began at an early age, and at least for some royal children, this included learning to read and write, religious instruction, army training (for the boys), and participation in state ceremonies. The frequent depictions of Akhenaten and Nefertiti's daughters show they must have had to fulfill various ceremonial and state roles at Amarna. In fact, the daughters seem to have ownership of the 'Sunshade Structures', places of retreat perhaps intended for formal ceremonies.

***Figure 20*:** Northern Palace, Garden Court, Amarna, photo by Jill Taylor Pepper

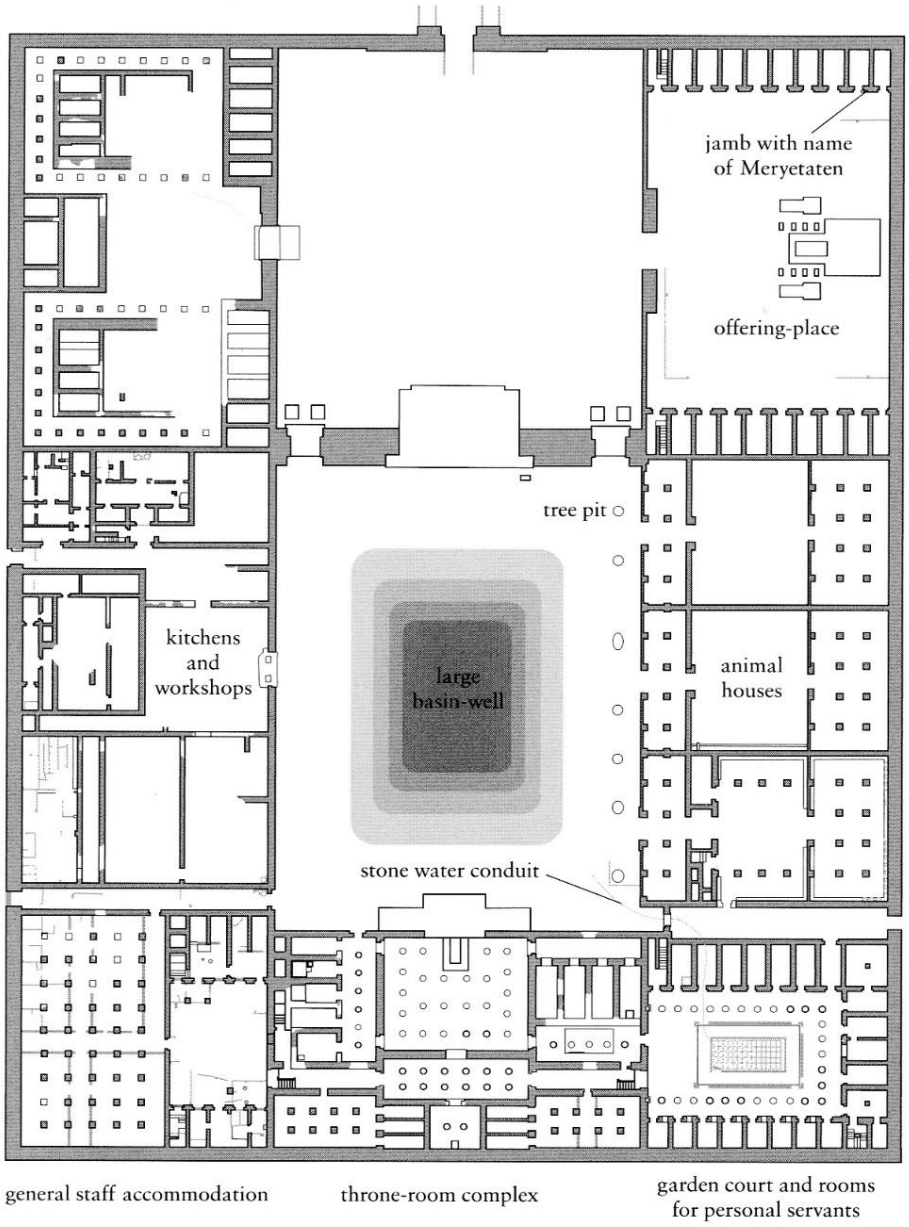


***Figure 21*:** Plan of North Palace, Barry Kemp [13]

ALL SIX DAUGHTERS:

All six daughters are shown in the scene from the year 12 *Durbar* (Figure 22). Setepenre seems to be the first to have died, probably in year 13 while still very young, perhaps 3 or 4. Meketaten is recorded as having died next in year 14, probably about 10 or 11 years of age. She was followed shortly thereafter by Neferneferure probably also in year 14. The older daughters seem to have fared better, but the date of their deaths have not been found.

It has been proposed that a plague swept through Egypt between Akhenaten's regnal years 12 and 15, as many members of the Royal family seem to have died then – Meketaten, Neferneferure, Setepenre, Queen Tiye, and possibly Kiya [14]. Since the *Durbar* involved dignitaries from all over the empire, and since it was recorded that plague ravaged much of the middle east during that time, it is possible that the *Durbar* spread this disease to Egypt. Indeed, a study of the debris found under the floor of the House of Ranefer, confirms that refuse was packed with fleas and the remains of other vermin. This could explain the spread of disease at Amarna [15].

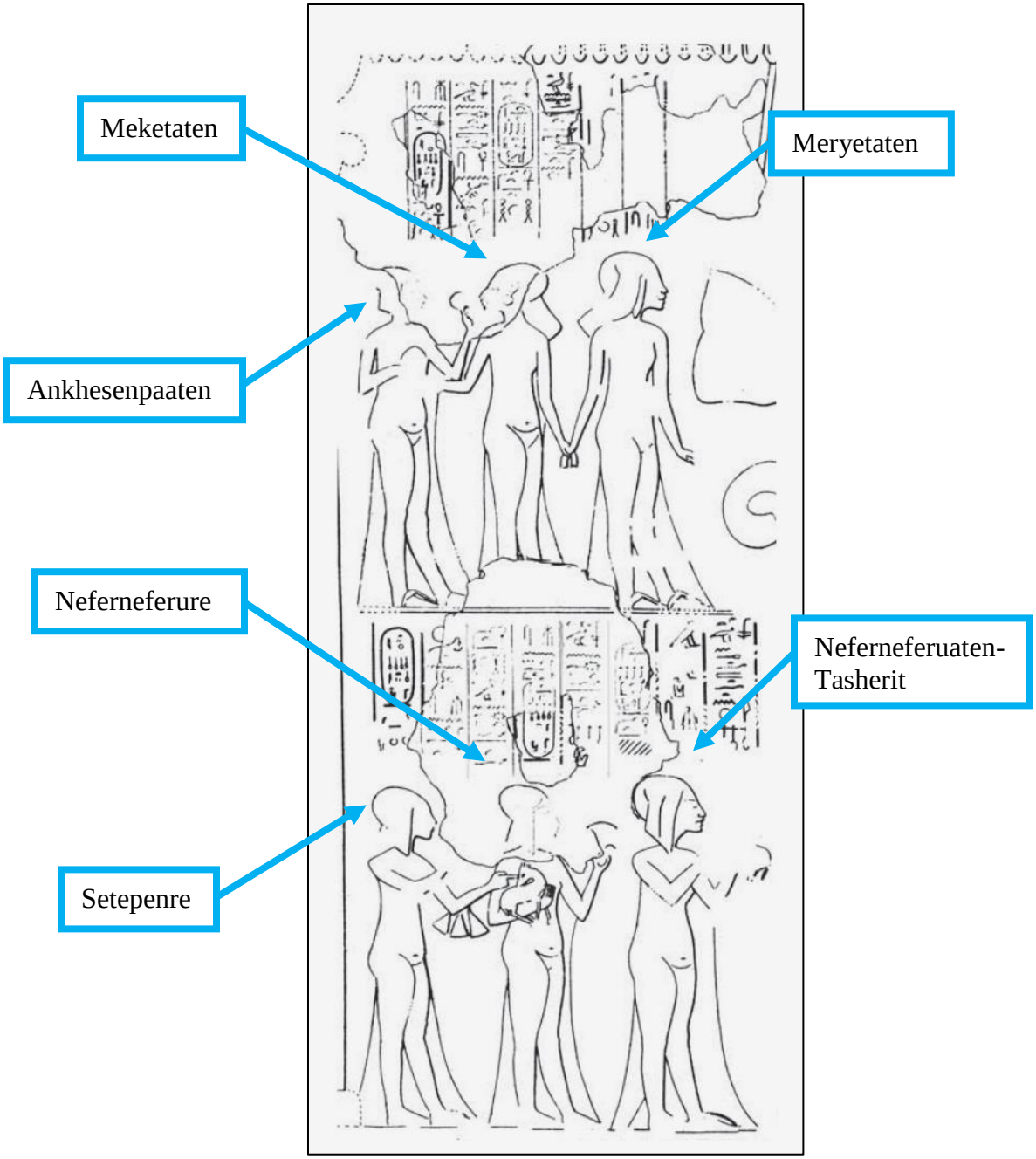


Figure 22: Detail of *Durbar* scene on east wall of Meryre II, year 12 [16]

END NOTES:

1. Full title: *Monuments égyptiens, bas-reliefs, peintures, inscriptions, etc., d'après les dessins exécutés sur les lieux par E. Prisse d'Avennes, pour faire suite aux Monuments de l'Egypte et de la Nubie, de Champollion le Jeune* (Egyptian monuments, bas-reliefs, paintings, inscriptions, etc., according to the drawings executed on the spot by E. Prisse d'Avennes, following the Monuments of Egypt and Nubia, of Champollion the Younger). It can be found at https://www.meretsegerbooks.com/pages/books/M6898/prisse-davennes-emile/monuments-egyptiens-bas-reliefs-peintures-inscriptions-etc-d-apres-les-dessins-executes-sur-les
2. Talatats are light-weight Amarna Period building blocks, one cubit in length, one-half cubit in width, and one-half cubit in depth. Ancient Egyptian cubit rods measure about 20.7 inches in length. Their use was discontinued after the Amarna Period.

3. The Prisse drawings are from the scan of his book by Meretseger Books.
4. *New Kingdom Amarna Period: The Great Hymn to Aten*, by Robert Hari, Leinden: E.J. Brill 1985, Plate XI
5. http://i-cias.com/e.o/slides/akhnaton_nefertiti01.jpg
6. Personal correspondence with Dr. Aidan Dodson
7. https://www.metmuseum.org/toah/works-of-art/2005.363/
8. *The Death of Meketaten*, by Jacobus van Dijk, p84
9. https://www.brown.edu/Departments/Joukowsky_Institute/courses/greatheresy11/files/15397491.pdf, and https://sites.google.com/site/historyofancientegypt/queens-of-egypt/amarna-princesses?overridemobile=true&tmpl=%2Fsystem%2Fapp%2Ftemplates%2Fprint%2F&showPrintDialog=1
10. https://www.smithsonianmag.com/smart-news/archaeologists-could-close-tomb-king-tuts-wife-180967858/
11. https://www.ashmolean.org/princess-fresco
12. *The City of Akhenaten and Nefertiti*, by Barry Kemp, p132
13. Kemp, ibid. p147
14. *Amarna Sunset* by Aidan Dodson, p13
15. *Underneath Ranefer's floors – urban environments on the desert edge*, by Eva Panagiotakpulu, Paul C. Buckland, and Barry J. Kemp, in Journal of Archaeological Science 37 (2010)
16. Dodson, ibid, p 14
17. https://www.metmuseum.org/art/collection/search/544058

Two Daughters of Akhenaten, Metropolitan Museum of NY [17]

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