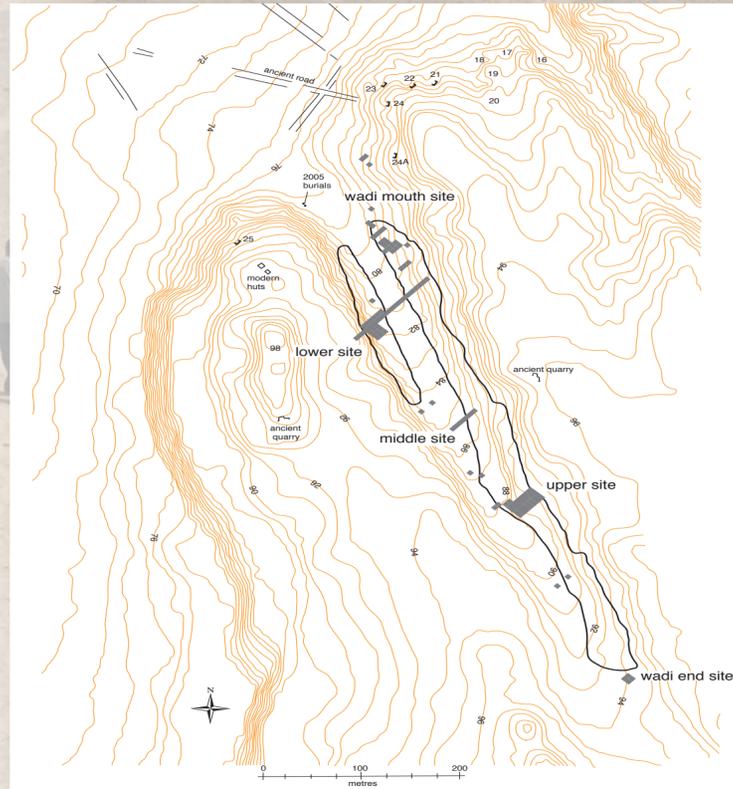


Piecing together coffins of the non-elite at Amarna

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Introduction:

The South Tomb Cemetery (STC) at Amarna is thought to contain the remains of several thousand people – some of the inhabitants of the 18th Dynasty city. It was a new capital city, built, at the command of the pharaoh Akhenaten, on new territory, on the East bank of the Nile, half way between Memphis and Thebes. Thousands of people migrated to Akhetaten ('Amarna') in order to build, live and work in the vast residential, administrative and religious centre. The city grew rapidly for almost two decades, until it was abandoned and dismantled following the death of Akhenaten. The STC is therefore a time capsule of life and death during a twenty-year period of ancient Egyptian history.



The STC project took place between 2006 and 2013. Excavation squares were opened throughout the wadi, from the Wadi Mouth to the Wadi End Site.

Excavations at the STC have uncovered over 364 graves, containing seven different styles of burial container:

1. Vegetable fibre coffin
2. Pottery coffin
3. Mud coffin
4. Undecorated wooden coffin
5. Decorated box coffin
6. Decorated anthropoid coffin – traditional style
7. Decorated anthropoid coffin – new Amarna style

These different types, their iconographic style and the materials and techniques used to construct them are described in detail.

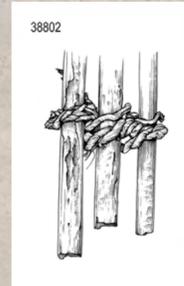
1. Vegetable fibre coffin:

The majority of the human remains in the STC were interred wrapped in vegetable fibre matting.

There are several different types of matting, made using sticks cut from tamarisk (*Tamarix sp*) which are small trees or shrubs; date palm (*Phoenix dactylifera*) leaf and leaf mid-rib; halfa grass (*Desmostachy bipinnata*); sedges (*Cyperus spp*); rushes (*Juncus spp*); and reed (*Phragmites Australis*).



Vegetable fibre 'coffin' with carrying rope

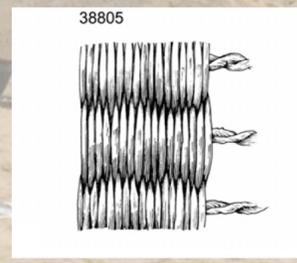


Matting Type 1

The most common type, often forming the outer rigid layer of the 'coffin bundle', is made from stiff palm mid-rib or tamarisk (Type 1). It has long stakes of tamarisk or palm mid-rib 'sticks', which are joined together at intervals with cord of palm leaf or grass. When fresh, this type of matting 'coffin' would have provided a strong container in which to carry the body to the wadi for burial. Some of the burials have carrying ropes, which would have further facilitated this.



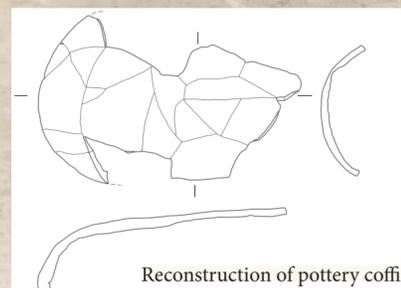
Decayed remains of Type 2 matting



Matting Type 2

A second type of matting (Type 2) is more densely woven, forming a sheet, the internal bundles of grass or palm leaf are entirely concealed by the 'weavers' tightly twined on the outside. Being made from bundles of grass or strips of leaf, Type 2 would have had more flexibility than Type 1 and covered the body somewhat like cloth.

The production of these types of matting would have been quick, and compared to constructing a wooden coffin it would have been cheaper (wood was a valuable commodity in Egypt). It is likely that a carpenter would have been required to make a wooden coffin, whereas the materials for the matting could be collected locally and, conceivably, woven in a domestic setting.



Reconstruction of pottery coffin

2. Pottery coffin:

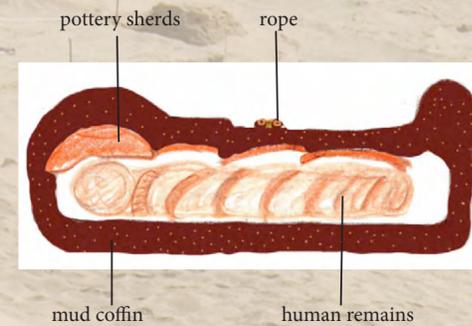
There are some rare examples of pottery coffin fragments found in the STC. Unfortunately, none were in the graves - the fragments were found during a surface survey. Some pieces of this type have been reconstructed.

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3. Mud Coffin:



There is a single example of a child-sized coffin modeled from mud (40103). This has an anthropoid form, with the impressions of a wig, rounded face, shoulders and raised foot. Ropes fashioned from vegetable fibre remain wrapped around the coffin body, perhaps from carrying the coffin to the wadi. In the future, the mud will be analysed, to determine whether the constituents were modified to make the coffin (by the addition of dung or chopped grass for example).



mud coffin human remains

During extraction from the grave, the base of the coffin became loose. This meant the coffin could be inverted in the lab and the interior examined. Inside were the remains of an infant and numerous large potsherds which had been placed over the body to provide definition around which to build the lid of the mud coffin.

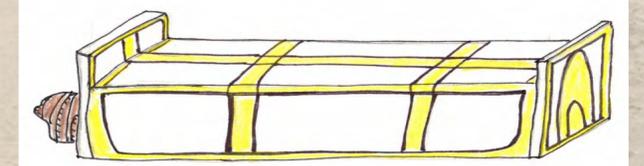
5. Decorated box Coffin:

A number of small wooden coffins containing infants were uncovered in the STC but only one of these was decorated. This is a rectangular box coffin (40106), made from four straight wooden planks, butt joined at the corners, and it has small raised wooden sections on the foot and head boards. The lid was fashioned from a single plank and rested on wooden strips attached to the interior of the head and foot board.



40106 Box coffin for an infant (Image by Nicole Peters)

This coffin was coated in white plaster and parallel, transverse and longitudinal black lines of paint were applied thickly to the plaster, dividing the outer surface into text bands and image panels. The black bands were painted yellow but the 'image' panels were left blank.



Yellow and black design. Wrapped feet protrude from the foot board

The deceased child was wrapped tightly in linen bandages and evidently too large to fit in the coffin. The coffin was adapted to accommodate the body by removing a piece of the end plank and pushing the wrapped toes through the hole so they protruded out through the end - perhaps evidence for coffin reuse.



Double curve design on coffin foot (Image by Nicole Peters)



Triangular shaped stele from the STC

On the head and foot plate of this coffin a similar colour scheme was used to delineate two concentric curves, one within the other. This form is similar to limestone grave stela found in the STC, which have a distinctive pointed shape, finishing at the top in one or more triangles. The curved iconography may imply a solar association, or perhaps depict something similar to the offering loaves on the foot end of coffinette found by Pendlebury in the Central City at Amarna (BM cat. no EA63635).

Interestingly, as you can see in the image above, preservation of the wood in areas painted yellow is a lot better than elsewhere on the coffin. A possible explanation of this is discussed in the following section about the pigments.

STC anthropoid coffins

The remains of twenty painted wooden coffins have been excavated from the STC. All are in poor condition, but of the seven best preserved examples, all are of the 'black type' and anthropoid in shape, with hieroglyphic text painted in yellow/white. Others are preserved only as small painted plaster fragments, but it is possible to tell, from the wood-traces in the ground that they were probably all anthropoid coffins. Only small painted plaster fragments remain of coffin (37841), but we know for certain that it was anthropoid because the red-painted plaster ears which originally attached to the side of the face are preserved.

The coffins display a system of transverse mummy-strap text bands extending from the lid to the case and longitudinal bands intersect the body of the coffin. The case walls feature the same system of alternating text columns and image panels, and the orientation of text and images is the same as before the Amarna period. However, the contents of the



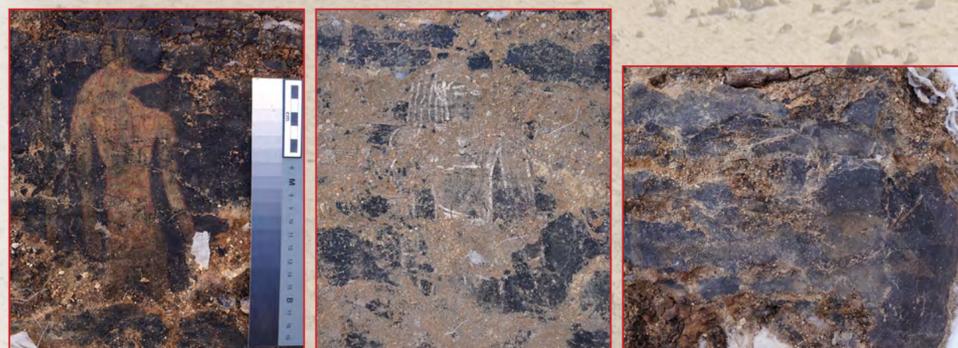
37841 - painted plaster, including one red-painted plaster ear (top-left of image)

6. Decorated Anthropoid Coffin - Traditional style

Three coffins have been excavated which appear to preserve the traditional pre-Amarna period style of decoration. This is the BD 151 decorative scheme, which placed the deceased in the role of Osiris in a mytho-ritual drama of resurrection (Barbra Lüscher:1998). The name of the deceased (Tiy) is partially discernible on one coffin of this type (40105).



Coffin13438 - proper left-side of coffin case



1. Well preserved jackal-headed figure from panel centre

2. The red outline of the figure has been manipulated to reveal a human headed figure, in white for clarity

3. Large wejat-eye on far right of coffin panel

The proper left side case wall of the coffin (13438) is undergoing conservation. Although the decoration is only partially preserved, two figures have now been revealed. Both have short legs, wear kilts, have long extended arms by their sides and strong shoulder musculature. The central (and better preserved) figure has a jackal head. The other figure – only partially preserved - has a human head. At present we are unable to say whether the other figure/s – which may be the other two of four sons of Horus - were rendered with human or animal heads. At the far right of this panel there is a large wejat-eye. There is no varnish coating on this coffin.

Following further conservation to stabilise and remove further surface encrustation, techniques such as RTI will be used in an attempt to discern further details of the text and decoration.

7. Decorated Anthropoid Coffin - New Amarna style

There are three adult coffins, which display a new decorative scheme, so far unattested outside Amarna. Names are discernible on two of these - Hesyenre /Hesyenaten (13281) and Maya (38819).

With these coffin types, the traditional references to the Osirian constellation of funerary deities have been replaced by human figures involved in ritual activity. Recurring motifs include images of male offering-bearers and women in the mourning pose, and offering-tables or alternatively the wedjat-eye on the left and right shoulder position of the coffins. The texts, where discernible, on these coffins contain prayers for offerings and other benefits in the afterlife.



Digital reconstruction of partially complete proper right side panel of coffin (13262) Image by Gwil Owen

It is not possible to discern the name on coffin (13262). The figures are painted by a relatively skilled hand, but the hieroglyphs do not form coherent sentences, suggesting that the painter (and customer) was illiterate.

The image below is the proper left side of the coffin, and on the left is a large offering table - a typical feature of the 'New-Amarna' style. There are no traces of varnish on this coffin.

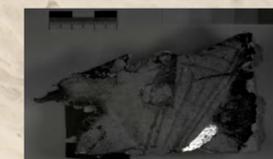


Coffin (13281) below is another 'New-Amarna' style coffin. The painting is low quality with uneven lines and crooked text panels. Multi-spectral imaging - more specifically V-IL (which is visible-induced luminescence in the infrared range), was used to characterise the spatial distribution of Egyptian blue on the coffin.

V-IL has also proven itself useful as a technique for 'seeing-through' discoloured varnish which is obscuring paint on the coffin surface.



4. Fragment from (13281) yellow figure with thick varnish coating.



Presence of Egyptian blue pigment confirmed with V-IL luminescence. Obscuring layers of varnish are rendered invisible under V-IL.

Concluding remarks

Researchers studying and analysing the South Tomb Cemetery coffins are in agreement that the coffins were probably produced at Amarna, primarily from cheap, local materials. The apparent ubiquitousness of yellow orpiment (commonly assumed to be a rare and expensive pigment) on the coffins is intriguing. Perhaps orpiment - the way it glistened in the sun and its evident preservative qualities - had symbolic importance to ancient Egyptians as part of the burial ritual.

The STC coffins' advanced level of decay, coupled with complications imposed by only being able to work on them in the dig house at Amarna, make them an immense challenge for both conservation and research. Nevertheless, their uniqueness make these challenges

Wood usage

Wood structure was observed under magnification in the transverse and longitudinal, tangential and radial break or section. Analysis during the 2015 conservation season revealed six woody taxa among which *Ficus sycomorus* was most frequently found. Occasionally present were *Acacia nilotica*, *Tamarix* sp., *Prunus* sp. Palmae and in a few pieces of *Cedrus libani*. All coffin planks were fashioned from sycomore wood which is a locally-available tree which grows to a large size. The joints, tenons and dowels, that held the coffin parts together, were made from the hard and strong wood of *A. nilotica*, and some of *Tamarix* sp.

C. libani occurred only in one sample, suggesting it was probably reused from another coffin or object.



Sycomore: diffuse-porous vessel distribution and regular alternation of parenchyma and fibre bands, which create distinct colour streaks.



(40107) Small well preserved panel with jackal head on the right. Three wooden dowels penetrate through to the back, where the wood tapers into a scarf joint. Traces of pink plaster remain on the edge.

Serious biodeterioration of all coffin wood has limited its potential for providing information about wood joinery. However, some fragments which have avoided damage suggest that simple wooden dowels were the primary method of joining panels and planks together. Traces of recesses and dowel holes in the edges of lids and cases, and a few loose wooden elements which look like tenons, suggest that the lids of the anthropoid coffins were attached to cases with internal mortice and tenon joints.

Mortar analysis



Plaster section from headboard region of (40106) box coffin. Lime and gypsum were not burnt hot enough to produce an effective mortar.

Analysis of the plasters shows that a variety of different mortar types were used on the coffins, with a single layer applied on coffin interiors, and two layers applied on the exteriors.

Further analysis is needed to categorise the plaster types for each coffin but what has been found out so far is that they are "lime-gypsum", containing mineral aggregates of fine to middle grained lime stone powder, small gypsum particles and traces of clay (aluminium silicate), quartz sand, and sparse organic fillers, embedded in a matrix of calcium carbonate and gypsum.

The raw materials processed for the plaster production generally appear to be local clays and soils mined in the close or slightly wider vicinity of Amarna.

Pigment analysis

During the Amarna period, a relatively narrow range of inorganic pigments was utilised for coffin decoration - making identification of many of these materials relatively straightforward using a combination of X-ray Fluorescence Spectroscopy and Polarised Light Microscopy.

Black: Appears to be carbonaceous as phosphorus is not detected (an element indicative of bone black), and iron levels are too low to indicate the use of magnetite.

Red: Only used to outline some figures, as a wash on some interiors and the plaster ears from (37871) - consistently high iron levels suggest the use of an iron(III) oxide pigment.

Blue: Used to highlight board collars on the offering figures, and on some coffin lids - the detection of copper by XRF strongly suggests the presence of Egyptian blue because this synthetic pigment is a combination of cuprorivaite and copper wollastonite.

Yellow: Yellow/white hieroglyphic texts on the 'new type' seems to be a combination of yellow ochre or goethite and an arsenic-based pigment, probably orpiment. Arsenic is strongly detected in the yellow paint of the offering bearers on the 'new-type'. It is probably not a coincidence that the wood which has the heaviest layer of yellow paint tends to be well preserved - almost certainly due to the toxic properties of arsenic. The pigment has likely altered through time to an arsenic oxide with corresponding partial loss of colour, making it hard to detect without XRF.

The absence of arsenic detected in the yellow/white pigment on the traditional-style 'jackal' (13438) coffin and elevated iron levels suggest that yellow ochre or goethite was used on this coffin. Similarly, where there is a yellow wash on several of the coffin interiors, high levels of iron suggest the presence of yellow ochre.