Amarna South Tombs Cemetery
Preliminary Report on the 2013 Excavations and Artefact Conservation

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**Introduction**

The 2013 season of excavations at the South Tombs Cemetery ran from 30 March until 1 May. The excavation team comprised Anna Stevens, Amelie Deblauwe, Delphine Driaux, Ashley Hayes, Conni Lord, Megan Paqua, Melanie Pitkin, Mary Shepperson and Reinert Skumsnes. Conservators Julie Dawson, Jennifer Marchant and Flavia Ravaioli worked mainly in the Dig House on the decorated wooden coffins excavated at the site in previous seasons. The Supreme Council of Antiquities Inspector was Ms Shimaa Sobhy Omar, to whom we extend many thanks, along with the staff of the Minia and Mallawi SCA offices.

**Background and aims**

The South Tombs Cemetery lies in a wadi in the eastern cliffs of Amarna, and is the largest of a series of desert cemeteries that were used by the non-elite of the city of Akhetaten in the late Eighteenth Dynasty. The burials are very simple, the bodies usually laid in an extended position, wrapped in textile and rolled in a mat, often made of a reed or stick-like material, and placed singularly in a pit in the sand.

The South Tombs Cemetery Project aims to explore the health, life experiences and beliefs of the people of Amarna through an integrated study of their skeletal remains and burial practices. Fieldwork at the cemetery began in 2005, with a collection of surface bone and pottery, and excavation has been undertaken annually since 2006. The 2013 season was the last excavation season scheduled prior to the final analysis of skeletal material and artefacts, and the full publication of the project results.

The excavation strategy has been to open a large excavation area at a location about two-thirds of the way down the wadi (the Upper Site), whilst jointly sampling other areas (the Wadi Mouth, Lower and Wadi End Sites) to test for variation in the way in which the cemetery was used (Figure 1). A noticeable trend has been the larger number of multiple burials at the Upper Site, and slightly less orderly appearance of burials here, than at other areas. This raises the important question of whether these were simply family burials, or whether this part of the site was in use when the population was under attack by a disease that saw the use of ‘mass’ graves.

This season our main aim was to increase the sample of human skeletons, ideally to the overall project target of 400 individuals. Further excavations were undertaken at the Upper Site, and at the Wadi Mouth Site, where a number of burials were identified late in the 2012 season and left uncleared. A new excavation site, the Middle Site, was opened in the large expanse of ground that had remained unexplored between the Upper and Lower Sites, to gain a further sample of skeletons here and again test for variation in burial practice. In the last couple of weeks of the season, a few test squares were also opened along the south-west edge of the cemetery, to check for its limits.

**Progress of excavation and results**

The surface of the cemetery is scattered with pieces of bone, sherds and boulders that represent the remains of disturbed burials, the cemetery having been extensively robbed, probably some time in the very distant past. The robbers usually rummaged through the interments, particularly the upper body, but often left much of the dislodged bone within the grave itself. The looting was so widespread that it destroyed most of the ancient surface of the cemetery, including the stacked-stone cairns that probably marked the locations the graves. In order to find the burials now, it is necessary to excavated the overburden of sand across each grid
Figure 1. Plan of the South Tombs Cemetery showing the 2013 excavation areas (base map by Helen Fenwick and Barry Kemp).
square until the grave pits or skeletons become visible. The depth at which this occurs varies according to the local topography, and this season ranged from essentially the current surface of the site to around 80 cm. Usually, the grave pits are visible only where they cut through horizons of more compact sand that underlie the upper layers of softer windblown sand. Sometimes, almost nothing remains of the grave cut itself. The pattern of excavation, therefore, is to remove the surface sand, immediate sub-surface layer, and lower horizons of bulk sand across each grid square until the graves emerge, at which stage each is individually investigated. All of the spoil is sieved, and all material culture and bioarchaeological material is collected, with each individual set of skeletal remains given its own ‘Individual Number’. The bones were studied by the bioarchaeological team from the University of Arkansas and Southern Illinois University in mid-2013, and the study of the human remains will be completed in 2014.

The work at each of the excavation areas is summarised below.

**Wadi Mouth Site (M. Pitkin)**

At the conclusion of the 2012 South Tombs Cemetery season, 11 burials were left unexcavated in the three southernmost grid squares (AL111–AN111). These were revisited over the first two weeks of the 2013 season, revealing a further four burials which intersected with the northern and southern walls of AM111 and AN111 (Figure 3). These 15 burials were excavated by Melanie Pitkin, Reinert Skumsnes and Dr Delphine Driaux.
Figure 3. The Wadi Mouth excavation site, showing the grid squares excavated from 2010—2013. Plan prepared by Melinda King Wetzel.
Of the 15 graves excavated, two were devoid of human remains. This includes one which possibly belonged to a child (as indicated by the short length of the grave cut) and also the only coffin found at the Wadi Mouth during the season, of which only painted plaster fragments survived. In both cases, the burials were highly disturbed by looting. All remaining 13 burials were also disturbed, with skulls recorded for only three individuals.

All of the Wadi Mouth individuals were interred singularly, with no examples of multiple burials. The graves themselves were quite evenly spaced and tended to conform to a (grid) north-west/south-east orientation, with two oriented sharply (grid) north-south. Where the posture of the skeleton could be identified, all appear to have been buried on their back (Figure 2), the usual position at the cemetery. Only one object was recovered this season, a blue-green faience scarab in the burial of Ind. 336. As with previous seasons, however, the state of preservation of human remains was relatively good and hair, desiccated skin and toe nails were encountered quite often.

Upper Site (M. Shepperson)

Four 5 x 5 m squares were marked out at the Upper Site on the 30th of March 2013, and excavation was begun on the 31st of March. Two of the four squares under excavation, H55 and G55, were on the eastern slope of the wadi, contiguous with the area previously excavated (Figure 4). The other two squares, F56 and E56, were located on the wadi floor which has never previously been excavated at the Upper Site. These two areas were offset from each other in order to avoid a large spoil heap from previous seasons. Excavation was continued until the 21st of April when the Upper Site was closed.

The surface level of each square was photographed and recorded before the surface deposits were removed to a depth of 10–15 cm. The sub-surface bulk material was then removed down to the level at which grave cuts became visible. In the case of G55 and H55, this was 30–50 cm below the surface; in F56 graves appeared after 50–60 cm had been removed from the slope up from the wadi floor on the eastern side of the square. In E56 no graves were found and the material was removed as a single bulk deposit. In general, the graves were dug from the level at which they could be identified. Material below the level of the highest visible graves in each square was removed as a separate deposit until no more graves could be found. The material was removed by the workmen in 5–10 cm spits with 100% of all deposits sieved.

Square H55

The upper deposits of H55 contained a fairly large amount of burial material, suggesting a high level of grave robbing activity. Skull 310 was found near the south-east corner in a cluster of large stones, but no other significant clusters of material were found in the upper deposits. Five grave cuts were identified in H55, although one intruded too far into the northern baulk to be excavated. Three single burials were excavated, containing Inds 345, 355 and 356. Of these, the burial of Ind. 355, intruding somewhat into square I55, was notable for the unusual quantity and quality of the plant fibre matting used to wrap the body. Sections of this matting were removed by the conservation team.

The final grave to be dug in H55 was a triple burial in a wide, deep cut, unusually containing three adults; Inds 357, 358 and 359 (Figure 5). The three bodies remained partially in situ side-by-side at the bottom of the grave, with the middle body laid in the opposite direction to the others. They each had a separate and different plant stem coffin and appeared to have been buried all at the same time.
Figure 4. The Upper Site, showing the grid squares excavated from 2006—2013. Prepared by Mary Shepperson.
Square G55

No clusters of bones or burial debris were found in the upper deposits of G55, although scattered material indicated looting activity. Four grave cuts were found in the square but one could not be excavated as the majority of it lay outside the area of excavation, under the high north baulk. The remaining three graves held a single (Ind. 345), a double (Ind. 346 and 347) and a triple burial (Ind. 351, 352 and 353). The double burial in cut <15120> consisted of an adult with a baby wrapped in textile laid over the adult’s legs, lying in the opposite direction. The triple burial in cut <15134> extended into the unexcavated square F55 and consisted of two adults and a small infant. The two adults were laid in separate coffins with their heads at opposite ends. The infant was laid over the legs of Ind. 351 in the same direction.

Square F56

F56 contained the edge of the eastern wadi side, sloping steeply to the wadi floor near the east edge of the square. On removal of the material from this slope, two burials were quickly identified before the edge of the wadi floor. One of these could not be excavated as it lay too far into the two unexcavated squares at the south-east corner of F56 but the other grave <15128> was a double-width cut containing the triple burial of Inds 348, 349 and 350. This burial was very badly disturbed and much was missing. From the recovered bones it seems to have contained two adults and one infant, although it was not possible to tell how these were arranged in the grave.

Figure 5. The triple burial of Inds 357, 358 and 359 at the Upper Site, unusual amongst the Amarna multiple burials for being all adults, rather than one or more children.
No graves were found in the western part of the square, and on removal of a greater depth of deposit, a natural edge, probably cut by a violent flood, was found running north-south through the centre of the square. This seems to mark the limit of the burials.

Square E56
This square lay at the bottom of the wadi floor. No burials were found in square E56 despite being excavated to a considerable depth. Pottery and bone fragments were found in the upper levels of deposit but these became less as excavation progressed. A sondage was dug along the eastern side of the square as a final check to see if burials might be found at greater depth, but this produced no cultural material of any kind and no burials. The deposit here appears to be accumulated layers of flood wash, the upper portion containing debris washed out from the cemetery, and the lower levels predating the use of the cemetery. It seems that burials did not extend beyond the eastern wadi slope at the Upper Site.

Finds from the Upper Site
Considering the small number of burials excavated at the Upper Site this season, the number of grave good was quite high. All the excavated graves had some evidence that pottery vessels were included with the burial, but the best vessels were found with Ind. 346 and 347 in <15120>, who were found with a complete pilgrim flask and a complete, though broken, shallow bowl. This grave also held the remains of a necklace made of hundreds of small blue faience beads and blue faience pendants in the shape of fish (Figures 6 and 11).

Figure 6. An intact pilgrim flask and group of faience fish pendants and beads representing the remains of a necklace in the grave of Inds 346 and 347.
The badly disturbed triple burial of Inds 348, 349 and 350 contained a complete blue faience finger ring, with an open-work design showing two papyrus heads (Figure 11). This was completely displaced in the jumble of bones but remained stuck on a finger bone, showing it to have been worn by one of the adults in the grave. Another triple burial, that of Inds 357, 358 and 359, held a steatite cowroid bead, incised on the bottom with a design showing a lizard and a winged insect (Figure 11). The grave was thoroughly robbed, but the bead may have been missed as the upper side of it looks like a plain, round stone.

A novel find this year was the discovery of two pairs of copper-alloy tweezers in the grave of Ind. 345 (Figure 11). They remained wrapped in thin textile and had become joined to each other as they oxidised. Although other cosmetic implements, such as a mirror and kohl applicators, have been found previously, these are the first example of tweezers from the cemetery.

Another interesting find of the season was a small metal bracelet of fine, interwoven links. This was found in almost perfect condition in situ around the left wrist of infant Ind. 353. The chain is still supple and retains tiny loops at the end so that it could be secured with some kind of fastening. Although the two adults in the same burial were very badly disturbed, the small infant buried with them seems to have been missed by the grave robbers.

Summary: the Upper Site excavations
Although comparatively few graves were excavated at the Upper Site this season, the work here has been very productive. The western edge of the burials in this area has been established, showing that the cemetery did not extend into the wadi floor as it does at the Lower Site. The burials retain the distinctive character of burial practice at the Upper Site, showing a high frequency of multiple graves, perhaps a greater degree of disturbance from looting, and a somewhat more disorganised distribution of graves in terms of density and orientation. The wealth of finds from the graves this year has helped to expand our understanding of the sort of grave goods that looting has generally removed from the site.

Middle Site
Seven 5 x 5 m excavation squares were opened at the Middle Site, in a single row (Figures 7, 8 and 9). Three of these, R–T75, lay on the raised embankment of sand that runs along the north-east side of the wadi, and the remainder, N–Q75, lay within the channel that runs along the axis of the wadi, and was formed at least in part by a large flash flood some time after the Amarna Period (and also after the site was looted).

A total of 44 graves were identified, and 32 of these excavated, the remainder extending too far into the edges of the squares to retrieve in the time available. The excavated graves yielded the remains of 35 individuals. As is standard at the cemetery, the bodies were usually laid out in an extended posture on their backs, wrapped in textile and matting. One important exception was an adult (female?) buried in a flexed position in a small grave pit, the burial remaining undisturbed (Ind 376, cover image). She had been wrapped in textile and two layers of matting, the inner an unusual woven basketry and the outer a plant-fibre layer. This is only the second flexed burial so far encountered at the cemetery, and the only undisturbed example, the other being the looted burial of an adult female found at the Upper Site in 2006 (Ind. 28).

Most of the squares at the Middle Site were quite densely filled with grave pits, with neighbouring graves usually running in a similar direction. As is often found at the cemetery, graves cut into flat ground usually followed the axis of the wadi itself, whilst those on sloping ground often ran at an angle to the wadi. No
Figure 7. The Middle Site at the very beginning of the season, with the Upper Site just visible in the background.

Figure 8. Excavations underway in grid squares P–Q75 in the channel floor at the Middle Site.
burials were found in square N75, and across the south-west part of O75, suggesting that the south-west edge of the cemetery runs through the latter.

Only two wooden coffins were found, both in very bad condition, but which appear simply to have been rectangular, undecorated boxes. One contained the body of a child (Ind. 319), and the other an infant (Ind. 372), the latter buried in a particularly deep grave, perhaps to deter robbers. The interment escaped robbery, but was badly affected by a flash flood. Generally, the burials cut within the channel floor showed signs of water damage, the flooding causing the matting, textile and rope to deteriorate, although the bone often remained in good condition.

Most of the Middle Site individuals were adults buried singularly, in graves cut just large enough to accommodate the body and matting, but there were three examples of double burials. The first comprised a child (Ind. 319) buried in a wooden coffin, with the remains of an infant (Ind. 318) found high up in the grave fill, but possibly originally interred alongside the juvenile. The remaining two examples comprised burials of adult females (incidentally, both with long, braided hair) with children. The first, Ind. 362, lay extended and supine with the skeleton of a young child (Ind. 361) buried in a separate mat, of plant-fibre, lying over her lower legs (Figure 10). There was nothing to suggest that the two individuals were not interred at the same time. In the second case, the child, a very young infant (Ind. 386), seems to have been wrapped within the same plant-stem mat as the adult, perhaps in a separate piece of textile. In this case, there is no doubt the two were buried at the same time, raising the possibility that the woman died in childbirth.

Squares B35, -B35, I3, H65, M82 and P82
Towards the end of the excavation season, six 5 x 5 m squares were laid out along the south-west margin of the cemetery, where the surface scatter of bone and sherds peters out. The aim was to test whether burials continued here (Figure 1). Burials were observed in squares B35, I63 and P82, but not in -B35, H65 or M82 (although the latter contained a possible unused grave pit). This suggests that the edge of the cemetery conforms fairly well to the edge of the surface scatter of bone and sherds, narrowing as it extends deeper within the wadi and concentrated here on its north bank. One burial was excavated in B35, that of an adult (Ind. 365) of which only the lower legs remained, the rest washed away by a flood. The graves in I63 and P82 were planned but not cleared.

Burial goods
Burial goods were quite rare across the cemetery in 2013, as is common at the site. By far the most numerous are fragments of pottery vessels, of which diagnostic pieces were retained for future study. Four substantially intact pottery vessels were found: an Egyptian pilgrim flask, two small bowls and a small jar.
Amongst other grave goods were pieces of jewellery, some with likely amuletic functions, such as decorated beads, scarabs and finger rings (Figure 11). Several ear or hair rings were found, whilst the metal chain from the infant burial at the Upper Site represents a technique of metalworking not previously recorded from Amarna. Items with a cosmetic role comprises two bronze tweezers found together in a grave at the Upper Site (Figure 9), and two wooden cosmetic applicators, found with a piece of kohl, in a burial at the Middle Site.

Amongst the more unusual finds were two model mud balls from the burial of an infant (Ind. 388) at the Middle Site, which probably had a ritual function, and a wooden handle (?) with elaborate decorative binding also from the Middle Site.

Only one possible stela was recovered this season, a badly weathered slab of stone lying on the surface of the cemetery to the south-east of the Middle Site.

Most of the artefacts have been placed in storage in the on site magazine, and will be recorded in full in a future field season. The more significant pieces have been removed to the Ashmuniein magazine.
Figure 11. A selection of artefacts excavated at the South Tombs Cemetery in 2013. Clockwise from top: faience fish pendants and a selection of beads from a necklace (obj. 40116); bronze tweezers with textile wrapping (obj. 40119); wooden handle (?) with decorative binding (obj. 40138); bead with engraved insect and lizard (obj. 40113); and faience finger ring with papyrus design (obj. 40120).
Concluding remarks on the excavations

The 2013 excavations saw us reach the target of 400 excavated individuals from the cemetery. The Upper Site continued its trend for multiple burials, whilst the Middle Site burials seem more in keeping with those at the Wadi Mouth and Lower Sites, although also incorporating a few multiple burials. With the conclusion of the 2013 excavations, we have a substantial sample not only of human remains from the South Tombs Cemetery, but a solid understanding of variation in use of different parts of the site.

Conservation, 15–28 April 2013 (J. Dawson, J. Marchant and F. Ravaioli)

A variety of work was undertaken this season. On site, three sections of reed matting and a piece of textile were lifted from burials. At the Dig House, work continued on the coffins and minor treatments were undertaken on small finds.

Reed matting and textile

Burial <15142>
A piece of textile was consolidated with 1% Klucel G (hydroxy propyl cellulose) in ethanol. This, along with two different types of reed matting, was coated with the subliming wax cyclododecane (CDD) to make a solid facing. After the first application, gauze strips were laid over the surface, prior to the application of a second layer. The now solid layers of facing and object were eased away from the sand and the objects supported face down for transport to the dig house. Loose sand was cleaned away from the back of the reed matting (15148) from the head end (east) of the grave. The reed matting was consolidated from the back with repeated applications of 1% Klucel G in ethanol. Loose components were adhered with 5% Klucel G in ethanol. The matting (15154) from the feet end (west) of the grave and the textile (15149) were securely packaged to prevent the coating of CDD from subliming and put into storage for later treatment.

Burial <15188>
Matting (15253) was lifted from the surface of the skeleton in this burial. The reeds were consolidated in situ with 1% Klucel G in ethanol. CDD was applied over a layer of gauze to ensure that the matting was supported for lifting, but not stuck to the bone. At the Dig House, these very fragile pieces were consolidated from the back with a further application of 1% Klucel G in ethanol. Tinted Japanese tissue was applied as a partial backing on very fragile areas using 15% Mowital 30H (polyvinyl butyral, PVB) in ethanol as the adhesive.

Additionally, a piece of matting (14773) that was faced and lifted on site in December 2012, using 3% Paraloid B72 (acrylic resin) in 50:50 acetone/ethanol, was turned over, cleaned and further consolidated with PVB 5% in ethanol. Loose components were adhered with 50% Paroloid B72 (acrylic resin) in acetone. Small supportive bridges of painted Japanese tissue were attached to vulnerable areas of the back using 5% Klucel G in ethanol as the adhesive.

Detachable backings were built for matting 15253 and 15148. A thin layer of CDD was applied to the back of the matting as a separating layer. 25% Lascaux 498 (acrylic dispersion) in bottled water was used to apply spider tissue in layers. Egyptian white glue was used to apply the final layer of tissue and a gauze facing.

Small finds
A storage box was prepared for a tiny metal chain (40115) and for 2 pairs of copper-alloy tweezers (15117). The metal of the tweezers is highly mineralised, but appears to be stable (Figure 9). A fragile piece of linen...
Figure 12. Flavia Ravaioli applying gauze and cyclododecane to textile and reed matting in burial 15142.

Figure 13. Jenny Marchant consolidating the back of matting 15148.
textile, attached to both pairs of tweezers, was consolidated with 1% Klucel G in ethanol. The connection between the tweezers and the linen was very frail, so this was reinforced by application of 10% Klucel G in ethanol.

A wooden handle (obj. 40138) with bark and plant fibre decoration was treated (Figure 11). Loose decorative elements were adhered in place with 5% Klucel G in ethanol. The wood is very fragile, the interior of the handle has termite damage and the surface is falling into cubes due to rot. A 5% solution of PVB in ethanol was used to consolidate fragile areas of wood. This object may require further treatment once the wood has fully dried.

**Painted wood coffins**

Work was carried out on three coffins.

Coffin 38819, surviving sections of which were lifted in 2008. A treatment protocol tested and established in previous seasons was used. The fragments were dry cleaned using fine brushes and puffer, where this did not risk damaging the paint layer. Areas of flaking paint were consolidated with Lascaux MFC (acrylic dispersion) 50% v/v in bottled water after pre-wetting generously with white spirit to aid penetration and prevent staining. Larger paint and plaster flakes were re-adhered using Lascaux 498 HV (acrylic dispersion) 50% v/v in bottled water after white spirit application. Where the plaster surface was very tented and lifted, it was secured by inserting small amounts of filler in the voids. This consisted in a mixture of glass microballoons, cellulose powder and pigment in Paraloid B72 50% w/v in acetone, diluted to the required thickness with ethanol. The filler was applied using a thin nosed pipette or a micro-spatula. Once the front was secure, the fragments were turned onto a soft support and the back was consolidated, if necessary, using Paraloid B72 3% w/v in acetone or PVB 5% w/v in ethanol. Particularly fragile areas were backed with a thin layer of filler. Joining fragments were adhered together using Paraloid B72 50% w/v in acetone.

The focus was on stabilization of the groups which have been identified as contributing to coherent sections of coffin. Groups 1, 4, 5, 16, 17, 20, 21 were completed. Ten removable backings were made for medium-large fragments from two coherent sections (the upper left side and lower right side of the lid and coffin). Group 19 was fully treated, but a removable backing still needs to be made for one large fragment. Experiments were undertaken to find a strong outer support which can be moulded to the shape of the fragments and in which connecting groups can be mounted.

Coffin 14049 was lifted from site in four sections (with the foot end and parts of the sides still standing) in December 2012 (Figure 16). Prior to lifting, the surface decoration was consolidated with 3% Paraloid B72 in 50:50 acetone/ethanol. The coffin was coated with a layer of CDD and a support structure of gauze strips and wooden tongue depressors held within more layers of CDD.

This coffin is painted in black with decoration principally in white and pale yellow, plus occasional use of blue and red. Most of the decoration is covered with a natural resin varnish. The box and parts of the rim and footboard of the lid survive.

This coffin is in a highly deteriorated state. The box has been crushed causing a gradual buckling of the boards, especially on the proper left side. The wood is badly rotted and has been eaten out by termites. Behind the decoration layer there is mostly an incoherent mass of wood fibres and dust, frass and sand. The decoration layer is highly fragmentary. After examination, it was decided that there was insufficient structure surviving for any parts of the coffin to stand, even after intensive consolidation. It was necessary therefore to cut the lid and box footboards away so that these and the side walls of the box could be laid decorated surface
**Figure 14.** Flavia Ravaioli making detachable backings for parts of coffin 38819.

**Figure 15.** Sections from upper left side of coffin and lid together as a group in their detachable backings. N.B. White patches are the CDD separating layer that is still subliming from the surface.
down to ensure satisfactory consolidation once the CDD on the interior surface has sublimed. Consolidation experiments were undertaken on small detached pieces. The coffin sections have been fully supported and left wrapped in aluminium foil and plastic sheet to ensure a slow, controlled sublimation of the CDD.

**Jackal coffin**

Fragment 8 (foot end lid fragments) which had been stabilized in spring 2012 was repaired, using 50% B72 in acetone as the adhesive. Structural voids were filled with the same material that was used for gap-fill on 38819. A supportive, detachable backing was made by the technique described above.

A check was made on the condition of all other coffin parts that are in the magazine awaiting treatment or are partially treated. Those in mid-treatment were put into the ‘cage’ inside the inner magazine, to ensure that they are not moved unnecessarily.

More supportive boards were used to reinforce most of the flimsy boards on which parts of 13262 and 13281 (excavated in 2010) were housed and new covers provided for many sections to ensure that they are not damaged and do not become excessively dusty.