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The Mummies of Kha and Merit: Embalming Ritual and Restauration Work

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Abstract

The bodies of both Kha and Merit were wrapped in a wide linen sheet stitched along the bottom; but Merit had a second funerary sheet and a painted mask. The condition of the textiles was very poor due to both age and long display. There was a general lack of strength and elasticity in the fibers which were fragile, very brittle and partly covered by dust.

In order to consolidate the textile of Merit, it was necessary to temporarily remove the mask and second sheet, which were conserved separately. After vacuum cleaning the mummies, consolidation was achieved by sewing a dyed nylon net around the bodies.

The mummies of Kha (S 8431) and Merit (S 8471), which date back to the reigns of Amenophis II-Thutmosi IV-Amenophis III (1388-1351), were found by E. Schiaparelli, in 1906, in the intact Theban Tomb 8 at the northern extremity of the Cemetery of Deir el-Medina.
Dodson (2000: 97-9) offers parallels between late XVIIIth Dynasty mummies of Teti, Kha, Merit, Sennefer, Neferit and Setau, which all seemed to have been subject to "minimal - if any - mummification" and "were simply wrapped in linen after death" implying a "limited degree of post-mortem treatment (despite the quantity of jewellery on the body of Kha and Merit) that clearly accounts for the lack of canopic equipment in any of these tombs." New CT scans (Martina et al.: 2005) seem to confirm that.

The mummy of Kha (Suppl. 8431)

Kha is lying on dorsal decubitus with the arms extended along the body and the hands upon the pubis. The legs are parallel and the feet joint. Anatomic connections have been perfectly preserved and the chest has not subsided. The body is wrapped in many layers of good quality linens. An external linen covers the mummy. Two linen bandages were set one on top of the other, parallel to the main axis of the body in the central position. The inner bandage is larger than the outer one and both start from the head ending at the feet. Embalmers equally arranged four very tight small bandages transversally to the axis of the body, in order to keep the ritual funerary position of the body. The first surrounds the region below the shoulders for at least two folds on all sides. The second keeps the wrists, wrapped in many layers, solidly fixed to the inguinal abdominal region. The third holds the knee region tightly, maintaining the position of the legs. The fourth surrounds the tibia – tarsus joint, maintaining the position of the feet. Each leg was finished with a common linen wrapping on top. The CT shows an air space between the body and the linen tissues, which seems to confirm that the body was not desiccated before the wrapping.
The general condition of fibres was very poor. A thick layer of grey, greasy dust covered the entire surface that penetrated the fibres, changing the original colour of the linen and accelerating the degradation of the cellulose material. Dark stains (brown and blackish) have spread over the surface, which are probably a residual of the substances used in the burial ritual. However, the main problem was an attack by fungi, which accelerated the degradation of the fibres and produced a collapsing of the linen's mechanical strength. The attack occurred in recent times, probably caused by a sudden increase of relative humidity in the exhibition display case. The foot area was in the worst condition, with almost total destruction of the material, which was partly transformed into dust. First, it was necessary to stop the fall and the loss of the material; samples of fibres were analysed to identify correctly the nature of them, then the Department of Vegetal Biology of Turin University analysed the fungi, confirming that it was not active anymore. The preservation treatment proceeded with surface cleaning using a micro-vacuum cleaner, with the help of brushes of different softness. Then, we tried to put most of the fragments in place, respecting the direction of the warp and weft of all the different layers of material. The main problem was to solve the consolidation of the surface, keeping the fragments in place without producing any chemical or visual alteration in the fibres. Not having any access from the back, we had to consolidate the

material from the right side. The selection of the support received a great deal of attention. We needed a fabric as transparent as possible, and easy to manipulate, with non-fraying edges and elastic enough to follow the 3D shape of the mummy's body. For all these reasons we chose nylon net, which is suitable for its non-obtrusive appearance, and its ease of handling and dyeing. As the colour of the mummy's linen was quite different from the head to the feet, we dyed the nylon net in three different colours in order to match the original better. We wrapped the mummy completely in the net, cut into three different long stripes, to match the colour of the mummy's shroud underneath.
Then we sewed the net to itself through a silk ribbon (correctly dyed), using curved surgical needles and sheets of melinex in order not to sew through the original material. The silk ribbon, placed on the non-visible side of the mummy, has the function of helping the stitching and allows a minimum of mechanical tension for correcting the deformation of the net that follows the body's shape. We placed the joins between different parts of the net along the vertical bandages, to make them less visible (Fig. 1).

Fig. 1 - The Mummy of Kha during restoration (© Museo Egizio di Torino).

There is no trace of embalming practice at the head. The desiccated brain is still in position. In addition, the chest region is intact with the heart and right lung visible, and no trace of embalming practice. There is no incision on the left side of the abdomen. The desiccated organs are still in the abdomen region, and again there is no trace of embalming practice.
The amulets and jewellery were illustrated in Curto, Delorenzi, Spagnotto (1980: 149, 155). New CT views and 3D reconstruction confirm the data, except for the number of rings that seem to be more than five. A cornelian or jasper *menqebyt* (*or menqeryt*) amulet, in the shape of a snake's head was placed on the forehead of Kha, in order to prevent snake and scorpion bites in the netherworld (Chapters 34 and 164 of the Book of the Dead). The suspension hole is visible. In the XVIIIth Dynasty, this kind of amulet was found in the burials of kings, members of the royal family and in the tomb of the vizier Aper-el, though depicted in private tombs like that of Sennefer. Its position on the forehead suggests a parallel with a *ureus*. The mummy is wearing gold jewellery: earrings, the *shebw* gold necklace of valour, five rings and a strip armlet on both arms. A heart scarab is attached to a gold chain, and a stone or faience tit-amulet is lying on the chest.

The mummy of Merit (Suppl. 8471)

Merit is lying on dorsal decubitus with the arms extended along the body and the hands upon the pubis. The legs are parallel and the feet joint. The desiccated organs and thorax abdomen cavity are not visible. Unfortunate manipulation cracked the spine in three places, and the costal grid and arch was disorganised. Shock impact has also affected the pelvic region.
The mummy of Merit was in a very different condition from that of Kha. It was wrapped in a white linen shroud, whose extremities were rolled upon themselves along the spine as a spiral spring and sewn with a long overcast stitching together at the back with a thick twisted cord (Fig. 2). The execution of the manoeuvre needed two operators. The mummy was placed inside the coffin on two

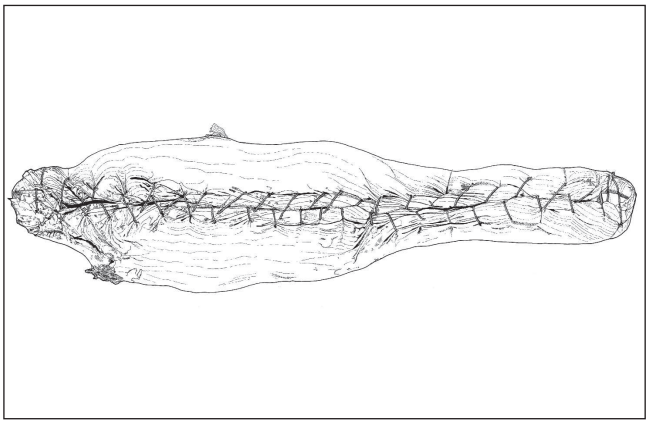

Fig. 2 - System of fastening on the verso of the mummy of Merit (drawing by F. Janot).

different linen sheets – the first was wrapped around the shoulders and over the body, and folded under the feet; it was partly hidden by the funeral mask. The second was folded into a type of mattress that was put at the bottom of the coffin in order to fill the extra space around the mummy because, as Merit died before her husband, his coffin was used for her. On the lower corner of the shroud, we found the mark of property of Kha.
As the coffin was too big for Merit, they filled the extra space with the folded shroud and eight long rolls of bandages, arranged around the head and feet.
The general condition of the cloth fibres was very poor. The main causes of decay were very similar to those found on the Kha mummy. Dust deposits increased the natural ageing of the cellulosic material, and the long period the mummy was on display.
On the surface of the exposed parts of the mummy and linen sheets, there were thick, greasy deposits that penetrated the fibres, changing their colour and physical and chemical structure.

Some white spots on the mummy's surface seemed to be caused by a fungal attack but, after analysis, this proved wrong. In fact, they were only organic residuals.
There was tearing and cuts in the linen in the parts submitted to stronger mechanical stress, like the sides at the elbow and where the funeral mask was laid on the cloth.
The weight of the mummy and its general deformation, determined by the bad condition of the skeleton, and the folds in the cloth wrapping, produced a general weakness in the fibres.
Furthermore, the effects of previous restoration work on the mask also affected the linen, with residues of different glues and resins. The resins hardened the fibres, often breaking them and producing further deformation and damage.
To start the conservation treatment, we had to remove the mask to get to the body, in order to understand the true condition of the material, and to preserve it properly.
The mask was removed from the body by softening the resin deposits that fixed the mask to the shroud, using an ultrasonic humidifier and metal spatulas. Then we removed the body from the second shroud.
The preservation of the body proceeded with surface cleaning using a micro-vacuum cleaner. The residue of adhesives from fibres and fragments of the painted mask, which had stuck on the shoulder and shroud, were removed by cold steam from an ultrasonic humidifier.
As the colour of the mummy was pretty even all over the surface, the net was dyed in only one colour. We wrapped the mummy in the correctly dyed net and sewed it together through the dyed silk ribbon, as carried out on the mummy of Kha.
The aim of the restoration work was to preserve the original fabric and, at the same time, allow the mummies to be correctly displayed again. We believe that the total covering with net achieved our target: all the fragments are safely in place, and we did not interfere with the original cloth structure because any stitches or needle holes would have passed through the original linen; with careful dying of the net, we obtained a minimum visual change of the surface colour. Furthermore, the treatment is completely reversible, which will allow any other choices for the future.
The brain of Merit is still in the cranium, and no infraction is visible at the head. The TC suggests that the wrapping method led to a slight flexion of the head – about 27° to the right. The cephalic extremity was held in the hands of an assistant while the officiating priest operated considerable traction to the left-side bandages. The direction of wrapping seems to show that the embalmer, who prepared the head of the deceased, was right handed.
The CT views of the head of Merit show its position inside her gilded cartonnage funerary mask with inlaid eyes, only one of which is still in position. The cornea is of alabaster and the iris of obsidian. The eyebrows and eye-lines are of blue vitreous paste. The traditional headdress is striped with alternating gold foil and Egyptian blue (SiO_2, CaO and CuO). Observation of the gilding revealed the typical reddish decay of the of silver-gold sulphide alloy (Ag_3AuS_2), which has been detected in other contemporary specimens (ref. Frantz and Schorsch, 1990).
The collar has alternate inlaid lines of moulded cornelian and vitreous paste, imitating lapis lazuli, and turquoise set on fabric.
The pectoral of the mask, which extends along the shoulders, is decorated with a blue and red painted vulture, facing left, on an orpiment (arsenic sulphide) base. The whole painted layers received white priming. The binding media is proteinic. A fine layer of white stucco (calcium carbonate), 5 mm thick at its maximum, covered the inner and outer side of the mask. Restoration works carried out on the mask, showed the assembly of up to eight pieces of linen tissues on the edge. The stucco, which shaped the face of the funerary mask, was 1 cm. thick at its maximum.
CT views also show the large space between the shroud enveloping the head of the mummy and the mask. This is too big. The mask was probably modelled on a pre-shaped mould. Once the mummy was set in the coffin, the mask collapsed at the sides and the upper part of the back, which are the parts that suffered the most; the stucco and the painted layers were smashed to fragments and dust; the linen tissues were defibrated and torn as the restoration has indicated (Curti, Doneux, Oliva, 2003: 112-3). Vast areas of the gilded and painted surface were misshapen by ageing and the 1967 restoration. Even if this operation was to some extent necessary to preserve the integrity of the mask, large quantities of hard and heavy stucco layers were put in with excessive use of animal and synthetic glue, which after a short time decayed.
In 2002, the restoration operation necessary for the linen of the mummy revealed the degrading process affecting the tissues of the mask. The extremely difficult task that was faced needed a continuous upgrading of the methods and definition of the project. Stratigraphic and chemical analyses by Stefano Volpin and the Cultural Heritage Superintendence of the Aosta Valley gave details of the painting materials. The CT views and 3D reconstruction by the team of the Institute of Radiology of Turin University were of invaluable help to detect the extension of the preserved area of the back of the mask and the quantity of stucco layers from past restoration work. The removal of the mask from the body was then necessary to proceed. At first, the filler, retouching, patina and misshaping from the 1967 restoration work were removed, maintaining the false eye. A detailed report of the work can be found in Curti, et al. (2003). In 2004, the mask was set on a hollow support of epoxy resin with polyester wadding, and covered with dyed linen. We placed the mask on the support sustaining the fragments of fabric with little inserts of treated silk organza, and covering the back part with dyed nylon net. We sewed the net onto the padded support along the edges of the fabric.
We were not able to complete the reconstruction of the back because a large painted fragment found detached beneath the body had lost its original shape. The presence of organic substances, oil and resins from the mummy, and the weight of the body flattened the surface and stiffened

it. The dimensional changes of the fragment and the display repositioning of the mask on the mummy led us to keep the fragment separate.
The collar was reinforced inside by Japanese paper and carboxyl-methyl-cellulose. The final rendering was completed by a light filler, and aquarelle retouching. The pectoral, which had been heavily glued to the linen of the mask in modern times, was set on a non-acid paper lined with dyed linen. The mask now is 46 cm high, 34.5 cm deep, and 37 cm wide (Fig. 3).

Fig. 3 - The Mask of Merit after restoration (© Museo Egizio di Torino).

In the late XVIIIth Dynasty, masks were provided for some of the wealthiest male and female burials in the Theban necropolis (Smith, 1992: 199). They were usually gilded and often had inlaid eyes. The presence of the mask for the mummy of Merit, but not for Kha, was believed to be due to the fact that not all wealthy burials had one and were, to some extent, an option. The lack of a mask for Kha is probably due to the premature death of his wife, and the adoption of his funerary mask for her, as can be observed on the coffin, and the shroud with the mark of property of Kha, and the papyrus Luynes B, and many other objects in the tomb with the name of Kha on them? Meskell (1998: 373) stresses the conscious decision of the family of Merit to give her a substantially poorer burial than that of her husband. However, Meskell (1998: Table 1; it must be noted that many items are missing) does not include in her list the second papyrus found outside the tomb, a gold chain, six gold rings and a bracelet: her assumption must be definitely reconsidered in terms of the value of the jewellery. The feeling is that, to the contrary, her husband gave her many things of his funerary equipment in order to offer her a more adequate burial.

During the restoration work, when the mask was taken away, we were surprised to discover one of her gold rings (2 cm high, 2.2 cm wide, 0.2 cm thick and 1 cm at the bezel), which had been held on the mask's protective tissues that were crammed with resinous products for mummification, and stuck at the back of the mask (Fig. 4). This female ring has a bezel incised with the goddess Hathor as a cow, wearing the *menat* collar, on a boat floating along the river behind a recumbent palm tree and the representation of the sky above (ref. Nefertity

Fig. 4 - The incised gold ring of Merit (© Museo Egizio di Torino).

electrum ring in Bruyère 1929: pl. X, 1). It was set close to the head as the second similar ring was (both were visible at the CT views), and possibly came out through a space in the stitching at the back of the shroud after the body was positioned inside the coffin. Were the rings forgotten during the embalming process, and added later in a hurry? The hands were set separately flat on the pubis with open palms. The fingers of the right hand had no jewellery. On the contrary, the third finger of the left hand wore a double gold ring, and the fourth finger two gold rings with bezels, probably in a different material as a minor density seems to point out. Were the two rings found out of context, intended for the right hand fingers? This is most probable. The double set of earrings, collar, bracelet, rings and girdle were reconstructed in Curto et al. (1890: pp. 156-7). The girdle, which surround the waist of Merit, and which is made of 12 gold finely incised cowries, was a protective amulet for the afterlife and symbol of sexual fertility (Meskell, 1998: 368; 375). The fragile composition of beads broke up, spreading into many places until the area of the feet. The bracelet comprises four worked gold plaques, very likely decorated with the same pattern. There is a clasp fitted with a slide, and strings of gold beads around the forearm. The broad collar around the neck, covering the shoulders of Merit, is made up of eight lines of beads of different shapes. Its rigid clasp is set along the height of the collar, and could be made of faience. New CT views show that the collar is surmounted by a fine chain of gold beads and give more details on the rings.

Literature Cited

Bruyère B. 1929. *Rapport sur les fouilles de Deir el Médineh (1928)*, FIFAO 6,2, Le Caire.

Curti A, Doneux K, and Oliva C. 2003. Museo Egizio di Torino - Il Restauro della maschera e dei tessuti della mummia di Merit, in *Lo stato dell'arte. Conservazione e restauro. Confronto di esperienze. Atti del I° Congresso Nazionale IGIIC* Villa Gualino – Torino – 5/7 Giugno 2003, pp. 110-117.

Curto S and Mancini M. 1968. News of Kha' and Meryt, *Journal of Egyptian Archaeology* 54, pp. 77-81.

Curto S, Delorenzi E and Spagnotto D. 1980. I risultati d'una rilevazione radiografica e grafica su mummie (Scavi del Museo Egizio di Torino, 10), *Oriens Antiquus* 19, pp. 147-157.

Delorenzi E and Grilletto R. 1989. *Le mummie del Museo Egizio di Torino*, CGT VI, Milano.

Dodson A. 2000. The Late Eighteenth Dynasty Necropolis at Deir el-Medina and the Earliest 'Yellow' Coffin of the New Kingdom, in: R.J. Demarée and A. Egberts ed., *Deir el-Medina in the Third Millennium AD* (Egyptologische Uitgaven 14), Leiden, pp. 89-100.

Frantz JH and Schorsch D. 1990. Egyptian Red Gold, *Archeomaterials* 4, pp. 133-152.

Martina MC, Cesarani F, Ferraris A, Grilletto R, Boano R, Donadoni AM, Gandini G, *Kha and Merit: Multidetector computer tomography and 3D reconstructions of two mummies from the Egyptian Museum of Turin.* In press for the Proceedings of the V World Congress.

Meskell L. 1998. Intimate Archaeologies: The Case of Kha and Merit, *World Archeology* 29, pp. 363-379.

Schiaparelli E. 1927. *Relazione sui lavori della missione archeologica italiana in Egitto (anni 1903-1920)*. II. *La tomba intatta dell' architetto Cha nella necropoli di Tebe*, Torino.

Smith, ST. 1992. Intact Tombs of the Seventeenth and Eighteenth Dynasties from Thebes and the New Kingdom Burial System, *MDAIK* 48, pp. 193-231.