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# Cultural interconnections: textile craft and burial practices in Early Medieval Sudan

## Abstract

This article focuses on a loincloth found in situ on the skeleton of an Early Medieval male buried on the Nubian island of Sai, in northern Sudan, dated to the seventh to ninth centuries BCE. This loincloth differs from most contemporary textile production because it was woven in a triangular form and probably using threads made from dromedary wool. It exhibits several phases of repair and reuse until its burial with the body. This garment therefore illustrates the textile expertise and clothing practices of the ancient Nubians, as well as the cultural role of textiles in funerary rituals.

**Keywords:** ancient textiles, burial practices, fibres, Early Medieval, Sudan, Nubia, weaving

## Introduction

Despite abundant archaeological remains ranging from mounds of ceramic sherds to standing granite columns, little is known about the Medieval period on the Nubian island of Sai (modern Sudan). Often cited as the seat of a bishopric, with at least five bishops known from textual remains, Sai was a strategic location during Medieval times (Łajtar 2006, 92; Hafsaas-Tsakos & Tsakos 2010, 79; Francigny 2017, 538). From the Bronze Age and the Kerma period, it served as a control station on the Nile river. Until recently, the people of the Medieval era there have not been the focus of research. Discoveries were made in conjunction with other remains such as those from the New Kingdom layers in the main settlement or, as in the present case, the excavation of a Meroitic cemetery. One of the major medieval sites at Sai is a church located to the north of the island and still marked today by four standing columns dominating a cluster of kôms covered with red bricks. Without excavating the site, it has been proposed that this church served as the cathedral of Sai (Vercoutter 1958, 160; Geus 1996, 1188). However, finely carved blocks and capitals as well as a red granite column found in the Ottoman fortress suggest that the cathedral was in fact located

in the town and was later dismantled during the Ottoman phase of occupation.

An archaeological survey conducted in 2010 around the island revealed the existence of 26 previously unregistered medieval sites (Hafsaas-Tsakos & Tsakos 2010, 78). Among them, a few seemed to correspond to small churches or religious buildings, and one to a large pottery production area. In most of the cemeteries associated with Christian constructions or settlements, it is possible to see the continuity with older burial areas from the Meroitic and Post-Meroitic periods (circa 350 BCE to 550 CE). This is also the case at site 8-B-5.A, where the loincloth under discussion here was found.

Located to the west of the main ancient and medieval settlement of the island, the site has so far only been investigated for its Meroitic graves. Organised in five rows oriented north-south, with a total of 68 units, these Meroitic graves belong to an elite group whose cemetery was separated from the main necropolis so that it would be visible from the town (Francigny 2014, 799). Originally covered with tall mudbrick pyramids, the graves were used as family vaults over generations and filled with high quality funerary deposits often containing rare, imported goods. In 2010, a series of

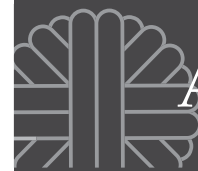


Fig. 1: View of grave CH 01 (©Sai Island Archaeological Mission)

unusual intrusive burials were recorded at the surface of several graves. They all consisted of Christian stillborn and child burials placed in the shaft or at the entrance of the graves, either in pots or wrapped in shrouds (Francigny 2010, 56). In contrast to the adult Christian graves that surround the Meroitic cemetery, these child burials were not always oriented east-west with the head to the west. Especially when placed within the Meroitic access ramp, the grave diggers adopted a pragmatic approach rather than a religiously meaningful one, depending on the space available and the nature of the soil.

During the 2011 campaign, the adult medieval burials were also investigated to extend the information known about this unique configuration. It was the first time that such a phenomenon was recorded: an early medieval population gathering their graves around an ancient cemetery and placing their children under the protection of what they saw as their ancestors. The adult graves cover the surface of the site with a different appearance from the Meroitic graves, thanks to the narrow shape of the burial chamber and the total absence of superstructures. The graves are of different types: some have a short access ramp leading to a vaulted chamber built with mudbrick or a lateral niche, while the vast majority are made of a single vertical shaft at the bottom of which the corpse is deposited. In most instances, no construction was made inside the shaft itself, except for rare cases with a mudbrick cover. Otherwise, it is not unusual to find a few bricks around the top of the body, placed there to protect the head. The absence of an empty space created by a cover means that the corpse was buried deep in homogeneous soil that contributed to the exceptional conservation of the human remains and their associated organic material. Almost all the

Christian burials in this area seem to be intact, as they contain no valuable material for robbers.

Grave CH 01, where the loincloth was found, was the first in a series of eight medieval adult graves excavated at cemetery 8-B-5.A. It is located in the south-west



Fig. 2: Loincloth in situ on the skeleton (Image: ©Sai Island Archaeological Mission)



corner of the site, in an area heavily disturbed by Ottoman graves. While adult Christian burials carefully avoided the Meroitic monuments and graves, it is clear that during Ottoman times little could be seen of the ancient cemetery, as many Ottoman graves cut through the remains of existing superstructures and substructures. The fact that Christian burials were laid out in a different way gave the impression that they were early enough in date to have still witnessed and understood the organisation of the Meroitic necropolis. This impression was later confirmed by a radiocarbon 14 analysis of the loincloth, placing CH 01 between 649 CE and 879 CE (95.4 % calibrated date)<sup>1</sup>. The garment was found in situ around the corpse of an adult male (fig. 1). The corpse was placed at the bottom of the grave in a supine position, head to the west, with the entire body tied with a bicolour rope.

### General presentation

Left undisturbed since its interment with the deceased, the garment itself is fairly well preserved. Its arrangement on the body was readily visible to the excavators, who recorded every detail available before its removal (fig. 2). It survives today as three main fragments (the two upper corners and a large lower part), which are easily reassembled into an elongated triangular shape (fig. 3). While the sides are quite well preserved, the lower point of the triangle is missing. Both its shape and its position on the body show that the textile was woven and used as a loincloth. Unsurprisingly, the garment suffered from its close proximity to the body during decomposition and a large portion of it was destroyed, particularly in the middle area that would have received much of the putrefaction fluids. The remaining textile is brittle and shows several folds, deeply impressed in the fabric, which indicate the original positioning of the pieces and greatly assist the reconstitution and understanding of the complete garment.

It is a triangular wool cloth, woven into shape starting from the upper side and tapering towards the lower point. When complete, it would have measured about 104 cm wide across the upper side and about 127 cm down the longer sides. It is preserved at a maximum length of 113 cm. The method used to create this rare tapering shape remains difficult to ascertain with any degree of certainty, but it involved a pronounced variation in the weave density and a reduction of the warp thread count (see below). The plain weave of the textile (Textile A) shows many damaged areas, demonstrating the long use of the loincloth during the individual's lifetime before its interment as a funeral cloth. The prolonged wear is even illustrated

by a mended section, where darning threads fill an area worn out through sitting. A later large patch was applied to the face of the loincloth fabric, effectively covering most of the original garment. Torn from a finer and darker wool textile (Textile B), the patch was secured with crude sewing. The irregular positioning of this later piece, as well as the coarse threads and sewing techniques, could indicate that the patching was done around the time of the funeral and as a final stage of textile reuse and recycling.

The loincloth was worn in the same manner as the pharaonic loincloths often illustrated in Egyptian reliefs and paintings (Vogelsang-Eastwood 1992, 10). However its bigger size implies a looser fit. The garment was positioned along the lower back of the corpse, with the two upper corners wrapped around the waist and knotted at the navel. It has short ties attached to each of the upper corners, presumably used to secure the knot. The long-pointed part was passed through the legs and brought up in front, then tucked under the knot with the free part left hanging at the front. It is not possible to ascertain its exact length or eventual décor because the Sai loincloth is missing its lower point. In any case, the garment would have effectively covered the buttocks and genitals, with extra fabric adding some bulk around



Fig. 3: Overall view of the loincloth (Image: Elsa Yvanez)

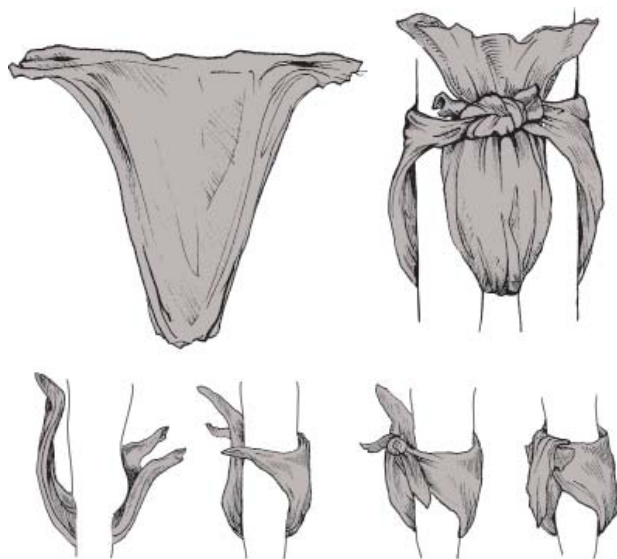


Fig. 4: Reconstitution of the loincloth as worn on the body for the funeral (Image: Kayla Younkin)

the upper thigh area (fig. 4). Either worn by itself or as an undergarment, a loincloth of similar shape is a basic piece of clothing of which there are many ancient examples along the Nile valley. However, this specific piece presents unusual technical characteristics which help to better define the textile production of early medieval Nubia.

#### Textile analysis of Textile A – loincloth

TEXTILE A. Loincloth	
Dimensions	Fragment 1: L. 57 cm, W. max. 32 cm Fragment 2: L. 26 cm, W. 44 cm Fragment 3: L. 91.5 cm, W. 36 cm (top) and 20 cm (bottom)
Material	Wool (most likely dromedary hair)
Spinning	S-spun, single ply
Weave structure	1/1 tabby weave
Thread count /cm	6 warps x 5 wefts (ground weave), 11 warps x 5 wefts (along the edges)

Table 1: Technical data Textile A

**Overview:** This nearly complete triangular loincloth retains three portions of intact selvages. The tapered triangular fabric was woven in a coarse, predominantly balanced tabby weave employing thick wool yarns (table 1). On removal from the burial, the fabric was revealed to have many areas of wear and tear, including fragile and abraded fibres. There are also areas of distended weave due to deterioration.

As mentioned above, some substantial portions of the garment fabric were missing, primarily from the buttocks area where decomposition fluids must have drained after interment and caused decay of the organic material. Irregularities in the weave structure are due to many broken wefts which were repaired with small knots. A few weaving errors were also noted, such as occasional missed shafts. Several wedges, or returning wefts, were also observed in the ground weave (fig. 10).

The tapering triangular shape of the loincloth was created during the weaving process itself. It was accomplished by manipulating the warp and the weft threads at irregular intervals, inducing a reduction in the number of threads used in the ground weave (fig. 10). Augmenting the thread count along the edges also helped in weaving a denser area which made use of the unwanted warps.

The upper border consists of an edge with looped warps, reinforced on four picks (or wefts) by the use of weft pairs instead of single threads. This border is classified as a variant of Type A3, in the *Late Nubian Textiles'* typology (Bergman 1975, 50, fig. 51) (fig. 5a and fig. 5b). The short lower border was not preserved. Along the two long sides, the selvages are, for the most part, intact – except for one missing area on the left side measuring approximately 30 cm in length. The selvages are of a simple type C1, not reinforced by the insertion of extra threads or cords. They are, however, strengthened by the weave of a denser, almost warp-faced portion, 1.5 cm wide (fig. 5a). The thread count in this area is 11 warps per cm by 5 wefts per cm. As the weaving progressed, the weaver started adding along the left selvage extra warp threads in the shed, first using one warp pair, then a second one. The corners of the fabric appear to taper quite drastically at first glance, but this pronounced tapering is due largely to the memory of the fabric as the corners had been pulled tightly to secure a large knot about the waist of the individual. The left corner of the loincloth bears a little knot, tied with several small looped fringes, maybe primarily used as a “button” to fasten the garment. These small fringes are two plied, Z twisted, and are essentially the extremities of the first wefts used in the border. This knot is tied to another small piece of a different fabric in a darker coloured wool. On the right corner, the fabric is tied into a small ball, maintained by two short cords originally meant to be attached to the “button”. The cords are made of a very coarse dark animal hair fibre (possibly goat), two plied and Z twisted, with knots at each of the cord extremities. The measurements of the cords are 16.5 cm and 13.5 cm in length.



Fig. 5: Textile A: a) Detail of the right corner of the loincloth, showing the starting border, the selvedge and the closing cord. b) Schematic drawing of the starting border (Image: Elsa Yvanez)

**Darned area:** Below the large reinforcing patch sewn to the seat area of the loincloth, a presumably long expanse of the garment ground fabric had been previously mended. Only portions of the mended area remain, since the centre of the garment has disintegrated, and it is difficult to ascertain the total coverage of this repair. This relatively extensive area of darning exhibits a somewhat crude appearance, and at least three distinct kinds of wool yarns have been used in the mending – a light orange, a thick dark brown, and a finer russet brown (fig. 6). The stitching is very uneven and runs parallel to the deteriorating ground weave. Long runs of darning wefts are inserted into the main weave, including warp and weft returns as well as longer threads passing through the ground weave and knotted in.



Fig. 6: Textile A. Detail of the mended area (Image: Elsa Yvanez)

The main warps and wefts are grouped in an irregular fashion, by two to four, on their own or with extra darning threads.

**Fibre analysis:** Small samples – portions of thread no greater than a few millimetres in length – were taken from both the loincloth base fabric (Textile A) and from the applied patch (Textile B). Threads from both the warp and weft of these two areas were sampled. Morphological features of longitudinal fibre sections were examined by polarised light microscopy and scanning electron microscopy (SEM). Two reference slides were also examined under the microscope: one sample from modern dromedary hair and another sample from modern sheep wool (microscope slide library, Textile Conservation Lab, American Museum of Natural History, New York). The fibres were first examined with an optical microscope for a preliminary analysis. Because of the extreme desiccation and fragility of the fibres, cross sections and scale casts could not be obtained at this time. They would probably prove inconclusive due to the degraded state of the fibre. Each sample (aside from the previously mounted sample of sheep's wool), was prepared on a slide in Cytoseal 60, a permanent low-viscosity mounting medium with a refractive index of 1.495, and examined under magnifications of 10x, 40x and 100x.

Preliminary observations of the loincloth material revealed certain clear morphological characteristics (fig. 7): the fibre is composed of a wide and continuous medulla contained within the walls of a brown cortex

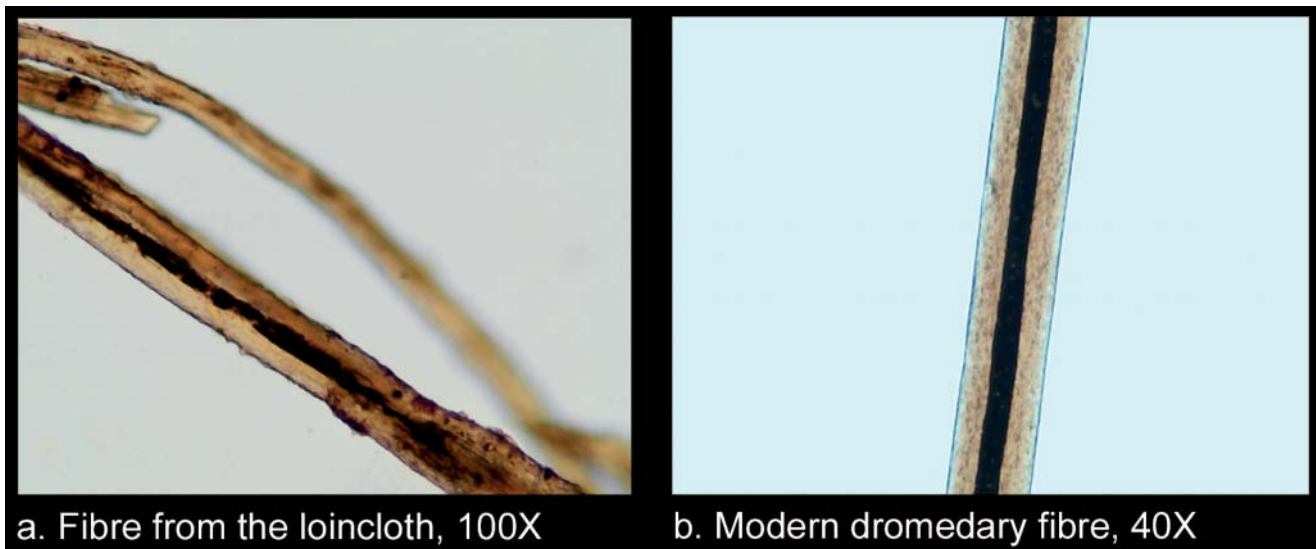


Fig. 7: Micrographs of fibre samples: a) Fibre from the loincloth base fabric (Textile A), at x100 magnification. B) Reference sample of dromedary hair from the Bronx Zoo (New York, US), at x400 magnification (Image: Mary Lou Murillo)

and thin cuticle layer. The deep brown pigmentation follows a linear pattern along the length of the fibre. This general appearance, especially the presence of such a noticeable medulla and the brown pigmentation, is not consistent with sheep wool. However, it is found in modern dromedary hair fibres, both in the standard reference sample and other modern Sudanese camels (Abd Elgader et al. 2017). Both warp and weft threads of the loincloth Textile A exhibit the same fibre characteristics, indicating a homogenous fibre content throughout the weave.

Only faint scale patterns could be perceived on the cuticle of the fibre. This could be due in part to the natural degradation of the archaeological specimen, and in part to its intrinsic qualities. Camel hair is often identified by the lack of relief in its cuticle scales (Fiedler 1979, 49). Where they are better preserved, the loincloth fibres showed a rather smooth appearance, in keeping with the appearance of the fibres from the modern dromedary hair. The slide prepared from the hair of a modern dromedary was a sample of the coarser guard hair (and not the fine underfur or down) of the camel and, in contrast to the loincloth fibre, was unprocessed and unspun. As a reference specimen, despite its modern date and pristine condition, it has nonetheless shown immediate similarities with the loincloth fibres, including the existence of a wide continuous medulla and a deep brown linear pigmentation.

Additional fibre samples were also taken for analysis at the Microscopy and Imaging Laboratory at the American Museum of Natural History (AMNH) in

New York (United States) using an EVO60 SEM. The fibres were attached to small pin stub specimen mounts with double-coated carbon conductive tabs, and then sputter-coated using a gold palladium alloy to promote conductivity. The stubs were then analysed under SEM which permitted the collection of data for three specimens: fibre from the loincloth base fabric (Textile A), fibre from the applied patch (Textile B), and fibre from the modern dromedary guard hair (fig. 9).

Even under high magnification, the loincloth fibres appear very degraded (fig. 9b). The cuticular scale pattern is almost non-existent, with a blurred outline, in contrast to the imbricate pattern visible on modern dromedary hair (fig. 9a). However, it is consistent with the degraded archaeological samples taken from several textiles from Ballana and Qustul and previously identified as dromedary (Fiedler 1979, 51). By comparison, even degraded sheep wool from the same sites show more pronounced scales.

Measurements taken on the SEM photographs show archaeological fibres with a diameter of about 22  $\mu\text{m}$ , versus modern dromedary fibres with a diameter of 50  $\mu\text{m}$  to 80  $\mu\text{m}$ . The fibre loss experienced by the archaeological specimen, as well as the differences between fine and coarse camel wool, may explain this discrepancy. Generally, fine camel wool fibres have a range of 5  $\mu\text{m}$  to 22  $\mu\text{m}$ , while coarser fibres measure an average of 40  $\mu\text{m}$ . Modern sheep wool on the other hand presents a range of 10  $\mu\text{m}$  to 70  $\mu\text{m}$  (Fiedler 1979, 49).

On the basis of measurements and longitudinal morphology, it is therefore impossible to positively



identify the origin of the loincloth fibres. The degraded state of the loincloth's fibres impedes identification. However, a network of evidence based on morphological traits and comparisons with other modern and archaeological samples point to dromedary as a likely source (for a general description of dromedary wool in archaeological textiles, see Rast-Eicher 2016, 223-224).

#### Textile analysis of Textile B – The patch

TEXTILE B. Mending patch applied to the seat area of the loincloth	
Dimensions	L. 21 cm, W. max. 12 cm
Material	Wool, sheep (?)
Spinning	S-spun, single ply
Weave structure	1/1 tabby weave, weft dominant, weft patterning
Thread count /cm	10 warps x 17 wefts

Table 2: Technical data Textile B

**Overview:** The large rectangular patch (fig. 8) was torn from a different, recycled textile and laid on top of the loincloth ground weave without much care. The abraded and torn sides of the patch were folded in, while the preserved original selvedge and edge were simply laid on before sewing. This patch was most likely applied to reinforce or hide the damaged seat area. The large darned area repaired with polychrome yarn is located precisely beneath it. It is attached by crude sewing with uneven running stitches of coarse animal hair, which could suggest a hasty modification of the loincloth, perhaps just prior to burial. The patch itself is woven with a much finer wool than the loincloth, in a balanced 1/1 tabby weave with a



Fig. 8: Detail of Textile Bn the fabric used for the mending patch, showing the light colour stripe and the crude stitching (Image: Elsa Yvanez)

higher thread density (table 2). It is primarily weft-dominant, with slightly thicker threads in the warp than the weft. It was woven with reinforced selvages, type C2, using three cords of two, four, and four threads each. In its present state, it is impossible to determine if the preserved edge is the lower or upper edge of the original piece. It seems to be of type B7, with looped warp threads assembled in a flat braid (Bergman 1975, 50, fig. 51).

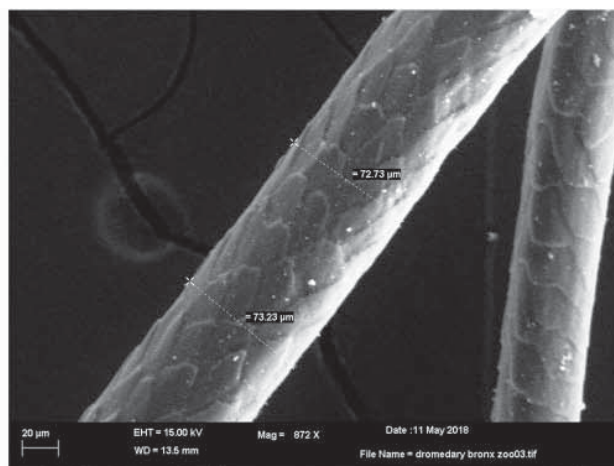
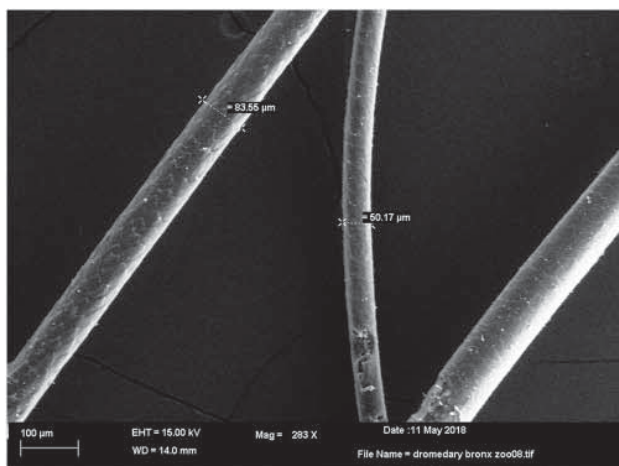
The fabric was decorated along its borders, approximately 4 cm from the edge, with a cross-stripe of beige or light yellow thinner wefts. Woven in a weft-faced technique, the light threads draw three thin lines: two beige picks, two brown picks, eight/nine beige picks, two brown picks, two beige picks. About 13 cm from the edge, three picks of patterned weft pairs also form a discrete horizontal line. The threads have a thicker diameter than the ones used in the ground weave and are going over/under groups of two to four warps in an irregular fashion, creating short areas of floating wefts (*crapautage*). The wool used for this decoration is of a slightly darker colour.

**Fibre analysis:** The fibre sample taken from the patch was especially degraded and contaminated by exogenous agents, which made analysis very difficult. An informal and preliminary observation showed that the overall look of these fibres was very different from that of the base loincloth fabric, and certainly different from the modern dromedary fibre (fig. 9c). The fibres have a jagged or rough appearance, perhaps the result of deterioration of more pronounced, imbricate, and coronal scales of sheep fibre cuticles. In that regard, it more readily matched the modern sheep's wool slide. The fibres have a diameter range of 14  $\mu\text{m}$  to 16  $\mu\text{m}$ , consistent with the average measurement of 20  $\mu\text{m}$  registered for modern sheep fibre. For these reasons, it is possible that the patch is made from sheep's wool.

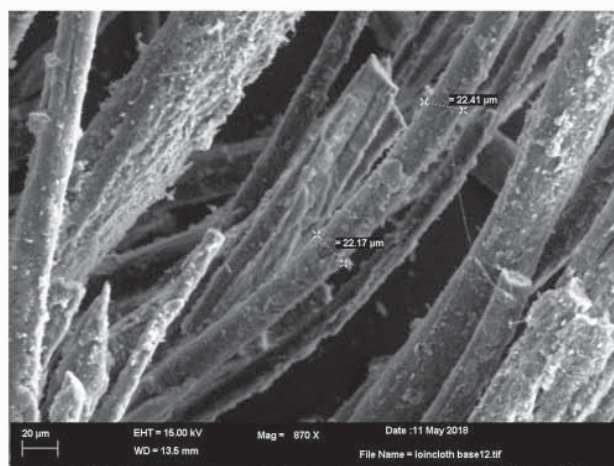
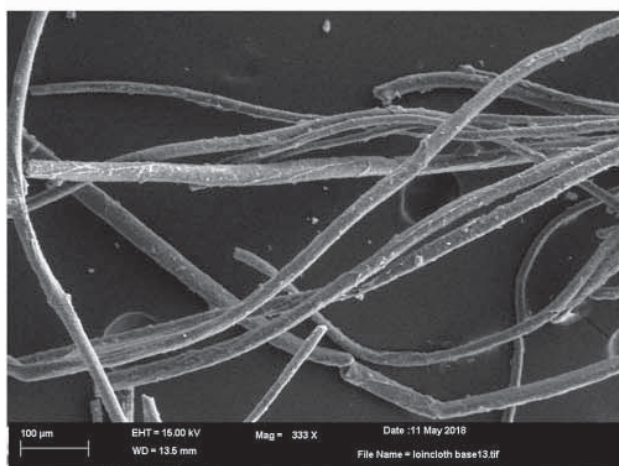
#### Discussion

##### *Dromedary fibres*

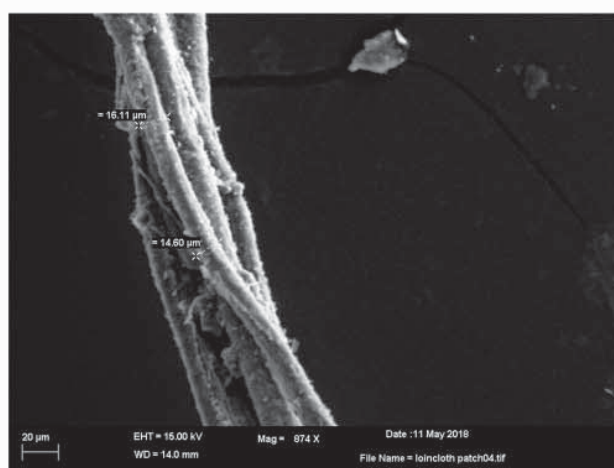
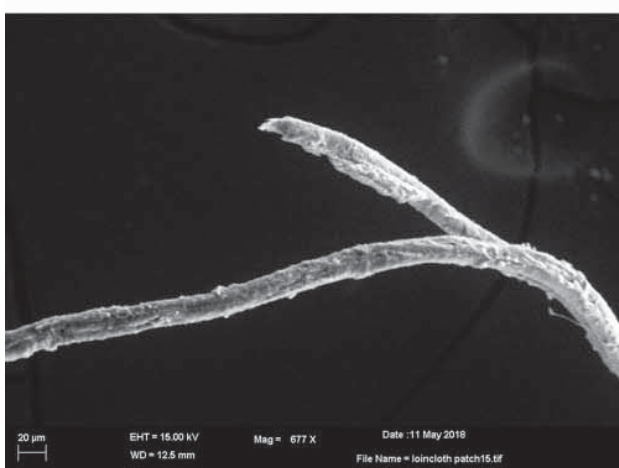
In Sudan and Nubia, the first remains demonstrating the presence of camels (*camelus dromedarius* L.) along the Nile are dated to the Napatan period and were found in an area adjacent to the Taharqa temple in Qasr Ibrim from the late ninth to early eighth centuries BCE (Rowley-Conwy 1988). First attested by animal droppings and bone remains, camels continued to be exploited through the Meroitic period, when their use was first noted as wool conveyors from 350 BCE to 350 CE (Chaix 2010). Among the hundreds of wool textiles discovered on Late Meroitic sites, about 30



a. Modern reference sample, dromedary hair from the Bronx Zoo, magnification 203X and 872X.



b. Sample from the loincloth ground fabric, magnification 333x and 870x.



c. Sample from the patch fabric, magnification 677X and 874X.

Fig. 9: Electron micrographs of fibre samples from modern dromedary fibres and archaeological Textiles A and B (Image: Mary Lou Murillo and Anibal Rodriguez)



occurrences have been securely identified as camel hair during systematic fibre identification projects (see below). Many others may appear as more material is subjected to analysis. Camel wool is particularly well attested in Lower Nubia: in Ballana, Qustul, Debeira, Abka, Ashkeit and Serra East (Bergman 1975, 12; Mayer-Thurman 1979, 10-12). The sites along the Scandinavian Joint Expedition concession have proved especially rich in ancient textiles, many of which were woven with dromedary wool. This type of fibre is not restricted to this area, as it was also recognised in the fourth cataract region, at Kassinger Bahri (Maik 2007, 101). Dromedary fibres were generally used to weave simple rectangular fabrics used as large tunics and mantles which were reused as shrouds. It also appears in furnishing pieces, such as a polychrome pile weave blanket and an elaborate tapestry showing rows of lotus flowers and palmettes (Bergman 1975, 68, 81, plate 71.1 & plate 73). The large Lower Nubian collections of extant textiles show that the use of wool increased through time from the Late Meroitic period, and the use of plant fibres declined, until wool represented the majority of raw material for textile production (Yvanez & Wozniak 2019). The use of camel wool seems to have followed this development and was particularly important during the Post-Meroitic period (circa 350 BCE to 550 CE), a time when the animal must have been essential to the expansion of trading networks. They also played an essential role in the construction of royal power – both material and symbolic – as shown by the numerous camels interred with the Post-Meroitic sovereigns at Ballana (Lenoble 1994). Camels probably remained just as significant during the following medieval period, enabling communications and exchange between the Nubians and their neighbours. The suggested identification of dromedary wool in the Sai loincloth illustrates another aspect of animal exploitation in early medieval Nubia, making it a key component of the local population's resources.

#### *Weaving techniques*

Besides the remarkable in situ preservation of its raw material, the main characteristic of the Sai loincloth is its weaving technique. Making a garment generally involves one of two processes: either tailoring large fabric into a shaped garment by cutting and sewing it, or directly weaving the garment into shape, meaning that the shape and dimensions of the garment are created at the very beginning of the weaving project and implemented through the weaving process. In ancient Sudan and Nubia, most garments were of this latter type, mainly consisting of rectangular fabrics

wrapped around the body, as a dress or a mantle, or folded and assembled into a tunic. This technique was economical, efficient, and required very little or no sewing at all. The Sai loincloth was directly woven into a triangular shape, thereby following a more complex weaving process. This single fact, apparently mundane for anyone unfamiliar with textile making, sets this garment apart from the general production. It required a different method than the ones used for pharaonic loincloths, which were assembled from two cut triangles sewn down the middle and hemmed, and the Meroitic loincloths, which were cut into a scalloped shape and hemmed. It also relied on specific weaving techniques, and possibly on a specific type of loom.

The key challenge is to find a way to reduce the width of the cloth as it is being created in order to achieve a triangular-shaped fabric on a loom. The Sai loincloth goes from an estimated 104 cm wide along the upper edge to a mere 22 cm at the preserved bottom of the lower part. The width would have presumably continued to decrease until the fabric finished in a point. Several methods were known in the ancient world which might achieve this effect but none of them seems to perfectly apply to the Nubian specimen (Granger-Taylor 1982). On the contrary, it seems that a range of different techniques was used on the same cloth to dramatically reduce its width. The first notable method was to decrease the actual number of warps used across the fabric. There are an estimated 350 to 400 warp threads at least used along the starting border, but there are only 159 warp threads in the bottom part. This drastic diminution in number would automatically narrow the web. It is difficult to understand how this reduction was achieved. Several areas of the cloth show returning warp threads, which instead of running down the full length of the fabric were purposely turned back into the weave, forming discreet wedges as they did (fig. 10). Where these threads went and how they were stopped or even maintained in tension on the loom is not known, but the use of a set of subsidiary rods is possible. The returning warps do not form a regular pattern and are always associated with a number of returning wefts. They seem to intervene every 15 cm to 20 cm or so, and concentrate on areas along the side edges. However, one point is clear: the triangular shape was intentional from the very beginning of the weaving, while building the starting border and laying-out the warp threads on the loom. The second technique used to decrease the width of the cloth was to introduce a variation in the density of the weave, since a textile with spaced-out warp threads would be larger than one with dense

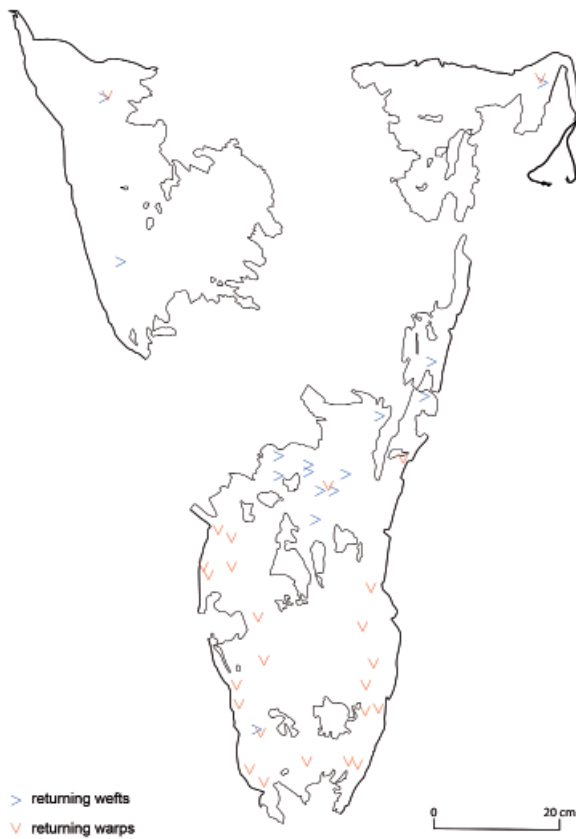


Fig. 10: Diagram showing the broken wefts, and the returning wefts and warps (Image: Elsa Yvanez)

warp threads. Unfortunately, the prolonged use of the Sai loincloth, as well as its degraded state, produced many post-weaving variations, such as areas of very distended weave in the middle of the garment. Where the structure is well preserved, it appears that the density of the warp threads is much higher along the side edges than in the central part of the weave. It goes from 6 warps per cm at the centre to 11 warps per cm closer to the edges. The tabby weave even becomes completely warp-faced for 1.5 cm along the selvedge, notably reinforcing the edges. It is highly probable that these two portions of warp-faced weave, on both sides of the triangle, were used to “push away” the unwanted warps, thereby creating a tapered shape while keeping a consistent weave density in the main body of the garment.

As the study progressed, it became difficult to envisage how these different processes could have been implemented on the warp-weighted loom, the weaving tool of choice during the previous Meroitic and Post-Meroitic periods (Wild 2011; Yvanez 2015). Despite the broad versatility of this tool, laying-out all the warps according to a triangular shape seems

particularly arduous when using a set of the large pear-shaped clay loom weights known in Nubia, let alone while maintaining a constant and regular tension throughout weaving. The use of fixed warp bars appears better suited for the task, especially to attach the diagonal selvedge threads that keep clearly-defined edges to the piece. The horizontal loom, known in the Nile valley for millennia, or the two-beam vertical loom, seem more logical candidates. The use of one of these two looms is further illustrated by the starting border, in which warp threads appear to be regularly grouped every centimetre or so where the leashes would have been passed to attach the fabric to the beam (Vogelsang-Eastwood & Kemp 2001, 108, 324-333). No archaeological traces of the horizontal ground loom or the vertical two-beam loom have been identified so far in ancient Sudan because of their wooden construction and their temporary character. If this hypothesis is confirmed, the loincloth from Sai would offer a welcome addition to the body of knowledge about local textile craft, by attesting specific expertise about loom types and a particular item of clothing.

#### *Comparisons with other loincloths from Nubia*

The loincloth from Sai does not follow the same construction methods as its many pharaonic counterparts, which were using two cut triangular panels sewn together and hemmed. It cannot be related either to Meroitic specimens, since these garments were also cut and sewn to shape, albeit from one single piece of fabric. It has a better match to three similar textiles discovered in different Nubian sites: Ashkeit (Bergman 1975, 23-25, 76-77, fig. 12-13, Bergman 1988, 31-32, fig. 5-6), Qustul (Mayer-Thurman & Williams 1979, 142, number 178) and Kulubnarti (Adams and Adams 1998, 53, plate 9A-B).

The piece excavated in the cemetery of Ashkeit was found in situ around the hips of a mature individual of undetermined gender, lying in the grave in a supine position. It has the same triangular shape, the same types of starting border and selvedge, and is made in the same woven-to-shape technique with returning warps. Found in a cemetery in use for a long period between about 350 CE and 600 CE (Bergman 1975, 76-77), the cloth has been dated to the Late Meroitic to the Post-Meroitic period (around 300 CE to 400 CE). In view of the other examples, it might be safer to attribute it to a later Post-Meroitic/Early Christian phase (around 500 CE to 650 CE). It is interesting to note that this loincloth was woven with dromedary wool, as were many other specimens found by the same team along the Scandinavian Joint



Expedition concession in Lower Nubia. It illustrates the important role played by dromedaries in the pastoral economy of the region from Late Antiquity onwards (Bergman 1975, 12). Another loincloth discovered in an early Christian grave at Qustul shows the same use and technical characteristics as well as being found in a similar funerary context. The ground weave displays few differences from the Sai and Ashkeit pieces, with the use of a weft-faced tabby weave and the creation of a reinforced corded selvedge along the two long sides. It is made of wool of an unidentified species. The Kulubnarti specimen is also a wool loincloth with a tapered shape, but its general aspect is much narrower than the previous examples, with an elongated trapezoidal shape. Its good preservation provides the opportunity to observe a fine fabric woven with reinforced corded selvedges and finished by ornamental twining and fringes. These would have been left hanging over the knot of the garment, decorating the mid-section or upper-thigh areas of the body. Another textile with a tapered shape finished with fringes was also found by the Scandinavian Joint Expedition in Abka, in a Post-Meroitic grave, indicating a possible recurrence of this type of ornamentation along the finishing border of tapered textiles (Bergman 1975, 25-26, 84). This piece, in weft-faced tabby weave, was also decorated with thin red, yellow, blue and brown horizontal stripes. Its context of use and discovery was unfortunately not as well preserved as in the other cases, since this fragment was found in a disturbed multiple burial. A fifth triangular loincloth was also reported from the early medieval levels of Qasr Ibrim, but its weaving technique is not reported (Adams & Adams 2010, 168). This piece is surprisingly made of cotton, a fibre that ceased to be used on a large scale in Nubia some time during the Post-Meroitic period. Evidence suggests that it remained in use in Qasr Ibrim only (Yvanez & Wozniak 2019).

This small body of evidence, especially the three well-preserved triangular loincloths from Sai, Ashkeit and Qustul, confirms the creation of a specific type of wool loincloth at the end of the Post-Meroitic period (circa 500 CE), thanks to new weaving techniques. Thus far, this particular weave-into-shape method remains unique along the Nile valley and has its roots in the expertise of local Nubian weavers. The juxtaposition of dromedary fibre and the probable use of the ground loom point to the integration of relatively new pastoral practices and craft technologies in the local Nubian culture of the time.

The cultural link between the use of a ground loom and nomadic populations is quite well attested in the

Maghreb/Mashreq areas, along the Nile valley and in Arabia, where textile crafts also rely extensively on wool from dromedaries. The ground loom, a light and temporary structure, which is easy to install, operate and dismantle, is particularly well suited to nomadic life (for Sudanese examples of ground-loom weaving, see Crowfoot 1921). However, the use of dromedary wool with the ground loom need not to be exclusively related to nomadism. In the case of the Nile valley, it seems that these two phenomena were embedded in the daily life of the sedentary population.

#### *Comparisons with other burials*

As a product of different weaving methods, the Sai loincloth illustrates the transformations in textile craftsmanship in Nubia at the end of the Post-Meroitic period and the beginning of the Medieval era. Besides its technical attributes, the garment also provides an interesting glimpse into the Christian burial customs on Sai Island. The man buried in his loincloth was laid in a supine position in a rectangular shaft oriented east-west, with his arms along his chest, his hands on his pelvis, and his legs closed. Despite the good preservation of organic remains in the grave, no trace of other fabric was found. The body was maintained in a tight position thanks to a network of bi-colour ropes, knotted in a criss-cross pattern from head to toe (fig. 1).

This suggests that the loincloth was the sole covering of the deceased, who was not wrapped in a shroud. That fact alone distinguishes this inhumation from the burial rites observed in other medieval graves on Sai Island. Several undisturbed Christian graves have also been excavated in cemetery SN, where many of the bodies were found wrapped in shrouds (Geus et al. 1995). Some shrouds wrapped the body from the midsection to the legs, with the arms crossed over the pelvis and the head bare. Other larger sheets entirely enveloped the body from head to toe. In some cases, the textiles were maintained in place with a network of knotted black strings. A particularly well-preserved inhumation of a young child even shows the complex wrapping method of a specifically designed shroud, intended to secure the body in a crouched position with the head leaning toward the thorax (Peressinotto et al. 2001). The hyperflexion of the cervical rachis is a recurring trait of Christian burial practices in this cemetery. No such complexity of taphonomic process is visible in tomb CH 01 in cemetery 8-B-5.A. The deceased is not wrapped in a shroud but is wearing a garment, probably his own loincloth reused for his funeral. From the body position to the context of the loincloth, the same can be said for the burials



at Ashkeit and Qustul (Bergman 1975, 76; Mayer-Thurman & Williams 1979, 142).

### Conclusion

This specific type of loincloth seems to correlate with different burial customs in which the body of the deceased was visible during the funeral. This approach to funerary rites implies deeply grounded differences in body acculturation processes, suggesting the negotiation of cultural, social, or ethnic identity. The data remains insufficient to justify this difference. Could it correspond to a particular time period or population group? It is hoped that further study of medieval cemeteries and funerary textiles will refine our understanding of this clothing item as well as its associated burial customs.

### <sup>1</sup> Abstract from the radiocarbon dating report:

The date is uncalibrated in radiocarbon years BP (Before Present – AD 1950) using the half life of 5568 years. Isotopic fractionation has been corrected for using the measured  $\delta^{13}\text{C}$  values measured on the AMS. The quoted  $\delta^{13}\text{C}$  values are measured independently on a stable isotope mass spectrometer (to  $\pm 0.3$  per mil relative the VPDB. Bronk Ramsey et al., 2004; Bronk Ramsey et al., 2002). The calibrated ranges have been generated using the Oxcal computer program (v. 4.2) of Bronk Ramsey, using the 'INTCAL09' dataset (Reimer et al. 2009).

Analysis performed by Haley Sula, University of Oxford Radiocarbon Acceleration Unit.

OxA	Material	$\delta^{13}\text{C}$	Date
Sai Island, Sudan SAI/ 001	textile	18.00	1290 $\pm$ 60  95.4% probability 649 - 878 calAD (95.4%)

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### Bibliography

- Abd Elgader, M.-B., Eisa, M. O. & ElFagir, I. (2017) Morphology and Morphometry of Raw Camel Hair of Some Sudanese Camel Types in Kordofan States. *Nova Journal of Medical and Biological Sciences* 6, 1, 1-8.
- Adams, W. Y. & Adams, N. K. (1998) *Kulubnarti II. The Artifactual Remains*, SARS Publication, 2. London.
- Adams, W. Y. & Adams, N. K. (2010) *Qasr Ibrim: The Earlier Medieval Period*, EES Excavation Memoir 89. London.
- Bergman, I. (1975) *Late Nubian Textiles*, Scandinavian Joint Expedition 8. Oslo: Scandinavian University Books.
- Bergman, I. (1988) The triangular Nubian textiles. How were they produced? In: I. Estham and M. M. Nockert (eds.), *Opera Textilia Varioorum Temporum. To honour Agnes Geijer on her ninetieth birthday 26<sup>th</sup> October 1988*. Stockholm: Statens Historiska Museum, 29-32.
- Bronk Ramsey, C., Higham, T., Owen, D. C., Pike, A. & Hedges, R. (2002) Radiocarbon Dates from the Oxford AMS system: *Archaeometry Datelist 31*. *Archaeometry* 44, supplement 1: 1-144.
- Bronk Ramsey, C., Higham, T. & Leach, P. (2004) Towards High-Precision AMS: Progress and Limitations. *Radiocarbon* 46(1): 17-24.
- Bronk Ramsey, C., Higham, T., Bowles, A. & Hedges, R. (2004) Improvements to the Pretreatment of Bone at Oxford. *Radiocarbon* 46(1): 155-163.
- Chaix, L. (2010) Animal exploitation during Napatan and Meroitic times in Sudan. In: W. Godlewski and A. Laitar (eds.), *Between the Cataracts, Proceedings of the 11<sup>th</sup> International Conference for Nubian Studies, Part 2.2*. Warsaw: 519-526.
- Crowfoot, G. M. (1921) Spinning and Weaving in the Sudan. *Sudan Notes and Records* 4, 25-28.
- Fiedler, I. (1979) The fibers. In: C. C. Mayer-Thurman and B. Williams (eds.), *Ancient Textiles from Nubia*. Chicago: Art Institute of Chicago, 49-51.
- Francigny, V. (2010) The Meroitic Necropolises of Sai Island. Second Season at the Cemetery 8-B-5.A. *Sudan & Nubia* 14, 56-59.
- Francigny, V. (2014) An Elite Meroitic Cemetery at Sai Island. In: J. R. Anderson and D. A. Welsby (eds.), *The Fourth Cataract and Beyond, Proceedings of the 12<sup>th</sup> International Conference for Nubian Studies*. Leuven-Paris: Peeters, 797-803.
- Francigny, V. (2017) L'île de Sai, joyau archéologique du Soudan. In: O. Cabon (ed.), *Histoire et civilisations du Soudan*. Paris: Soleb/Bleu Autour, 521-539.



- Geus, F. (1996) Les nouvelles fouilles de l'île de Saï. *Comptes-rendus de l'Académie des Inscriptions et Belles-lettres* 140, 4, 1165-1195.
- Geus, F., Lecoite, Y. & Maureille, B. (1995) Tombes napatéennes, méroïtiques et médiévales de la nécropole de Saï. Rapport préliminaire de la campagne 1994-195 (archéologie et anthropologie). *Archéologie du Nil Moyen* 7, 99-139.
- Granger-Taylor, H. (1982) Weaving Clothes to Shape in the Ancient World: The Tunic and Toga of the Arringatore. *Textile History* 13, 1, 3-25.
- Hafsaas-Tsakos, H. & Tsakos, A. (2010) First Glimpses on the Medieval Period of Sai Island. *Beiträge zur Sudanforschung* 10, 77-85.
- Łajtar, A. (2006) Christian Sai in Written Records (Inscriptions and Manuscripts). *The Journal of Juristic Papyrology* 36, 91-104.
- Lenoble, P. (1994) Une monture pour mon royaume. Sacrifices triomphaux de chevaux et de Mehara d'el-Kurru à Ballana. *Archéologie du Nil Moyen* 6, 107-127.
- Maik, J. (2007) Textiles from a late fifth-century Post-Meroitic cemetery in Kassinger Bahri (Sudan). *Gdansk Archaeological Museum African Reports* 5, 97-102.
- Mayer-Thurman, C. C. & Williams, B. (1979) *Ancient Textiles from Nubia: Meroitic, X-Group and Christian Fabrics from Ballana and Qustul*. Chicago: Art Institute of Chicago.
- Peressinotto, D., Maureille, B., Lecoite, Y. & F. Geus (2001) Reconstitution de gestes funéraires, le linceul de la tombe 176 de la nécropole Nord de l'île de Saï (Province du Nord, Soudan). *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 13, 1-2, 127-141.
- Rast-Eicher A. (2016) *Fibres: microscopy of archaeological textiles and furs*. Budapest: Archaeolingua.
- Reimer, P. J., Baillie, M. G. L., Bard, E., Bayliss, A., Beck, J.W., Blackwell, P. G., Bronk Ramsey, C., Buck, C. E., Burr, G. S, Edwards, R. L., Friedrich, M., Grootes, P. M., Guilderson, T. P., Hajdas, I., Heaton, T. J., Hogg, A. G., Hughen, K. A., Kaiser, K. F., Kromer, B., McCormac, F. G., Manning, S. W., Reimer, R. W., Richards, D. A., Southon, J. R., Talamo, S., Turney, C. S. M., van der Plicht, J. & Weyhenmeyer, C. E. (2009) IntCal09 and Marine09 Radiocarbon Age Calibration Curves, 0–50,000 Years cal BP. *Radiocarbon* 51(4): 1111-1150.
- Rowley-Conwy, P. (1988) The Camel in the Nile Valley: new Radiocarbon Accelerator (AMS) dates from Qasr Ibrim. *Journal of Egyptian Archaeology* 74, 245-248.
- Vercoutter, J. (1958) Excavations at Sai 1955-57, A Preliminary Report. *Kush* 6, 144-169.
- Vogelsang-Eastwood, G. (1992) *Patterns for Ancient Egyptian Clothing*. Leiden.
- Vogelsang-Eastwood, G. & Kemp, B.J. (2001) *The Ancient Textile Industry in Amarna, EES excavation memoir 68*. London: Burlington Press.

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