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# Spinning for the gods?
## Preliminary observations on prehistoric textile production at Hierakonpolis, Egypt

**Abstract**
Around 3500 BC, an adult elephant was sacrificed and buried in the elite cemetery of Hierakonpolis in the very south of Egypt. The elephant was given a burial similar to humans including a linen shroud. This shroud is just one of an impressive number of textiles found at the site illustrating a range of uses. The textiles of the late prehistory in Egypt, the predynastic period, have not yet been thoroughly researched, and the linen of the elephant's shroud therefore presents a unique opportunity to consider the time used to produce it and the expertise of the spinners and weavers. The information from textile tools found at Hierakonpolis can now also be added to this story. The results of research into the elephant's shroud and the textile tools question our perception of prehistoric society in Egypt just before state formation, especially in relation to the organisation of textile production.

**Keywords:** Egyptian prehistory, animal burial, linen shroud, spindle whorl

**Introduction**
Textile production in Egypt is mainly known from the pharaonic period, either in the shape of models or wall paintings in tombs (Vogelsang-Eastwood 1995, 9) or in well-preserved textiles such as those from Tutankhamun's tomb (Vogelsang-Eastwood 1999). Excavators of the 1800s and early 1900s had some understanding of textile production and the related tools, especially English excavators who were familiar with textile production from industrialisation. Flinders Petrie recognised and correctly registered textile tools (Petrie 1917, 53). However, later archaeologists had less knowledge of the processes, which resulted in incorrect identification and registration of tools (Jones 2001, 13). The main material known is from the Pharaonic period, both the Middle Kingdom (2055-1650 BC) and the New Kingdom (c. 1550-1070 BC). Two sites from those periods, Lahun and Amarna, are well researched and the results have been published - for example, *Evidence for linen yarn preparation in Ancient Egypt* (Granger-Taylor 1998) and *The ancient textile industry at Amarna* (Kemp & Vogelsang-Eastwood 2001).
However, the predynastic period was almost 1,000 years before the Middle Kingdom, which questions whether comparisons can be made without interpretation being unduly influenced by the later processes. For Egyptian prehistory, textile research is mainly based on finds from burial sites, as few settlements have been excavated resulting in very limited access to information about domestic spaces with their associated tools and household textiles. Furthermore, the burial sites were often heavily robbed, meaning that any data from the burials should be treated with caution. Tomb robbers typically displace both grave goods and the body leaving bones and textiles from the burials to disintegrate on the surface making it difficult to judge to what extent textile was used in the burial. The elephant's tomb at Hierakonpolis (HK6 Tomb 24) was robbed, too, but due to its size, enough textile fragments remain to provide the basis for research (Friedman 2003, 9-10). Fortunately, textile is also found in numerous other sites, such as Badari and Mostagedda (Jones 2007, 982); the best known piece of textile is the Tarkhan tunic which has been 14C-dated to 3482-3102 BC, i.e. at the very end of the predynastic period (Barber 1991, 147, UCL 2016). The research is further limited by a lack of typologies and catalogues. Predynastic textile remains from nine sites have been

compared (Jones 2008); the first analysis of early textile tools from Egypt undertaken (Spinazzi-Lucchesi 2018); and more work is currently underway, such as a PhD thesis by Alistair Dickey, University of Liverpool: *Textile of the elite and non-elite at ancient Nekhen* (Nekhen is the ancient Egyptian name for Hierakonpolis). This renewed interest in early Egyptian textile production will fill the gaps and make it possible to analyse the economic and ritual impact of textiles.

**Textiles in early Egypt**

From prehistory to the end of the Pharaonic period, Egyptian textiles are usually linen made from flax (*Linum usitatissimum*) woven in a tabby weave (Vogelsang-Eastwood 1992, 1). The process of turning flax into textile requires several steps, each of which necessitates a certain expertise (Vogelsang-Eastwood 1992, 1-35, Andersson Strand et al. 2010, 24-26). Flax may be described as easy to grow, but it has very specific requirements, such as slow running water, and must be harvested by pulling the roots, not cutting. The further extraction of fibres from the stems is no less time consuming (Andersson Strand et al. 2010, 24-26).

At the predynastic site of Hierakonpolis, an impressive quantity of textiles has been found, illustrating a range of uses. Textiles are found in burials in the workers' cemetery (HK43) and fragments are found in many of the robbed human burials in the elite cemetery (HK6) in addition to the burial of the elephant in Tomb 24 (Jones 2002, 13). Textile is also incorporated into the wooden walls of fences and structures in the elite cemetery, including the pillared halls, connected to ritual offerings, where the textile was plastered and painted in bright red, yellow, green and black (Friedman 2011, 187; Friedman, nd). Model objects, some possibly representing a shield and quiver, or a backpack found in a burial are also made from linen that has been plastered and painted (Droux 2016, 5; Hendrickx & Eyckerman 2017, 9). In the courtyard of a house within the settlement at HK11, a few bundles of yarn were found as well as spindle whorls and textile fragments, although in very modest amounts (Jones 2001, 13). The yarn at HK11 was analysed and found to be of good quality, finely and evenly spun with most of the fragments showing evidence of a new spinning technique which produced S-spun yarn (Jones 2001, 13). In general, the textiles found in the Naqada II phase of the Predynastic period show that the textile workers had acquired the expertise to produce linen of good quality that was evenly spun and woven (Jones 2002, 13-14). Furthermore, analysis of the Hierakonpolis textiles shows that textiles were produced in both fine and coarser qualities suggesting control, standardisation, and administration (Jones 2002, 13). The use of textile in burials was conventional – a single shroud wrapped around the body, and in a few examples of early mummification, pads of fine quality textile soaked in resin wrapped around wrists and neck, probably to maintain articulation in the afterlife, and a shroud for the entire body made from textile of a coarse quality. This use of textiles is also found at HK6 (Jones 2002, 13).

Just a few hundred years later, in the Early Dynastic period, evidence shows specialised workshops that are attached to religious or administrative institutions such as in Buto, where a stone vessel workshop was housed in a building connected with rituals and/or administration (Köhler 2010, 40). As early as 2900 BC, textiles are mentioned in historic records in the shape of the so-called "linen lists" which were a part of offering scenes detailing the amount and type of linen given to the deceased. In the royal tomb of the Late Predynastic period, tomb U-j from Abydos, small ivory labels are found and believed to have been attached to bunches of linen given to the king as grave goods (Jones 2010, 81, 83). Throughout the Pharaonic period, textiles were produced for gods and kings in specialised workshops. Those working for gods and kings received part of their wage in textiles.

**The elephant's shroud**

Hierakonpolis is a unique site for the prehistoric archaeology of Egypt, particularly the latter part of the prehistoric period also known as the predynastic period or the Naqada period (4000-3000 BC). It has been excavated since the late 1800s, and for more than the last 30 years, by the same team. It documents multiple aspects of an early society with settlement, ritual structures, production areas, and elite and workers' cemeteries. All this served a strong power centre with a population of possibly as many as 5,000 to 10,000 persons during the Naqada II period, c. 3500-3200 BC. Hierakonpolis is considered to be the most important city in the south of Egypt, providing evidence for the first kings and religious practices in the area (Friedman 2011, 44), and ultimately becoming one of two major cities vying for power at the time of the unification of Egypt under one king (Wengrow 2006, 73-74, 80). The elite cemetery, HK6, features fenced-in burial complexes and superstructures (including a pillared offering hall), not seen anywhere else in Egypt in this time period. Although animal burials are not abnormal, there are usually only few animals buried and not at every site (Flores 2004; Wengrow, 2006, 59). However, in HK6 animal burials are taken to a much larger and complex scale with more than 100 animals - from the

cattle and dogs seen in other sites, to exotic beasts such as a leopard, several baboons, two crocodiles, two aurochs and two adult elephants. In the burial pits of the largest animals, such as the leopard, one of the aurochs, perhaps one of the crocodiles as well as the two elephants, textile remains have been found suggesting they were buried in shrouds (Friedman et al. 2017, 274-275). One of these shrouds, the shroud of the elephant in Tomb 24, is the case study for the calculation of textile production time. Textile from the predynastic period is often found in small fragments which makes it difficult to calculate size and thereby production time. Despite this particular burial having been robbed, parts of the body of the elephant were found in situ with the textile adhering to the body both on the top and on the bottom, as well as on the side of the pit. It is this distribution which strongly suggests that the textile was wrapped around the animal (Friedman 2003, 9-10). An analysis of the elephant's bones showed that it was 6 to 10 years old and stood 2 m to 2.5 m in shoulder height (Friedman 2004, 149). The textile distribution and its implications provide a unique opportunity to estimate the size of the shroud and consequently the production time for it (Jones 2002, 13; Drewsen forthcoming). The fragments of the shroud are in parts well-preserved (fig. 1), and described as follows:

"A fragment of textile from the side of the tomb was selected for examination under a stereomicroscope because it was extremely well-preserved, still pliable, and a beautiful creamy gold colour ... The yarns are mostly single, s-spun, with a few s2S plied yarns. Thread diameters are fine to medium, ranging from 0.18 mm to 0.3 mm. The warp yarns are more tightly spun than the weft, which were laid at an angle of 60 degrees to the warp ... The weave is of medium density, with a thread count of 20 x 10 yarns/cm, a ratio of 2:1.This ratio is traditionally associated with textiles of a later date, as most Predynastic textiles have a ratio of 1:1, including those from the burials at HK43." (Oldfield & Jones 2003, 12).

Fig. 1: Micrograph of a well-preserved fragment of the textile from Tomb 24 (14x magnification) (after Friedman 2003, 8-9; image: R. Oldfield)

Using tests carried out at the Ribe Viking Center in spinning and weaving flax, the production time can be calculated, though it should be noted that the tests were not carried out with replicas of Egyptian material and that they are therefore only an approximation. A piece of textile large enough to cover an adult elephant would be about 20 $m^2$. The thread count of 20:10 threads per cm is equal to a total of 60,000 m of spun yarn needed for the shroud. Since the tests have shown that an experienced spinner can spin an average of about 56 m of thread per hour (Ejstrud et al. 2011, 62), the final production time for spinning is 1,071 hours. This does not include harvesting the flax and processing it to the point at which spinners can use the fibres, which is a time-consuming process (Andersson Strand et al. 2010, 24-26). The tests also show that an experienced weaver can produce an average of 5 cm of fabric per hour (Ejstrud et al. 2011, 67). However, this is on a warp-weighted loom. So far, there is no evidence of vertical looms before the New Kingdom (Vogelsang-Eastwood 1991, 35) and the relevant loom would therefore most likely have been a ground loom or horizontal loom producing textiles with a maximum width of 100 cm to 130 cm (Vogelsang-Eastwood 1993, 6). The shroud would then have consisted of a minimum of four lengths, each of 5 m, to reach a total of 20 $m^2$. With a production rate of 5 cm per hour, the total time required for weaving the shroud is estimated at 400 hours. This does not include setting up the loom, which is another time-consuming process (Ejstrud et al. 2011, 62). The grand total is 1,471 hours. Divided by eight hours of work every day, it would have taken one person more than six months to produce this shroud. Since the shroud is only one of many pieces of textile, it underlines the fact that textile production is an extremely time-demanding process, which would have necessitated specialists working full-time at spinning and weaving. Due to the state of the fragments of the shroud, it is not possible to determine whether it is a piece of repurposed textile. However, in general, the textiles found in the workers' cemetery in Hierakonpolis, HK43, show no signs of repurposing, and it seems therefore that the textile was produced specifically for burial (Jones 2002, 13). Regardless, it was a wealthy society that allowed time-consuming production of textile purely for ritual consumption.

**Tools**

The use and need for the quantity of textiles for funerals is not in proportion with the amount of textile tools found in Hierakonpolis. Many have been excavated by Quibell and Green in the late 1800 (Adams 1974, 37, plate 26) in the Early Dynastic town at Hierakonpolis, amongst them limestone spindle whorls, such as the one at Liverpool Museum (inventory number 16.11.06.371a). Finds of pierced discs made from potsherds that could have been used as spindle whorls are also known from the Predynastic settlement sites, but except for a study of 12 ceramic disks found at HK11, the spindle whorls have not been intensively investigated (Jones 2008, 112). However, in 2016 a number of these pierced ceramic discs were studied by the author and are published in this article.

The pierced discs come from excavations at HK29, the house and workshop of a pottery excavated in 1978-1979 by Michael Hoffman (Hoffman 1982), and from HK29A, a predynastic ceremonial centre investigated in 1985-86, 2003 and 2008 by Michael Hoffmann and Renee Friedman (Friedman 2009). The discs from HK11 Square G, excavated in 2000-2001 by Ethan Watrall and previously studied by Jana Jones were also made available for study. The analysis was made as a preliminary study to inventory possible textile tools from the area, using a mobile phone camera for the photographic record and a small scale for recording weights. Subsequently professional photos were taken of the discs. In total, 39 discs were recorded from location HK29, 90 discs from location HK29A, and 19 from location square G, HK11 (tables 1-3 and fig. 2, see also description of the sites further below). The weights and dimensions of the pierced discs seem to suggest that the textile production at all three localities was not specialised for one type of textile but produced both yarn of fine or semi-fine quality and a few heavier, coarser qualities.

Clay spindle whorls are found in all sites not just the Naqada power centres. They are found in the settlement areas, for example at Adaïma (Midant-Reynes & Bucez 2002, 443-463). In El-Mahasna, pierced discs were also found in Block 3, which is interpreted as a ritual structure (Friedman, personal comment). In other cultures and periods, it is not uncommon to see tools in a burial but in the Predynastic period, Egyptian grave goods are primarily personal belongings such as ornaments and food for the afterlife, although pierced disks are known from some burials of the period at Hierakonpolis and elsewhere.

| No. | HK Find No. | Diameter in mm | Width fragment/ hole-to-edge | Preliminary working description | Weight (actual) | Weight (if fragment, estimated) |
|---|---|---|---|---|---|---|
| 141 | | 28 | | Red on one side. Flat, roundish, edges uneven, some signs of smoothing. Hole attempted but not bored through. Missing about 1/5. | 3.7 | 4.60 |
| 140 | | 27 | | Red on one side. Flat, uneven, hole attempted, but not bored through. | 4.8 | 4.80 |
| 144 | | 30 | | Remains of red on one side. Flat, edges smooth. Fragment of 1/2 | 2.8 | 5.60 |
| 148 | | 30 | | Red on one side. Flat, edges smooth. Hole attempted but not bored through. | 6.1 | 6.10 |
| 130 | | 30 | | Red on one side. Flat, smooth sides. | 6.4 | 6.40 |
| 145 | | 35 | | Red on one side. Flat, edges smooth. Fragment of 1/2 | 3.3 | 6.60 |
| 131 | | 32 | | Red on one side. Flat, smooth side, a little tapered. | 7.3 | 7.30 |
| 142 | | 42 | 21 | Black topped red ware? Flat, round, edges tapered and smoothed. Fragment of c. 1/4. | 2.9 | 11.60 |
| 132 | | 36 | | Red on one side. Flat, smooth sides. Fragment: 1/2. | 6.4 | 12.80 |
| 137 | | 44 | 22 | Remains of red on one side. Flat, conical, edges smooth. Fragment ca 2/5. | 5.4 | 13.50 |
| 139 | | 48 | 24 | Black on one side. Flat, conical form, smooth edges. Fragment of c. 1/2. | 6.9 | 13.80 |
| 135 | | 45 | | Remains of red on one side. Flat, conical, edges smooth. Fragment: 1/2. | 7.2 | 14.40 |
| 143 | | 52 | 26 | Remains of red on one side. Flat, edges smooth and tapered. Fragment of c. 1/4. | 3.6 | 14.40 |
| 133 | | 44 | 22 | Red on one side, very degraded. Flat, sides smooth? Fragment due to degradation - size about 3/4 of original. | 11.5 | 15.30 |
| 138 | | 42 | 21 | Red on one side. Flat, smooth rounded edges. Fragment: c. 2/5. | 6.7 | 16.80 |
| 134 | | 46 | 23 | Red on one side. Flat, sides smooth. Fragment c. 1/2. | 10.7 | 21.40 |
| 146 | | 68 | 34 | Remains of black. Flat, edges smooth? Several bits broken off. Fragment of 1/4. | 8.8 | 35.20 |
| 136 | | 58 | 29 | Black on one side. Flat, conic.l, edges smooth. Fragment c. 1/4. | 9.0 | 36.00 |
| 129 | | | 62 | Red on one side. Flat. Fragment, broken off along most edges. A hole attempted to be bored through on each side. Holes do not line up. | 27.3 | |

Table 1: Preliminary list of discs found at HK11

| No. | HK Find No. | Diameter in mm | Width fragment/ hole-to-edge | Preliminary working description | Weight (actual) | Weight (if fragment, estimated) |
|---|---|---|---|---|---|---|
| 1 | 12 | 20 | | Black. Irregular, almost triangular, flat. Sides broken off? Hole not in the middle of the piece. | 3.0 | 3.00 |
| 40 | | 20 | | Red on both sides. Round, flat, hole on both sides, but not bored through. | 4.2 | 4.20 |
| 11 | | 24 | | Red on one side. Irregular, flat. Sides broken off? Hole not in the middle. | 4.3 | 4.30 |
| 2 | 12 | 35 | | Red, polished on flat side. Round, sligthly convex. | 7.0 | 7.00 |
| 159 | | 36 | | Red on both sides. Round, edges smoothed and tapered to one side. Hole attempted, but not bored through. Hole not centered. | 7.8 | 7.80 |
| 162 | | 38 | 19 | Red on one side. Round, edges smoothed. Fragment of c. 2/5. | 3.1 | 7.80 |
| 161 | | 35 | | Round, conical, smoothed. Fragment c. 1/2. | 4.0 | 8.00 |
| 23 | | 33 | | Roughware? Round. | | 8.40 |
| 3 | 12 | 34 | | Red on one side. Broken in half, flat. | 5.2 | 10.40 |
| 160 | | 44 | 22 | Red on one side. Round, edges not smoothed. Fragment c. 2/5. | 7.1 | 10.70 |
| 26 | | 40 | | Red on one side. Round, taperede at the sides, flat. | 10.8 | 10.80 |
| 27 | | 52 | 26 | Red on both sides. Fragment c. 2/5 of full shape. Round, taperede at sides. | 5.8 | 11.60 |
| 29 | | 60 | 30 | Blacktopped redware. Fragment of c. 1/4 of full shape. Round tapered at the sides. | 6.2 | 12.40 |
| 10 | | | 40 | Red on one side. Broken, not quite in half, very similar to No. 2 | 6.2 | 12.50 |
| 30 | | 34 | 17 | Red on one side. Fragment, c. a quarter of full shape. Flat, tapered. | 3.3 | 13.20 |
| 22 | | 35 | | Red on one side, black on the other. Round flat shape, hole not bored through. Hole placed off-center. Scratches around hole. | | 13.50 |
| 31 | | 42 | | Red on one side. Broken in c. half. Flat, tapered at sides. | 7.0 | 14.10 |
| 32 | | 40 | | Black on one side. Flat round, roughwarely tapered at sides. | 14.2 | 14.20 |
| 25 | | 41 | | Black. Round, broken in half, tapered at the sides. | 7.9 | 15.80 |
| 28 | | 45 | | Red on one side. Broken in c. half. Flat, tapered at sides. | 7.9 | 16.00 |
| 39 | | 49 | | Red. Irregular shape, flat, rounded from side. | 20.5 | 20.50 |
| 5 | | 50 | | Red on both sides. Broken in half. Round, sligthly convex - flat on both sides, but side slightly rounded one side (no top on this side). | 10.5 | 21.00 |
| 24 | | 49 | | Red on one side. Round, broken in half, tapered at the sides. | 10.7 | 21.40 |
| 34 | | 41 | | Red on one side. Flat round, broken in half, hole not bored through. | 12.5 | 25.00 |
| 20 | | 57 | | Red on both sides. Round, slightly rounded seen from the side, flat. | | 25.20 |
| 13 | | 45 | | Dark red on both sides. Round, flat, broken in half. | 13.4 | 26.80 |
| 35 | | 56 | 28 | Red on one side. Flat round tapered at sides, konvex, fragment of 1/4 of full shape. | 6.7 | 26.80 |
| 158 | | 60 | | Red on one side. Round, edges smoothed and tapered, fragments broken off. | 28.2 | 28.60 |
| 12 | | 54 | | Coarseware. Round, flat. | 28.7 | 28.70 |
| 33 | | 48 | | Red on one side. Flat round, broken, fragment of c. 2/3 of full shape. | 19.9 | 29.90 |
| 19 | | 57 | | Red on both sides. Round, part of side broken off, hole not bored through completely. | 32.1 | 32.10 |
| 8 | | 52 | | Red on one side. Broken in half, flat, clear curve seen from the side. | 18.4 | 36.80 |
| 14 | | 52 | 26 | Round flat, slightly tapered sides, broken, c. 1/4. | 9.9 | 39.60 |
| 17 | | 68 | | Roughware. Round, 2 holes not bored through completely. Slightly rounded from side. | 46.9 | 46.90 |
| 6 | | 62 | | Roughware. Round, sides rounded towards one side, no top (not completely convex). Hole not bored all the way through. | 44.6 | 89.20 |
| 4 | | | 52 | Roughware. Broken, flat. | 31.6 | |
| 9 | | | 58 | Red on one side. Broken, clear curve seen from the side. Max width from hole to side: 49 mm. | 15.0 | |
| 18 | | | 42 | Roughware. Square fragment, remains of hole visible. | 12.4 | |
| 7 | | | 58 | Roughware? Broken, flat, hole not bored properly from both sides. | 32.0 | |

Table 2: Preliminary list of discs found at HK29

| No. | HK Find No. | Diameter in mm | Width fragment/ hole-to-edge | Preliminary working description | Weight (actual) | Weight (if fragment, estimated) |
|---|---|---|---|---|---|---|
| 59 | 0447 | 20 | | Red on one side. Flat, smooth edges, not completely round. Hole attempted on one side, but not bored through. | 2.6 | 2.60 |
| 63 | 0409 | 24 | | Roughware. Flat, irregular shape. | 3.4 | 3.40 |
| 94 | 0516 | 25 | | Red on one side. Round, conical, smoothed. Fragment of 1/2. | 1.9 | 3.80 |
| 83 | 0492 | 32 | 16 | Round, edges smoothed and tapered, fragment of 1/3 size. | 1.4 | 4.20 |
| 50 | 0437 | 32 | 16 | Flat, round, smooth edges. Fragment 1/3 of full size. | 1.5 | 4.50 |
| 51 | 0438 | 28 | | Flat, tapered rough edges. Hole attempted, but not bored through. | 4.8 | 4.80 |
| 93 | 0517 | 28 | 14 | Red on one side. Round, conical, smoothed. Fragment of 1/4. | 1.2 | 4.80 |
| 77 | 0422 | 27 | | Red on one side. Round, irregular shape, holes on each side but not bored through. Holes do not completely line up. Edges somewhat smoothed. | | 5.90 |
| 91 | 0520 | 34 | 17 | Red on one side. Round smoothed tapered edges. Fragment of c. 2/5 | 2.5 | 6.30 |
| 76 | 0421 | 28 | | Irregular shape, hole not centered. Wearmarks of hanging? Edges not smoothed. | | 6.70 |
| 98 | 0511 | 32 | 16 | Red on one side. Round, smooth edges. Fragment of 2/5. | 2.9 | 7.30 |
| 116 | 0484 | 42 | 21 | Red on one side. Flat, smooth edges. Fragment c. 1/4. | 2.4 | 7.60 |
| 52 | 0439 | 32 | 16 | Flat, edges tapered to convex. Fragment 1/3 of size. | 2.6 | 7.80 |
| 106 | 0500 | 31 | | Red on one side. Round, smooth edges. Fragment of ½. | 3.9 | 7.80 |
| 79 | 0424 | 28 | 14 | Red on one side. Round, flat, smoothed edges. Fragment of 1/4 size. | 2.0 | 8.00 |
| 107 | 0498 | 32 | | Red on one side. Round, smooth edges. Fragment of ½. | 4.0 | 8.00 |
| 113 | 0493 | 30 | | Flat, smooth edges, convex. Fragment: 1/2. | 4.1 | 8.20 |
| 42 | 0430 | 31 | | Red on both sides. Flat round, fragment about half size, hole not bored through. | 4.1 | 8.20 |
| 47 | 0434 | 80 | 40 | Black/red on one side. Flat round uneven backside, slightly tapered. Fragment of 1/2 full size. | 4.2 | 8.40 |
| 112 | 0491 | 36 | 18 | Flat, tapered from both sides, smooth edges. Fragment: 1/5. | 1.7 | 8.50 |
| 119 | 0486 | 38 | | Red on one side. Flat, smooth edges that are tapered from both sides. Fragment: 1/2. | 4.6 | 9.20 |
| 90 | 0522 | 48 | 24 | Black on one side. Round, thin, tapered smoothed edges. Fragment of c. 1/3. | 3.1 | 9.30 |
| 69 | 0413 | 31 | | Red on both sides. Round, flat, edges not smoothed. Wearmarks consistent with hanging. | | 9.30 |
| 103 | 0503 | 34 | 17 | Black on one side. Round, smoothed edges. Fragment of c. 1/5. | 1.9 | 9.50 |
| 126 | 0476 | 34 | 34 | Red on one side. Flat, round edges, smooth edges. Fragment: Little less than 1/2. | 4.6 | 9.60 |
| 53 | 0440 | 34 | | Roughware. Flat, rough. 2 holes attempted, but not bored through. | 9.7 | 9.70 |
| 57 | 0449 | 37 | | Red on one side. Flat, partly smoothed edges. One hole drilled right through, one hole attempted. Ring edged around the holes. | 9.8 | 9.80 |
| 85 | 0530 | 33 | | Roughware. Round, flat, not smoothed. Fragment of c. 1/2. | 4.9 | 9.80 |
| 72 | 0416 | 38 | 19 | Round, flat, smoothed edges. Fragment of 1/4 size. | 2.5 | 10.00 |
| 95 | 0513 | 36 | 18 | Black on one side. Round, smoothed edges, fragment of 2/5. | 4.0 | 10.00 |
| 104 | 0502 | 38 | 19 | Light colour on one side. Round, smooth edges. Fragment c. 1/5. | 2.0 | 10.00 |
| 102 | 0504 | 40 | | Roughware. Round, rough edges. | 10.1 | 10.10 |
| 124 | 0478 | 35 | | Roughware? Flat, edges rough. Hole attempted, but not bored through. | 10.3 | 10.30 |
| 44 | 0429 | 40 | | Black glitted. Flat round (edges not tapered). | | 10.70 |
| 121 | 0481 | 36 | 18 | Red on one side. Flat, smooth edges, tapered from both sides. Fragment: c. 1/4. | 2.8 | 11.20 |
| 66 | 0408 | 37 | | Flat, smoothed edges. | 11.6 | 11.60 |
| 68 | 0414 | 39 | | Roughware. Square, flat, edges not smoothed. | | 11.80 |
| 49 | 0436 | 32 | 16 | Red on one side. Convex, smooth edges. Fragment 1/4 of full size. | 3.0 | 12.00 |
| 64 | 0427 | 40 | | Blacktopped redware. Flat, smoothed edges. Fragment of c. 2/3 of full size. | 8.1 | 12.20 |
| 115 | 0489 | 48 | 24 | Red on one side. Flat, convex, smooth edges. Fragment c. 1/4. | 4.1 | 12.40 |
| 92 | 0518 | 38 | 19 | Red on one side. Round, smoothed edge, tapered. Fragment of 1/4. | 4.1 | 12.40 |
| 71 | 0417 | 48 | 37/24 | Round, convex, smoothed. Fragment of a little less than half. | 6.1 | 12.50 |
| 80 | 0425 | 44 | | Red on one side. Round, flat, slightly conical, smoothed. Fragment 1/2 size. | 6.8 | 13.60 |

Table 3: Preliminary list of discs found at HK29A

| | | | | | | |
|---|---|---|---|---|---|---|
| 120 | 0485 | 38 | 19 | Red on one side. Flat, smooth edges. Fragment c. 1/4. | 3.4 | 13.60 |
| 58 | 0450 | 40 | | Roughware. Flat, not smoothed. Attempt at boring holes at both sides, but none going through. | 13.7 | 13.70 |
| 46 | 0432 | 43 | | Red on one side. Flat round, edges smoothed but not tapered. Fragment 1/2 size. | 6.9 | 13.80 |
| 110 | 0495 | 37 | | Roughware. Flat round, edges somewhat smoothed, hole not bored through. | | 13.80 |
| 74 | 0419 | 40 | | Roughware. Round, edges smoothed, fragment of 1/2 size. | 7.0 | 14.00 |
| 87 | 0525 | 46 | 23 | Roughware. Round, smoothed edge. Fragment of c. 2/5. | 5.6 | 14.00 |
| 122 | 0480 | 40 | 20 | Black. Flat, edges smooth and tapered. Fragment c. 1/4. | 3.6 | 14.40 |
| 97 | 0510 | 42 | 42 | Round, smoothed edges. Tapered from both sides. Fragment of 1/2. | 7.4 | 14.80 |
| 73 | 0418 | 44 | | Round, flat, edges smoothed. Fragment of c. 1/2 size of full size. | 7.5 | 15.00 |
| 99 | 0507 | 44 | 22 | Red on one side. Round, smooth edges. Fragment of 1/3. | 5.0 | 15.00 |
| 105 | 0501 | 39 | | Round, smooth edges, tapered from both sides. Fragment of 1/2. | 7.7 | 15.40 |
| 114 | 0490 | 46 | 23 | Red on one side. Flat, convex, smooth edges. Fragment c. 1/5. | 3.1 | 15.50 |
| 78 | 0423 | 40 | | Roughware. Round, slightly conical form, smoothing of edges. Fragment of c. 1/2. | 7.9 | 15.80 |
| 61 | 0451 | 38 | | Roughware. Flat, edges smoothed. | 15.8 | 15.80 |
| 88 | 0524 | 42 | | Red on one side. Round, conical, smoothed. Fragment of c. 1/2. | 8.0 | 16.00 |
| 123 | 0479 | 42 | | Flat, edges smooth and tapered. Fragment c. 1/2. | 8.4 | 16.80 |
| 62 | 0410 | 36 | | Red on one side. Flat, edges smoothed, fragment of c. 1/2 of full size. | 8.4 | 16.80 |
| 125 | 0477 | 36 | 18 | Red on one side. Flat, conical, edges smooth. Fragment: 1/3. | 5.9 | 17.70 |
| 89 | 0523 | 46 | 23 | Red on one side. Round, tapered, smoothed edges. Fragment of c. 2/5. | 7.1 | 17.80 |
| 111 | 0494 | 48 | | Flat round, edges smooth, tapered from both sides. 2 fragments glued making up 1/2 of a full whorl. | 9.2 | 18.40 |
| 82 | 0531 | 66 | 33 | Round, flat. Edges little smoothed. Fragment of c. 1/4. | 6.2 | 18.40 |
| 48 | 0435 | 54 | 27 | Roughware? Flat, round, smooth edges. Fragment 1/3 of full size. | 6.2 | 18.40 |
| 96 | 0512 | 52 | 26 | Red on one side. Round, smooth, tapered edges. Fragment of 1/4. | 6.1 | 18.40 |
| 54 | 0441 | 52 | 26 | Red on one side. Flat, edges partly smoothed. Fragment c. 1/2 of size. | 9.2 | 18.50 |
| 86 | 0527 | 49 | | Round, flat, edges smoothed. Fragment of c. 1/2. | 9.8 | 19.60 |
| 128 | 0468 | 52 | | Red on one side. Flat, smooth rounded edges. Fragment: c. 3/5. | 12.4 | 20.70 |
| 43 | 0428 | 48 | | Grey. Flat round, fragment about half size. Smooth. | 10.4 | 20.80 |
| 75 | 0420 | 48 | 24 | Red on one side. Round, flat, polished, tapered edges. Fragment of c. 1/3. | 7.3 | 21.90 |
| 41 | 0431 | 50 | 25 | Red on one side. Flat round tapered at sides, fragment about 1/3 of size of full shape. | 7.3 | 21.90 |
| 118 | 0487 | 54 | 27 | Red on one side. Flat, smooth edges, convex. Fragment: 1/4. | 5.8 | 23.20 |
| 117 | 0483 | 36 | 28 | Flat, convex, smooth edges. Fragment c. 1/4. | 5.9 | 23.60 |
| 45 | 0433 | 49 | | Roughware. Flat round, two holes attempted but does not line up. No hole through. | | 26.00 |
| 127 | 0475 | 60 | 30 | Black? Flat, tapered edges, smooth edges. Fragment: 1/3. | 9.6 | 28.80 |
| 67 | 0412 | 49 | 49 | Roughware. Flat, smoothed edges. Fragment of c. 1/2 of full size. | 15.8 | 31.60 |
| 81 | 0535 | 42 | 21 | Roughware. Round, flat, edges not smoothed. Fragment of 1/3. | 11.4 | 34.20 |
| 56 | 0443 | 60 | 56 | Roughware. Flat, rough edges. Fragment of a little less than 1/2 of full size. | 17.8 | 37.00 |
| 100 | 0506 | 66 | 33 | Round, smooth edges. Fragment of c. 1/4. | 12.1 | 48.40 |
| 109 | 0496 | 68 | 34 | Red on one side. Flat, round, smooth tapered edges. Fragment c. 1/4. | 15.3 | 51.20 |
| 60 | 0448 | 69 | | Roughware. Flat, edges smoothed, smaller bits broken off. | 66.2 | 66.20 |
| 84 | 0533 | 88 | 44 | Roughware. Round, slightly conical form, smoothing of edges. Fragment of c. 1/4. | 18.1 | 72.40 |
| 70 | 0415 | 79 | | Red on one side. Round, flat, edges smoothed. Fragment of ca 1/2 size of full size. Wobbly, cannot lie completely flat. | 36.5 | 73.00 |
| 163 | 0385 | 32 | | Coarseware. Round, uneven edges, non smoothed. | | |
| 164 | 0386 | | 32 | Fineware. Round, uneven in size. Original size not possible to see. | | |
| 65 | 0411 | | 30 | Red on one side. Flat, irregular shape. Fragment, original size cannot be gauged. | 5.1 | |
| 108 | 0497 | 44 | 22 | Red on one side. Irregular shape, flat, tapered sides, bits broken of side. Fragment, size cannot be determined. | 5.6 | |
| 55 | 0442 | | 45/27 | Roughware. Flat, rough edges. Broken on all sides, original size cannot be gauged. | 12.6 | |
| 101 | 0505 | 56 | 28 | Roughware, red on one side. Fragment missing part of two sides. Edges rough. | 15.5 | |

Table 3 continued: Preliminary list of discs found at HK29A

**Identification**

All of the discs were repurposed potsherds, either pierced or showing signs of an attempt at boring a hole. The discs have been recorded on the premise that some may be the result of trial and error in making new spindle whorls and some of the fragmented objects may have been dropped too many times to be of further use for this purpose. This approach has some inherent problems; while it is not possible to classify all pierced discs as spindle whorls, it is equally difficult to exclude some when no typology exists (Jones 2008, 112).

In published catalogues, potential spindle whorls made from potsherds are sometimes rejected as being so. For example, in the catalogue from Brooklyn Museum, the pierced discs from Adaima were deemed "too light" in comparison to the more aesthetically pleasing decorated limestone spindle whorls (Needler 1984, 293-294, see also discussion in Midant-Reynes & Bucez 2002, 446-447). However, as the importance of the spindle whorls lies in their weight, one type cannot replace the other and it is more likely that both types were in use at the same time. Specifically for the Hierakonpolis material, there is an added question mark as the desert settlement at Hierakonpolis, from which most of the discs in this study were found was abandoned during the late Naqada II period when the settlement shifted closer to the Nile (Wengrow 2006, 92). It would be natural for the crafts people to keep the best tools and leave the broken behind and thereby also leave an uneven record of the tools actually used at that particular site. This could distort an understanding of the production process.

A question also arises regarding the use of the pierced discs. In the archaeological records, they have been registered using the neutral terms "pierced disc" or "pierced potsherd" or interpreted as "tokens", or "fishing net weights". The interpretation as tokens is usually relevant for any potsherd that has been worked into a disc whether pierced or not. It is not obvious for what the tokens would have been used. The idea of using the pierced discs as fishing net weights is relevant only in consideration of their weight. Most pierced discs are too heavy to float and too light to draw the fishing net down quickly. It is equally important to note that the objects may be multipurpose tools, or that a spindle whorl once too fragmented for that purpose, could have been used as a bottle stopper. Bottle stoppers are known from later periods, when the potsherd was wrapped with vegetable matter (plant stalks) to provide a secure stopper.

**Material**

The material of the discs has not been analysed in detail, but in general they are made from either coarse ware or fine ware such as blacktopped redware. While the coarse ware is tempered with straw and quite coarse in fabric, the fine ware with its denser fabric would have easier to polish on the edges and thereby giving less trouble with snagging the thin flax fibres.

**Context**

The majority of the pottery discs, 90 in total, are found in HK29A, the ritual structure in use during Naqada II. HK29A includes an unusually large, oval structure of 45 m x 13 m, with a number of refuse pits just outside the enclosure walls containing primarily animal bones of cattle and Nile perch as well as the largest collection of bones from wild animals from any predynastic settlement, all of which is connected with rituals (Friedman 2009, 81). The structure is a part of a ritual precinct covering perhaps one hectare with a fenced-in area encompassing the ritual structure itself and production areas for luxury items such as stone vessels, flint tools and beads. The production areas are described as workshops, although structural remains are not obvious, but evidence from them consists of considerable remains showing exceptional specialisation, including tools such as drills for stone vessel and bead manufacture as well as fine lithics

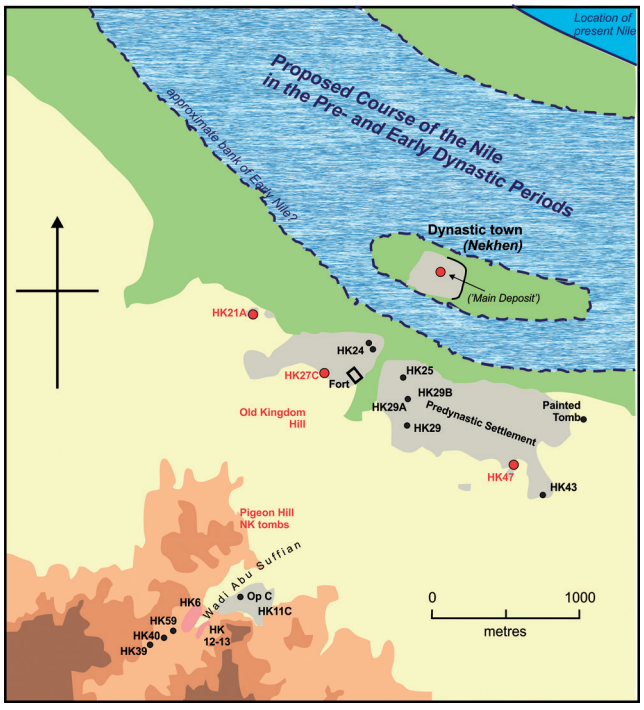


Fig. 2: Map of Hierakonpolis in the Naqada period (Image: P. Robinson)

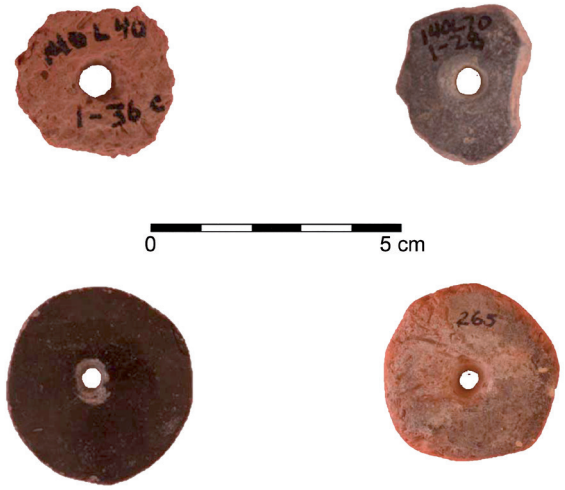


Fig. 3: Examples of pierced discs from HK29A (from top left: 163, 164, 44, 61) (Image courtesy of the Hierakonpolis Expedition)

(Friedman 2009, 85, 89, 98; Hikade 2011, 83, 105). In this area, the discs are tools of textile production, not the finished products themselves. Of the 90 discs, only 12 are intact, the rest are fragments. As the discs are made of potsherds, they will not tolerate being dropped on a hard or semi-hard floor without the edges breaking or snapping across the diameter and consequently losing their value as tools. The discs most likely relates to the specialised workshops attached to the ritual structure (Friedman 2009, 89). The weight of the discs found here range between 3.4 g and 37 g with four discs being much heavier at 48.4 g, 73 g, 66.2 g and 72.4 g (table 3 and fig. 3). In the neighbouring district to the southeast, HK29, 39 pierced discs were found of which only 12 are relatively intact (fig. 1). The weight ranges between 3 g and 39.6 g (fig. 4). HK29 is an industrial quarter bordering HK29A, the ritual structure, and amongst other feature a potter's house, preserved due to a fire. The remains from the pottery production suggest that the potter produced rough ware, not fine ware (Hoffman 1980, 129).

A total of 18 pierced discs were found at HK11 (square G), in the courtyard of a house (not fully excavated) in a settlement area in a wadi, 4 km from the Nile and 1.5 km from the edge of cultivation. HK11 is an enigmatic locality; being both the best preserved settlement area and the one which raises most questions regarding its location, as it lies so far from the Nile. HK11 is a site of c. 68,000 m$^2$ and includes a domestic area with houses to the northeast and breweries and food preparation on an industrial scale to the southwest (Friedman and Baba 2016, 179). HK11 lies in the same wadi as the elite cemetery, HK6 (fig. 2). Most of the discs were very fragmented, probably by being dropped during the spinning process that they cannot be used for spinning any longer (table 1 and fig. 5). Besides the discs, spun yarn and a piece of woven linen were found in a refuse pit. The proximity to HK6 raises questions of whether all or part of this site was established to service HK6


Fig. 4: Examples from HK29 (front and backside, from top left to right: No. 25, 1, 2 and 26) (Image courtsey of the Hierakopolis Expedition)

(Baba & Friedman 2016, 181) or perhaps to evade the annual flooding by the Nile (Watrall 2001, 8-9). The impressive amount of beer that can be produced at one of the breweries (Operation B) suggests it could easily supply the funerary cults at HK6 (Baba & Friedman 2016, 193).

**Spinning for the gods?**

Relatively little is known about rituals and religion, which gods were worshipped and how, in the Predynastic period. The fact that a number of pierced discs interpreted as spindle whorls have been found in relation to ritual structures is interesting. The finds of textile in all burials in HK43, as well as in many burials in HK6, point to textiles being used for ritual purposes in protecting the body. The use of textiles as padding for wrists and neck points to the aim of maintaining body articulation. The elephants and other powerful animals being buried in textiles could relate to preserving the power to protect the cemetery or perhaps limit their power in the afterlife. That textiles have been found in foundation deposits and used in walls in the pillared hall in the elite cemetery further suggest that textiles hold a ritual significance, perhaps as protection or as a separation between the sacred and profane. The find location of the pierced discs does not contradict this connection to rituals. The discs are found in connection with the ritual structure HK29A in an area connected with specialised workshops for fine objects. Likewise, they are found in HK29, an industrial area next to HK29A, where pottery was produced. They are also found at the enigmatic site, HK11, with evidence of food production beyond that of a normal household, and which lies close to the elite cemetery away from the Nile. On the other hand, pierced discs are rarely found in cemeteries such as the workers' cemetery, HK43. Jones sees the standardisation of textile quality not only as related to a specialised funerary industry, but also to an administration probably run by the elite. The textiles analysed proved to be of uniform quality, with evenly spun yarn, very few weaving faults and a surprisingly high thread count which points to an industry with specialised craftsmen and/or craftswomen. The technological change from a Z-spin to an S-spin at the start of Naqada II shows an understanding of the technologies contributing to a higher quality of finished product.

In combination, these facts suggest that at some time during Naqada II, the textile industry at Hierakonpolis was intentionally developed on a grander scale than household production with an impressive quantity of textiles produced and used for ritual purposes. Considering that a few hundred years later, textile workshops were part of both temples and court, producing textiles as payment for workers, for clothing the gods, and for other ritual purposes, this evidence suggests a new perspective on predynastic textile production, administration and organisation. It raises the question of whether the people of Hierakonpolis were already spinning for the gods in the Naqada period.

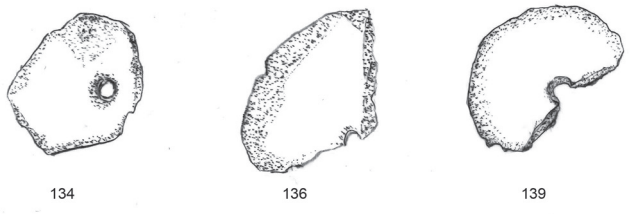


Fig. 5: Examples of discs from HK11 not to scale, see sizes in fig. 2 (Images: Anne Drewsen)

**Acknowledgements**

I would like to thank Renee Friedman of the Hierakonpolis Expedition for both her hospitality at Hierakonpolis and her kindness in reading through this article and provide invaluable comments and corrections. Dating according to The Oxford History of Ancient Egypt (Shaw 2000).

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