IDENTIFIABLE AND ASSOCIATED CORDAGE
EXAMPLES FROM BERENIKE (EGYPTIAN RED SEA COAST)

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Summary:
The excavations at the Ptolemaic - Roman harbour of Berenike, on the Egyptian Red Sea Coast, yielded large quantities of cordage. Although the majority is linear cordage, a few identifiable and associated objects were also recovered. This paper, one of a series of publications on the cordage, focuses on the identifiable and associated cordage and presents various, previously unpublished objects by means of description, illustrations and interpretation.

Keywords: cordage – identifiable – open & closed associated

Resumen:
Las excavaciones en el puerto ptolemaico y romano de Berenice, sobre la costa egipcia del Mar Rojo, produjo enormes cantidades de cordaje. Aunque la mayor parte es cordaje lineal, algunos pocos objetos identificables y asociados fueron también recuperados. Este trabajo, uno de una serie de publicaciones sobre cordaje, se centra en el cordaje identificable y asociado y presenta objetos inéditos a través de su descripción, varias ilustraciones e interpretaciones.

Palabras clave: cordaje-identificable-asociado abierto y cerrado.

INTRODUCTION[1]

All cordage (more than 9000 registered pieces) originates from rubbish deposits. The deposits in the northeast sector of the site (trenches 3, 13, 19, 29, 31, 33 & 48[2]) have been dated to the first century AD and contained a large number of *ostraka* and a wealth of organic remains including cordage, basketry and textiles. The rubbish deposits in the far eastern part (trench 22[3]) of the site

[1] Terminology follows Veldmeijer 2005a, c, 2005/6.

[2] See Veldmeijer & Van Roode 2004: figure 1.

[3] *Ibidem*.

did not yield any cordage, which is mainly, but probably not exclusively, due to the proximity of the sea hampering preservation of organic materials[4].

Various reports on the excavations are published[5] as well as preliminary reports on the cordage[6]. The present work however, offers a detailed analysis of some of the so-called 'identifiable' and 'associated' cordage objects. According to Veldmeijer[7] identifiable cordage is: "[…] cordage […] for which the function may be determined, and gives more information about the fragment than linear fragments provide, through which it proves possible to determine a (possible) function of the particular piece. Identifiable fragments are, for instance, fish netting and pot/head stands. An 'identifiable fragment' does not necessarily have to be a 'fragment' but might be a complete artefact." Veldmeijer[8] defines associated cordage as: "[…] a piece that is used in or with other artefacts. The association of pieces with another artefact, regardless of whether its function is known or not, is regarded as 'open association' [… and] is not an essential part of the artefact itself but is, rather, associated with the artefact. […] The association of cordage that is an essential part of an artefact (without which the artefact would not exist) is regarded as 'closed-associated'."

Only an estimated 5% of all cordage recovered are identifiable and/or associated cordage objects, which includes fishing nets[9], carrier nets[10], footwear[11], grommets and ring-shaped objects, sticks and poles and other miscellaneous objects.

THE MATERIAL

Grommets and ring-shaped objects[12]

Nine grommets and 25 other ring-shaped objects (table 1) were registered. Grommets are mostly made of yarns or unspun strands, which are twisted

[4] Veldmeijer, accepted.

[5] Sidebotham & Wendrich 1995, 1996, 1998, 1999, 2000.

[6] Veldmeijer 1998, 1999, in review a; Wendrich 1995; Wendrich & Veldmeijer 1996.

[7] Veldmeijer 2005a.

[8] *Ibidem.*

[9] Veldmeijer 2005b.

[10] Wendrich 1995: 77-78; Veldmeijer 1999: 267-269, 2005c; Veldmeijer & Van Roode 2004.

[11] Only one cordage sandal is recovered (Wendrich 2000: 232-233); see also Veldmeijer, in review b.

[12] Definition of grommet, according to Veldmeijer (2005a): "*A ring of cordage, made by twisting linear cordage a number of times around itself, is called a 'grommet'*". Definition of

into a ring in various production phases[13]. The finishing is done by twisting until the extremity ends somewhere down the ring: in most cases no knots are used. One example of a heavy, thick ring, made with thick yarns is shown in figure 1[14]. Another type of grommet is shown in figure 2[15]. The grommet is made of a very small, unspun grass (?) stem and wound S wise in four stages[16]. A messy example is shown in figure 3[17], in which unspun and unidentifiable material is twisted into a ring. The ring shown in figure 4[18], is made in the same way (twisting around itself), but with two parallel yarns (z spun) instead of one[19]. Other grommets, all excavated from first century AD contexts, are made with plied cordage of which one is shown in figure 5[20]. A curious 'grommet', shown in figure 6[21], is excavated from trench BE96/…-10. The grass cable, $zS_2[Z_3]$, of which the beginning, FT 2[22] is still visible, is twisted around itself. It is tempting to assume that the beginning was originally twisted into the ring and ones lost coherence but there is no indication that this is the case. Consequently, it remains questionable whether the artefact is a true grommet or not. Only one intended ring-shaped object is made of

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ring-shaped object, according to Veldmeijer (2005a): "*Cordage, which is made into a circular object by any means with the exception of twisting around itself [referred to as 'grommet'] are […] ring-shaped objects […]. The ring-shaped objects are made by closing a linear piece of cordage by all means (often knotting) to form a circular object. Ring-shaped objects are divided in 'intended' and 'accidental.' The first are made because they are needed whereas the latter are not and are often the result of wear, storage or the like. A pad is a closed ring-shaped object.*" The discussion is limited to the artefacts studied by the author only.

[13] Wendrich 1996: 49-50; 1999b (155-156 a.o.).

[14] BE96/97-13.002 0801-h-1806. For a detailed account on this particular piece see Veldmeijer 1999: 264-266. Another one, although slightly smaller and made of papyrus, is BE99-31.007 2465-h-3890.

[15] BE97-16.s/wbc 4987-h-2454.

[16] A comparable grommet, made with three S orientated windings is recovered from an undated context (BE94/95-1.tc 0398-h-0120) and another one from a context dated to the first century AD (BE99-29.002 0387-h-3886): this grommet has three windings in Z orientation.

[17] BE96/…-10.008 2481-h-1169.

[18] BE99-31.cbn 4207-h-3806.

[19] An instance of a small grommet which is either made with four grass yarns or with one plied zS_4 string is BE98-21.003 0983-h-3030.

[20] BE99-31.ebc 4214-h-3875.

[21] BE96/…-10.014 2970-h-1598.

[22] Folding Type 2 is a type of beginning (see Veldmeijer 2005a).

unspun material; the rest are made of plied or cabled cordage. Furthermore, only one ring is closed by sticking the loose ends of the yarns between the plies; the rest are closed with knots.

There are some difficulties in interpreting an artefact as a ring-shaped object. Two instances will clarify this. The ring-shaped object shown in figure 7[23] is one of the few instances of a ring that is made of cabled cordage ($zS_n[Z_2]$). The ring is closed by means of a half knot and could have been part of a larger string, which is now broken. If this is the case, the depicted 'ring' would be a running loop. The other instance is shown in figure 8[24]. The piece of cordage is made with $sZ_2[S_2]$ soft fibre (flax?) string by pulling (one of) the plies through the eye to close the ring. It is not clear whether the second ply was originally also pulled through the eye. If both plies had been pulled through, it is hard to believe that the object functioned as a grommet or a ring-shaped object as there is no knot to protect the ring from deforming. Therefore, it might have been a running loop like the one discussed previously. The only intended ring-shaped object made with unspun material is shown in figure 9[25]. A bundle of unspun grass is folded and few fibres are wrapped around it. Although the ring is not closed, it is likely that linear cordage has been bent into the ring shape deliberately. The object might have been used as pad or pot/head stand (to stabilise a cargo carried on the head or while standing on the floor), which was made on the spot when required. Also, a function as dunnage seems not too far fetched.

The ring-shaped object from a first century AD context[26], which is in perfect condition, is made of a woody material, probably *Arundo donax*, a tall bamboo-like reed. The sZ_3 cordage has a Cord Index of Ply (CIP)[27] of 54. Although this is low, the inflexibility of the material does not allow stronger plying. Putting the yarns between the ply has closed the ring. Another instance of an intended ring-shaped object[28] is made of zS_2 palm cordage. The ring is closed by means of a reef knot at the two ends of the yarns[29].

[23] BE01-48.018 3377-h-7260.

[24] BE99-29.006 0695-h-3350.

[25] BE97/98-16.041 3623-h-2321.

[26] BE00-33.008 1291-h-3636 (see Veldmeijer 2005a: figure 27).

[27] More information on CIP see Wendrich 1994: 37-38; Veldmeijer 2005a.

[28] BE96/…-10.008 2481-h-1159 (see Veldmeijer, accepted a: figure 38).

[29] A last instance (not illustrated) of intended ring-shaped objects is a $zS_2[Z_3]$ palm rope (BE00-33.026 2653-h-3675), which has been made into a ring and closed by means of a combination of pulling plies through the eyes and knots. Cf. Veldmeijer, accepted a: figure 5. A noose (BE97/98-16.038 3043-h-2246) has been made in $zS_2[S_4]$ rope. It has an inside diameter of 18-30 mm (outside 46-76). See figure 10.

The second group of ring-shaped objects can be referred to as 'accidental ring-shaped objects'. Although these artefacts are ring-shaped and, often flexible, they are predominantly the result of using linear cordage, for instance for tying. The cordage remained ring-shaped after discard or loosing the object around which it was tied. A few examples can be used to illustrate this. The piece of cordage shown in figure 11 is made of a $zZ_n[S_2]$ soft fibre string[30]. The loop (arrow) is made by means of an overhand knot, 'A'. A half knot, 'B', secures the construction because the end of the knotted cordage is tied in with this knot. Fastening of this construction without a marked decrease in size could be done by pulling 'C', but to keep this construction fastened, force should be exerted on 'C' continuously. Thus the artefact must have been used actively, *i.e.* in a way in which the necessary force on 'C' was maintained. A curious item is shown in figure 12[31]. The ring is made of palm with a zS_3 composition and is very tightly plied. Part of the zS_3 string is cabled [S] wise. One extremity is put between the yarns (double arrow in the figure), apparently as means of finishing. The cordage is made of relatively short pieces of material because the ends of the strips of material stick out between several yarns (arrows). Also cordage which is folded for storage can be regarded as accidental ring-shaped, because the ring has not been made to use it as such. Figure 13[32] shows an example. A linear piece of zS_2 goat hair string is folded and wrapped, as to allow easy storage without it getting tangled.

Basketry[33] and textiles[34]

Not only does the cordage in netting and (bed) matting have a closed association, but also the cordage used to sew two basketry strips together can

[30] BE00-33.009 1136-h-3719 (see also Veldmeijer 2005a: figure 28).

[31] BE01-48.008 1797-h-7111.

[32] BE96/97-13.002 0740-h-1844. This composition is extraordinary in goat hair cordage (see Veldmeijer, accepted b). On the material see Wild & Wild 1996: 253; 1998: 234. Other cordage, treated to store are BE96/97-13.002 0740-h-1844 (zS_2 goat hair), BE00-33.005 1138-h-7274 ($zS_2[Z_2]$, flax), BE00-33.018 1795-h-3673 (zS_2 soft fibre), BE00-33.025 3333-h-3757 (zS_2, soft fibre) and BE00-33.ebc 5467-h-7275 (zS_2, cotton).

[33] Wendrich (1995, 1998, 1999a, 2000) published extensively on the basketry and matting from Berenike and therefore will not be dealt with here. For a detailed account on other Egyptian basketry and matting see Wendrich (1999b). This extensive work does not discuss basketry and matting from Berenike, but mainly from Qasr Ibrim (from ca. 100-600 AD), 18th dynasty Amarna (ca. 1350 BC) and modern day Egypt. Nevertheless, it throws much light on the involvement of cordage in basketry making.

[34] Textiles are given little attention in the present work as well as they are also published in detail in the preliminary reports: Waveren & Wendrich 1995; Wild & Wild 1996, 1998, 2000.

be regarded as closed associated cordage. Closed associated cordage is always identifiable, but identifiable cordage is not always closed associated, for instance an isolated pot/head stand. Open associated cordage is not necessarily identifiable[35].

The cordage in textiles is also closed associated. Textiles made of plied (or cabled) cordage are of special interest, such as tassels and furbelows (figure 14)[36]. Objects such as carpets made of goat hair as well as belts[37] can be included, an example of which is shown in figure 15[38]. This belt is woven with goat hair sZ_2 string, folded and sewn with coarse stitches. The clasps are made of $zS_2[Z_3]$ palm fibre ropes. Another instance of textiles, which are of importance for the cordage specialist are sails. The only evidence from Berenike of cordage definitely related with shipping are small pieces of soft fibre string still connected to pieces of sails (figure 16)[39]. Brailing rings with small pieces of cordage still *in situ* were also recovered[40].

(Bed) matting, harnesses, saddles and bags

The cordage in (bed) matting can be easily recognised, especially if the structure of the weaving is intact, as closed associated and thus identifiable cordage, although these are published as basketry[41].

Cordage objects of which an example is shown in figure 17 are often regarded as basketry[42]. The widely spaced twined objects, encountered regularly, are entirely made of cordage.

[35] For an example to clarify this distinction see Veldmeijer 2005a.

[36] BE97/98-19.009 0970-h-3008. Other tassels with changing direction at doubling are (numbers in brackets refer to the number of pieces with one specialist number): (1) BE97/98-19.006 0575-h-3009, (1) BE97/98-19.006 0575-h-3010, (1) BE99-31.006 3050-h-3079, (2) BE99-31.007 2887-h-3099, (3) BE99-29.006 0695-h-3349 (all $zS_8[Z_2/S_2]$) and (1) BE00-33.025 3024-h-3767 ($zZ_n[Z_2/S_2]$. Tassels without changing of direction are: (1) BE00-33.025 333-h-3755 ($zS_2[Z_2]$), (1) BE00-33.026 2653-h-3683 ($zS_n[Z_2]$), (4) BE00-33.008 1175-h-3614, (1) BE00-33.036 4139-h-3743 (all $zI_n[S_2]$), (4) BE00-33.025 3333-h-3753 ($zI_n[Z_2]$

[37] On another cordage belt but made of vegetable material see Wendrich 2000: 248-250.

[38] BE01-48.009 2534-I.

[39] Although one suspect ropes to be involved in shipping, these are not identifiable when encountered without any clear association and hence not recognisable. On the sails see Wild & Wild 2000; Wild 2004.

[40] BE97/98-19.008 7278-l. An other brailing ring with cordage *in situ* is BE00-33.018 1672-l/ 3883-h.

[41] Wendrich 1998, 1999a, 2000.

[42] BE96/…-10.008 2538-H-9109. Wendrich 1995: 71-72; 1999a: 281-282.

Open twining is also seen with a bag[43]. The bag consists of 34 bundles of grass, which are folded halfway, forming the base of the bag. The bundles become smaller towards the top of the bag creating a tapering bag. The bundles are twined by means of two zS_2 strings, possibly made of grass as well. The cordage used to make the bag, can be regarded as identifiable.

Pottery and jar stoppers

Jar stoppers from Berenike have been published in detail[44]. Various stoppers still have cordage *in situ* as can be seen in figure 18[45] or the traces of cordage at the edges of the stoppers[46]. The *in situ* cordage can be regarded as closed associated and thus identifiable because it is an essential part of this type of stopper: it is used to remove the stopper from the amphora neck.

Few examples of pottery with associated cordage are recovered. A handle from the first century AD[47] (not illustrated) is wrapped six times with a small sZ_2 string (diameters of 3.1 mm for the ply and 2.0 for the yarn). The function of the open associated string is unclear and speculations on the function remain tentative. The string is made of grass[48].

Brushes

A small number of brushes and brooms were recovered. The small brush, which is shown in figure 19[49] is made of folded bundles of palm fibre, which are tied with a zS_2 string. This string is made of palm fibre and has been plied tightly. It is wrapped around the bundle four times and the end of the string is put under the third winding. Another brush recovered from trench BE96/…-10 is shown in figure 20[50]. The small bundle of grass is wrapped three times with unspun grass. The brush is tentatively interpreted as a painter brush on the basis of size and shape.

[43] BE01-48.018 1989-H-7300, see Veldmeijer 2005a: figure 23.

[44] Sundelin 1996; Dieleman 1998; Cashman 1999; Bos 2000.

[45] BE00-33.017 1674-Y-13.

[46] For instance BE96/…-10.238 2276-Y-10.

[47] BE00-33.018 1646-h-3887. More examples are discussed in Veldmeijer 1998: 248-249.

[48] For a clear example of identifiable, open associated cordage with pottery see Veldmeijer 2005a: figure 20.

[49] BE94/95-1.033 0260-h-0266.

[50] BE96/…-10.004 1140-h-0999. See Veldmeijer 1998: 250-251.

The small brush in figure 21[51] is made of strips of palm leaf. The strips are folded at one end and wrapped with a z spun soft fibre string. There is no knot to tying the string; it is likely that the extremity is put between the wrappings. A comparable brush[52] (not illustrated) consists of small woody strips, possibly reed, which are tied without being folded in contrast to the brush in figure 19.

The inner side of the brush in figure 22[53] consists of coarse palm fibres, but the outer side is made of grass. This outer layer of finer fibres is worn away due to its use, and the coarser inner side has become visible on both sides at the lower part. The middle part of the brush is wrapped seven times with a grass zS_2 string. The string is knotted, but the knot is due to deterioration, indeterminable. A last example is shown in figure 23, discussed in more detail elsewhere[54]. Wendrich[55] referred to a brush as a "small brush made of palm leaf", but the object has not been illustrated.

Sticks and poles

Various sticks and one pole with cordage were excavated, of which the cordage is open associated. Identification of the function of the cordage is, in most cases, not possible with any certainty. The object in figure 24[56] has already been published. The tip of the wooden peg is put between the ply of the doam palm leaf string. The cordage associated with a stick (figure 25)[57] is referred to by Vermeeren[58] as rope, but the diameter of the cordage, a sZ_2 string, is less than 10 mm and thus regarded as string. The grass string is wrapped three times around the *Acacia* handle. One Z overhand knot is visible but it remains uncertain whether it was used to tie the string or to keep the string from fraying. Two finds[59] (not illustrated), possibly originating from the same object, consist of long and small strips of date palm leaf,

[51] BE97/98-19.009 0970-h-3007.

[52] BE00-33.008 1161-h-3893.

[53] BE01-48.015 1977-h-7277.

[54] BE96/97-13.002 0704-h-1843. See Veldmeijer 1999: 266.

[55] BE94/95-1.002 0400-H-9012. Wendrich 1995: 69.

[56] BE96/…-10.019 3720-h-1495. See also Veldmeijer 1998: 248-250. Figure 24 shows the opposite view relative to figure 11-22.

[57] BE96/97-13.002 3194-Q-30. The string has cordage specialist number 2359.

[58] Vermeeren 1999: 310-312.

[59] BE00-33.018 1795-h-3882 and BE01-48.005 1133-h-7278.

wrapped various times with soft fibre (probably flax) zS_2 string (one with a length of the palm strips of 355 mm, is wrapped 132 times).

Figure 26[60] shows a cross, which is wrapped seemingly at random with fine zS_3 soft fibre (possibly flax) string. The function of this object remains unknown.

One short pole is recovered from a baulk collapse in trench BE96/97-13 (figure 27). The object has been described elsewhere[61].

Various

Often, closed or open associated linear cordage has been recovered of which it has been possible to determine the function of the string or rope. An instance of open associated, but identifiable cordage, is seen in figure 28[62], which shows a spout of a waterbag. The neck is tightly squeezed, and a string (zS_2) is tied around it to close it. The open associated and identifiable string in figure 29[63] has been used to tie the papyrus.

The yarns in the sZ_3 rope in figure 30[64] are coarse fibres, with a slight oval cross section, entwined with strips of leaf. The coarse fibres look very similar to the willow rods reported[65]. According to Wendrich[66], the only willow species that occur in Egypt was and is not used for making basketry. Wendrich thinks therefore, that it is more likely that the basket originates from Europe. Therefore, assuming that the willow was not used for making cordage as well, the cordage might have originated from Europe. Although too early for firm conclusions, as the determination of the material has not been completed, it could explain the appearance of the cordage as this kind of appearance is not commonly encountered. It is likely that the piece did not serve as linear binding or tying cordage, for which it is far too stiff. Possibly, it was part of something else, such as a basket.

[60] BE01-48.017 1984-h-7094.

[61] BE96/97-13 …-h-3898. For a detailed account see Veldmeijer 2005a. Although normally no artifacts are collected from baulk collapses, an exception was made with this one because the complete upper part of the trench, the rubbish dump, is dated to one period, namely the first century AD. No site id is assigned because the artefact is recovered in the 2000 season whereas the trench is excavated in the 1996 and 1997 seasons.

[62] BE00-33.017 1493-h-3885. See also Veldmeijer & Van Roode forthcoming.

[63] BE00-33-018 1844-V.

[64] BE01-48.005 1407-h-7128.

[65] Wendrich 2000: 233-241.

[66] *Ibidem.*

The object shown in figure 31[67] is the largest and best preserved of six pieces. The object is triangular and made with mesh knots. From the ends of the material, three or four strips of palm leaf of 1.5 mm width, it is clear that it is made this way deliberately, as the extremities are not broken off. One side of the object lacks four knots, including the corner knot, and the base lacks two knots (excluding the corner knot). The object might have had some decorative function; if larger, it might easily have been a floor covering.

Several beads with cordage *in situ* were recovered, of which some have been published[68]. The function of the cordage is to string the beads, which makes the cordage identifiable. However, it does not mean that it is clear from what kind of object the strung beads originate. Beads were transported in amphorae and also on strings but these examples may have come from jewelry as well. Thus the cordage is regarded as identifiable and open associated.

Discussion[69]

The Berenike corpus contains a surprisingly small number of identifiable and associated cordage pieces. This could be explained by the fact that the cordage from Berenike originates from rubbish dumps in contrast to the material from, for instance, Amarna[70]. It can be assumed, especially in places like Berenike where all material had to be imported from a distance, that the discard of (identifiable) cordage only took place when it was worn beyond repair. Consequently, the important contexts where well-preserved and largely complete identifiable cordage are expected to be found are living areas rather than rubbish dumps. Living quarters have not been excavated in abundance. The relatively small amount of excavated associated cordage, mainly (furniture) matting, points in the same direction. But on the other hand, the cordage from Quseir al-Qadim and to a lesser extent Qasr Ibrim, also originates (partially) from rubbish dumps, yet here the number of identifiable artefacts is far larger. The lack of footwear (not only basketry and cordage footwear but leather footwear as well[71]) from Berenike, compared to the usually large

[67] BE99-31.007 4535-I-… The five smaller pieces measures: 14.5x27.5, 23.5x30.0, 27.5x47.5, 37.0x30.0 and 15.0x33.0 (all in mm).

[68] Veldmeijer 1998: 248-249.

[69] The discussion is limited to the material presented here; for basketry and netting see the above mentioned publications.

[70] Wendrich 1989, 1999b.

[71] Veldmeijer & Van Roode forthcoming.

numbers of footwear from other sites (such as Quseir al-Qadim[72], Qasr Ibrim[73], Ismant el-Kharab[74]), is notable. An explanation and certainly counting for part of this absence is the unfavourable preservation conditions compared to those at Amarna and Qasr Ibrim. On the other hand, Quseir al-Qadim must have comparable conditions to Berenike but much more identifiable cordage artefacts were excavated at this site.

All tassels originate from the first century AD contexts. Taking these large amount of soft fibre yarns and unspun material recovered from these first century AD contexts relative to the late Roman contexts[75], as well as the various examples of storage cordage, it suggests the presence of either a textile or cordage workshop in the vicinity, or the discard of (one of) these shops in this part of the site.

Grommets, pads and ring-shaped objects are mainly used for similar tasks, *i.e.* as head/pot stand[76]. Use of the artefact is in first instance limited by size because a pot/head stand is of no use if it is too large or too small for the pot. The appearance of the pot/head stands, whether grommet or ring-shaped object, is of lesser importance: these stands are not only made from cordage, as various examples from Qasr Ibrim are known to have been made from textile[77]. Pot and head stands are often the same as they can be used to transport after which it might have been put down on its head stand, changing it into a pot stand. Grommets were also used for reinforcement of holes in sails[78] and the larger ones as fenders[79], although these have not been encountered in Berenike.

In general the function of brushes and brooms are more or less clear, the exact use of the brushes recovered in Berenike is unclear. The location of these brushes, rubbish dumps, does not give any indication for the exact use either. Some smaller ones have been suggested as being used as painter's brushes but these functions are speculative. The larger ones might have been used for sweeping floors.

[72] Whitcomb 1979; Handley 1999, 2000; Richardson 2001, 2002, 2003.

[73] Veldmeijer, in review b. Other footwear is currently under study by the author. See also Wendrich 1999b: 241-243.

[74] Bowen 2002.

[75] Veldmeijer, accepted b.

[76] See also Ashley (1993) for grommets as pot/head stand.

[77] See also Adams (1996: 150-151) for more non-textile examples.

[78] Ashley 1993; Valk 1995.

[79] Ashley 1993.

Most of the time, no function can be described to sticks and poles, although it is sometimes tempting to suggests uses. The pole with rope, shown in figure 27, might have been one of the two poles of a *ðels*[80]. A *ðels* consists of a rope that is tied between two poles, to which up to 40 or 50 animals like sheep and goats are tied. Another suggestion, but less likely, is that the pole, standing in the ground, was used to tie an animal to it directly. The pole must have been substantially larger and put into the ground for some considerably depth in order to withstand the tugging of the animals[81]. Camels are, at least nowadays, usually prohibited from walking away by bending one of their front legs and tie it with a camel rope[82] or tying the two front legs together (nowadays done especially with donkeys).

Specific function for multiple use artefacts such as cordage, especially linear, is difficult to determine. Association of cordage and the integration with other data from the excavation can give important information, even of linear cordage, making the artefacts identifiable, as the described examples show. The context (rubbish dumps) are not of much help, even though the nature of the two important dumps differ: the first century AD dump contained much more industrial material whereas the fifth-sixth century AD dump in the middle of the town much more domestic waste. But the bulk of the material, the linear, non-identifiable and non-associated cordage, has less informative content in itself; here it is the features that gives this cordage more informative content[83]. Nevertheless, the research of cordage pays the efforts, because it allows insight in the daily life of the people who lived a long time ago and will gain in value enormously if inter-site comparison would be possible. This, however, is still limited.

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[80] Henein 1988: 192.

[81] Another way of tying animals, is securing a thick rope in the ground, for instance by means of stones, to which the animals are tied. This method, in the fifty's of the previous century still in use, is depicted on the walls of mastaba's as well (Keimer 1951: 100).

[82] See for instance Keimer (1952: 125) and Bulliet (1990).

[83] For instance the knots, Veldmeijer, accepted a.

English. The anonymous reviewer, provided by *Antiguo Oriente* is kindly thanked for the suggested list of publications of non-Egyptian textile, cordage and related items. J.E.M.F. Bos is thanked for the production of figure 6 and 13. Last but not least, I thank E. Endenburg for all his round help and assistance as well as the production of various figures.

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Table 1

context & PB	identification	compositon	diameter (mm) yarn/ply/cable	CIP	material	diameters (mm) inside/outside
BE94/95-1.002 02*	0387-h-0003	zS_2	3.5/5.2	53	grass	29.0/?
BE94/95-1.002 03	0388-h-0023	i	5.8	n/a	palm	19.0/20.5
BE94/95-1.002 03	0388-h-0024	i	3.5	n/a	palm	3.5/23.0
BE94/95-1.002 05	0393-h-0068	?	4.5	n/a	palm	38.0/47.0
BE94/95-1.tc 08	0398-h-0120	i	?	n/a	grass?	15.0/?
BE94/95-1.002 09	0400-h-0139	z	?	n/a	grass	?/?
BE94/95-1.007 19*	0414-h-0166	$zS_3[S_3]$	4.5/9.5/15.0	?	palm	25/63
BE94/95-1.007 23*	0419-h-0176	$zS_2[S_2]$	3.5/7.5/31	-	grass	37/68
BE94/95-1.003 10	0403-h-0200	z	?	n/a	soft fibre	?/?
BE96/…-10.008 38	2481-h-1159	zS_2	4.3/8.0	32	palm	37.7-74.0/58-100
BE96/…-10.008 38*	2481-h-1169	unspun	1.8-3.6	n/a	-	18.0/3.1
BE96/…-10.002 15	1198-h-1174	zS_2	4.6/6.9	50	grass	60/98
BE96/…-10.014 45*	2970-h-1598	$zS_2[Z_3]$	4.1/5.1/11.0	57	grass	10/58
BE96/97-13.002 10*	0801-h-1806	s	15.1	-	grass	55/110
BE97-16.038 98	3043-h-2246	$zS_2[S_4]$	2.5/4.9/10.2	-	grass	18-30/46-76
BE97-16.041 133	3623-h-2321	unspun	-	n/a	grass	20-35/65-85
BE97-16.s/wbc 197	4987-h-2454	unspun	1.5	n/a	palm?	13.0/16.5
BE98-21.003 05	0983-h-3030	z	9.6	n/a	grass	15.5/48

BE99-29.002 04	0387-h-3312	zS_2	2.7/4.2	51	grass	8-40/20-60
BE99-29.006 08	0695-h-3350	$sZ_2[S_2]$	1.2/2.4/4.1	-	soft fibre	12.0/21.1
BE99-29.002 04*	0386-h-3886	unspun	1.6	n/a	palm?	26.5/29
BE99-31.nbc 35*	4207-h-3806	zS_4	4.6/11.2-	palm	35-60	60/90
BE99-31.ebc 38	4214-h-3875	zS_2	4.6/8.0-9.9	38	*A. donax*	42-78/80-110
BE99-31.007 04*	2465-h-3890	s	3.5	n/a	papyrus	21-25/40-44
BE00-33.008 23	1291-h-3636	sZ_3	4.7/11.0	54	*A.donax*?	65-105/85-130
BE00-33.026 37	2653-h-3675	$zS_2[Z_3]$	3.9/6.3/13.1	64	palm	60-75/85-100
BE00-33.009 11	1136-h-3719	$zZ_n[S_2]$	1.0/2.8/5.3	-	soft fibre	15-60/30-85
BE01-48.009 40	2533-h-7023	zS_2	2.7/8.6	-	grass	25-40/40-55
BE01-48.008 24	1817-h-7053	zS_3	2.5/5.2	77	palm	23.6-46.9/37-60
BE01-48.008 24	1817-h-7054	sZ_2	2.1/4.0	-	palm	34.0-40.4/50-57
BE01-48.008 23	1797-h-7111	zS_3	4.2/9.2	78	palm	-/-
BE01-48.ebc 33	2096-h-7135	sZ_3	2.9/4.5	41	palm	76.6-92.0/99->120
BE01-48.008 22	1529-h-7144	sZ_2	?/8.2	-	goat hair	11.3/19.5
BE01-48.018 51	3377-h-7260	$zS_n[Z_2]$	0.7/2.0/3.4	-	soft fibre	11.3/15

Table 1. Grommets (marked with *) and other ring-shaped objects, per context, showing composition, material and size (‘n/a’ = ‘not applicable’, ‘-’ = measurements, not taken, see text); they originate from nine different trenches and were distributed over 24 different loci, including five baulk and trench cleaning loci, and 30 pb-numbers. Fourteen ring-shaped objects originate from early Roman contexts (first century AD), trenches BE96/97-13, BE99-29, BE99-31, BE00-33 and BE01-48, and 15 from contexts dated to the fifth century AD and later, trenches BE94/95-1, BE96/…-10, BE97/98-16 and BE98-21. The remaining five are not dated due to the character of baulk and trench cleaning loci.

Figure 1. A pot/head stand made of grass (BE96/97-13.002 0801-h-1806). First century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 2. Small grommet from the fifth-sixth century AD, made of one unspun palm strand (BE97/98-16. cbs/w 4987-h-2454). Scale bar = 10 mm. Drawing by A.J. Veldmeijer.

Figure 3. Grommet made of unspun and unidentifiable material (BE96/…-10.008 2482-h-1169), dated to the fifth-sixth century AD. Scale bar in cm. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 4. Grommet from a first century AD context made of several z spun yarns (BE99-31.nbc 4207-h-3806). Scale bar = 30 mm. Drawing by A.J. Veldmeijer.

Figure 5. Grommet made of zS_2 string (BE99-31.ebc 4214-h-3875) from a first century AD context. Scale bar = 30 mm. Drawing by A.J. Veldmeijer.

Figure 6. S twisted 'grommet' made of a $zS_2[Z_3]$ grass cable (BE96/…-10.014 2970-h-1598). The context of the grommet is dated to the fifth-sixth century AD. Scale bar = 30 mm. Drawings by E. Endenburg/J.E.M.F. Bos.

Figure 7. Intended ring-shaped object or loop? Soft fibre $zS_n[Z_2]$ string (BE01-48.018 3377-h-7260). See text for explanation. First century AD. Scale bar = 10 mm. Drawing by A.J. Veldmeijer.

Figure 8. Intended ring-shaped object or loop? Soft fibre $sZ_n[S_2]$ string (BE 99-29.006 0695-h-3350). See text for explanation. First century AD. Scale bar = 10 mm. Drawing by A.J. Veldmeijer.

Figure 9. Intended ring-shaped object made of unspun material (BE97/98-16.041 3623-h-2321). Fifth-sixth century AD. Scale bar is in cm. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 10. Noose (BE97-16.038 3043-h-2246). The example contains two beginnings running through one and another. One of the zS_2 plies has been put in one of the two eyes (see the arrow in the figure). The messy piece of cordage is a $zS_2[S_4]$ cable, of which the cable is loosened. First century AD. Not to scale. Drawing by E. Endenburg/A.J. Veldmeijer.

Figure 11. Accidental ring-shaped object made of $zZ_n[S_2]$ soft fibre (not identified) string (BE00-33.009 1136-h-3719). First century AD. Scale bar = 30 mm. Drawing by E. Endenburg/A.J. Veldmeijer.

Figure 12. Accidental ring made of zS_3 palm cordage (BE01-48.008 1797-h-7111). Note that the extremities have been put between the yarns of the ply. First century AD. Scale bar = 30 mm. Drawing by A.J. Veldmeijer.

Figure 13. A zS_2 goat hair string (BE96/97-13.002 0740-h-1844), folded and tied for storage. First century AD. Scale bar = 30 mm. Drawing by J.E.M.F. Bos.

Figure 14. Tassel with two different orientations of the cabled loop (BE97/98-19.009 0970-h-3008). A bunch of yarns is loosely plied, often in 'I' direction, doubled and cabled. The plying is done usually in the opposite directions. Often, the direction of cabling changes orientation after the folding, resulting in a $[Z_2]$ orientation at one side and a $[S_2]$ orientation at the other side. The cable is knotted at the end and the ends of the yarns hang loose from the knot. All tassels originate from the first century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 15. Goat hair belt with palm fibre clasps (BE01-48.009 2534-I). Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 16. Piece of sail with brailing rings (BE97/98-19.008 7278-l). Note the string, still *in situ* in the rings. First century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 17. Example of often encountered Z twined, open 'matting' (BE96/…-10.008 2538-H-9109). Note the handles (cf. Wendrich 1999b: figure 10-20). Late Roman. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 18. Complete amphora stopper with plug and string (BE00-33.017 1674-Y-13). The string (zS_2 grass) possibly crosses at the bottom side and is regarded as closed associated and identifiable. First century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 19. Brush made of unspun palm fibre and tied with a zS_2 string (BE94/95-1.033 0260-h-0266). The brush is 75 mm long and has a width and thickness of 34 and 27 mm respectively. Fifth-sixth century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 20. Small brush, made of grass (BE96/…-10.004 1140-h-0999). The diameter of the brush is 6 mm and the length is 40 mm. Fifth-sixth century AD. Scale bar = cm. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 21. Small brush, made of strips of palm leaf (BE97/98-19.009 0970-h-3007). Length approximately 80 mm. First century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 22. This broom (BE01-48.015 1977-h-7277) is with its length of 225 mm (and a top of 43 mm wide and a bottom part of 80 mm wide) the largest of the recovered brushes. First century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 23. Grass brush (BE96/97-13.002 0704-h-1843), discussed in detail in the 1997 preliminary report. First century AD context. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 24. Pointed wooden peg wrapped with a zS_2 doam palm leaf string (BE96/…-10.019 3720-h-1495). Total length of peg is 100 mm. Fifth-sixth century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 25. Reconstruction drawing of the possible configuration of the string around the wooden handle. The drawing is 'stretched' in order to clarify the drawing. BE96/97-13.002 3194-Q-30 (the string has specialist number 2359). Not to scale. Drawing by E. Endenburg/A.J. Veldmeijer.

Figure 26. Cross made of small sticks (diameter of 2.2 mm), wrapped with fine (diameter of 1.2 and 0.5 mm for ply and yarn respectively) soft fibre zS_3 string (BE01-48.017 1984-h-7094). First century AD. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 27. Pole with $zS_3[Z_3]$ rope (BE96/97-13 …-h-3898). First century AD. Scale bar = 30 mm. Drawing by A.J. Veldmeijer.

Figure 28. Spout (BE00-33.017 1493-h-3885). The string is used to close it. The concreted condition of one side prohibits firm statements on the way the cordage is fastened, but a bulb at one side suggests the cordage is knotted. The string has a diameter of 2.9 and 1.9 mm and is possibly made of grass. First century AD[1]. Scale bar = 50 mm. Drawing by A.J. Veldmeijer.

Figure 29. Papyrus, tied with string (BE00-33-018 1844-V). First century AD. Scale bar = 50 mm. Courtesy of the University of Delaware / Leiden University / UCLA Berenike project.

Figure 30. Rope, consisting of a coarse fibre core, wrapped with strips of leaf (BE01-48.005 1407-h-7128). The rope has diameters of 6.6 and 16.0

[1] See also Veldmeijer & Van Roode, forthcoming, for discussion of the leather.

mm for yarn and ply respectively. A comparable piece (BE01-48.001 1272-h-7025) is recovered from another locus. First century AD. The trench is situated in the same area as the trench from which the willow basket was recovered. Scale bar = 30 mm. Drawing by A.J. Veldmeijer.

Figure 31. Reconstruction drawing of BE99-31.007 4535-I. The object is made with mesh knots with the same orientation but in alternating rows of obverse and reverse knots. The piece in the figure measures 60.8 mm in height and 37.2 mm in width. First century AD. Not to scale. Drawing by E. Endenburg.