Identification of Plant Materials used in the Coiled Basketry Collection at the Agricultural Museum (Giza, Egypt)

Rim Hamdy¹ & Nesrin M.N. El Hadidi²
1 - The Herbarium, Botany Department, Faculty of Science, Cairo University, Giza, Egypt
     E-mail: rimhamdy@yahoo.com
2 - Conservation Department, Faculty of Archaeology, Cairo University, Giza, Egypt
     E-mail: nelhadidi@gmail.com

Abstract: The Agricultural Museum in Giza, Egypt, has interesting basketry collections that vary in material, production technique and function. A collection of pot stands, coiled baskets, lids, decorated lids, a coffin and one sieve were chosen for this study. In total, twenty five objects of coiled basketry were examined using anatomical and morphological features to identify plant species used, coiling technique employed in their manufacture, and the state of preservation. All baskets were made of plant materials that were identified using a light microscope. In rare cases leather and coloured plant materials were used for decorating the baskets. Eight fibre plants were identified including halifa grass (Desmostachya bipinnata), date palm (Phoenix dactylifera), doum palm (Hyphaene thebaica), sharp rush (Juncus acutus), bitter rush (Juncus rigidus), papyrus (Cyperus papyrus), flax (Linum usitatissimum) and garawan (Cereua pratensis).

Keywords: coiled basketry, ancient Egypt, plant materials, anatomical and morphological features

Introduction

Previous studies on ancient Egyptian basketry include work by Lucas (1926) who mainly studied archaeological samples. In a later edition Lucas & Harris (1962) described different techniques of basketry production. In a catalogue of basketry from Deir el Medineh, Gourlay (1981) defined terminology, production techniques, forms and decoration motifs. For each specimen, he also studied particular signs and type of preservation. Ryan & Hansen (1987) studied 16 ancient Egyptian cordages from the British museum collection. Wendrich (1999) discussed the production of basketry excavated at the sites of Tell el Amarna in middle Egypt and Qasr Ibrim in Nubia. This was followed by Wendrich (2000) who described materials, tools, techniques, imitations, representations and functions of basketry.

The Agricultural Museum in Giza, Egypt, has a large and interesting collection of baskets. They are located in two areas of the museum, namely the "Ancient Agriculture Section" and the "Greco Roman Section". Different manufacturing techniques were employed in making the baskets such as coiling, twining, and weaving, and they had a diversity of functions. This research covers most of the coiled basketry specimens in the Ancient Agricultural Collection, which includes pot stands, sieves, baskets, lids, plates and coffins. These objects were used in the past for either domestic or funerary purposes. The aims of this study are to identify the plant species used in 25 coiled basketry objects by their anatomical and morphological features and to identify the technique adopted in their manufacture, in addition to the description of their present state of preservation.

Materials and methods

Twenty-five samples (4 pot stands, 1 sieve, 6 small baskets, 2 large baskets, 5 filled baskets, 3 lids, 3 bowl shaped plates and 1 coffin) of coiled basketry objects were examined. The studied coffin dates to the first or second dynasty, but most of the examined objects date to the New Kingdom, with a few exceptions which date to later periods. They range from
very simple to finely decorated baskets varying in size, shape, materials, technique, decoration, quality and function. Shapes range from oval to circular shaped baskets, with or without lids. Some of the small decorated baskets contain food or other materials needed for life after death. Large storage baskets may have contained spices, dried fruits, seeds, wheat or bread.

Materials used for making and decorating the selected baskets were closely studied and identified under the microscope. In some cases all basket elements were made of the same species while in other cases the winder and bundle material were made of two different plant materials. Previous studies on the anatomical features of identified plants used in archaeological objects, including Greiss (1949, 1957), Ryan & Hansen (1987), Waly (1999), Wendrich (1999) and El Hadidi & Hamdy (2011), were important references for this work.

Anatomical identifications were made using free hand sections (about 30–50 μm) which were examined by light microscopy for details of internal structure and compared with reference collection specimens held in the Archaeobotany Laboratory of Cairo University Herbarium. Procedures used in preparing materials and descriptions followed those of Greiss (1957), Metcalfe (1960, 1971), Tomlinson (1961), Cutler (1969), Ryan & Hansen (1987), Waly (1999) and Gale & Cutler (2000). External structure including pigment and decorative elements were studied using a stereo microscope. The elemental composition and thickness of the pigment layer of decorated objects were previously studied using SEM/EDX (El Hadidi & Hamdy 2010). The coiling technique of each object was identified following the descriptions of Wendrich (1999, 2000). Non-plant decoration materials were examined and identified using a light microscope, although some difficulty arose while preparing the fragile samples for examination.

Results

The main components of the baskets were of plant origin, but the decorations, when present, included in addition to palm leaves, thin leather straps, ropes, textiles and very thin layers of paint. Eight fibre producing plants were identified in the baskets, including, halfa grass (Desmostachya bipinnata), date palm (Phoenix dactylifera), doum palm (Hyphaene thebaica), sharp rush (Juncus acutus), bitter rush (Juncus rigidus), papyrus (Cyperus papyrus), flax (Linum usitatissimum) and garawan (Ceruana pratensis).

Anatomical description

Taking samples from archaeological objects can result in damage. To minimise destruction of baskets in this study, sampling depended on the availability of crumbling parts found within the object. That is the reason why only six of the eight fibre plants are described here. It was not possible to take linen samples from some objects, because it was either present in the form of intact woven textile in one of the pot stands or of linen textile mixed with mud that formed part of the basket contents. Ceruana pratensis, which made up the coffin, had been previously identified by Greiss (1957), and was confirmed by closely looking at its flowering heads.

Cyperus papyrus L. (papyrus)

T.S. of the culm (object no. 178, Fig. 1a & b)

The epidermis is formed of ordinary thick-walled epidermal cells. Below are patches of chlorenchyma alternating with strands of fibres. The ground tissue is differentiated into a narrow peripheral zone, formed of several layers of radially elongated chlorenchyma cells, small reduced vascular bundles and a large inner layer made up of highly lacunate aerenchyma with 3-armed cells and collateral vascular bundle surrounded by a sheath of 2-3 thick-walled lignified cells.

Phoenix dactylifera L. (date palm)

T.S. of the leaflet: (object no. 1908, Fig. 1c)

The upper and lower epidermises form a slightly undulating layer. The hypodermis is composed of one layer of polygonal thick-walled lignified cells, interrupted in intervals by lignified cells. Patches of thick-walled lignified fibres and reduced vascular bundles are embedded between large oval-shaped collateral vascular bundles. Each is enclosed by a cap-like sheath of thick-walled fibres.

T.S. of the midrib (object no. 716, Fig. 1d)

Large vascular bundles are scattered in the ground tissue sheathed by an outer parenchymatous layer and inner thick-walled lignified cells, especially at the phloem pole.

Hyphaene thebaica Mart. (doum palm)

T.S. of the leaflet: (object no. 1906, Fig. 1e)

The epidermis of the upper and lower surfaces form undulating layers. The outer walls may carry peltate hairs. The hypodermis is formed of 2–3 layers of thick-walled cells. The mesophyll is not differentiated.
A Key to differentiate between the studied species:

1a Vascular bundles are scattered in T.S.
1b Vascular bundles are in one row in T.S.
2a Presence of 3-armed aerenchyma
2b Absence of 3-armed aerenchyma
3a Absence of chlorenchyma
3b Presence of chlorenchyma
4a Chlorenchyma forming a complete ring below the epidermis
4b Chlorenchyma not forming a complete ring below the epidermis
5a Presence of large air cavities between vascular bundles
5b No air cavities are observed
6a Lower epidermis undulating
6b Lower epidermis not undulating
7a Hypodermis 2–3 layers; presence of pellate hairs
7b Hypodermis one layer; absence of pellate hairs

Culm of Cyperus papyrus
Midrib of Cyperus papyrus
Culm of Juncus acutus
Culm of Juncus rigidus
Basal part of the lamina of Desmostachya bipinnata
Lower region of the lamina of Desmostachya bipinnata
Leaflet of Hypaene thebaica
Leaflet of Phoenix dactylifera
into palisade and spongy tissues and the majority of vascular bundles are spindle-shaped surrounded by a thick-walled lignified sheath.


T.S. of the culm (no. 3269, Fig. 1f)
The transversal section of the culm is wavy in outline due to the presence of ridges and depressions. Below the ridges triangular patches of thick-walled lignified fibres are found, and below the depressions there are patches of chlorenchyma, which occupy the zone between the fibrous patches. In the periphery there are small reduced and large vascular bundles. Large vascular bundles of variable size with a spindle-shaped sheath are scattered throughout the ground tissue.

*Juncus acutus* L. (sharp rush)

T.S. of the culm (no. 1909, Fig. 1g)
The transversal section of the culm is oval in outline. The outermost region of the ground tissue is formed of continuous tissue separated from the epidermis by patches of sclerenchyma and a complete ring of chlorenchyma. The central part of the culm is outlined by closely arranged vascular bundles variable in size. Each one is surrounded by a well developed bundle sheath of thick-walled lignified fibres. No reduced vascular bundles are observed.

*Desmostachya bipinnata* (L.) Stapf. (halía grass)

T.S. of the lower region of the lamina passing through the midrib (no. 4463, Fig. 1h)
The upper hypodermis is formed of 1 or 2 rows of lignified cells, while the central part is occupied by isodiametric parenchyma cells. The lower epidermis is slightly undulating and composed of elongated silica cells with four concave walls, found among the ordinary epidermal cells. The margin is occupied by a triangular sub-epidermal patch of thick-walled lignified fibres found below each bundle. The vascular bundles do not occupy the entire space between the upper and lower epidermis.

T.S. of the basal part of the lamina (no. 679, Fig. 1i)
The upper epidermis has a subepidermal row of lignified cells. Small and large vascular bundles are subtended on the upper side by fibres. Large air cavities are observed.

**Description of the coiled basketry objects**

Basketry is an art that has been developing in Egypt since very early times, but no finds pre-date the Neolithic period (*Wendrich* 2000). The art of basketry has been continuously developing by introducing new materials for decoration purposes until the present day, but techniques have not differed a great deal throughout the centuries. Basketry found in Quseir dating to the end of the 18th century (*Wendrich* 2007), for example, is comparable to basketry made today.

Nine major basketry techniques were applied in ancient Egypt (*Wendrich* 2000), but all the studied baskets were coiled, *i.e.*, a bundle of material is fixed in a coil, and the bundle is held in place by wrapping with a strand, namely the winders. Coiling techniques included fine and coarse coiling, with either "stitching through the previous winder" or "stitching through the previous winder and bundle" techniques. The "lazy-basket makers stitch" was also employed, where the bundle was wrapped with a strand and stitched into the previous bundle at long intervals. Only one extremely fragile basket was unique in its coiling, because the winder was made of a 2-ply Z-spun rope that may have been twined instead of wrapped. The loss of a large part of the winders makes it difficult to clearly confirm how it was made, because in some parts, the rope seems to be passing through the bundles, and in other sections the rope seems to pass through the previous winder. *Table 1* summarizes information on the objects such as object registration number, locality, period, acquisition date, plant part used as coil bundle or/and winder, dimensions and techniques used in making the objects, and their state of preservation.

**Pot stands or grommets**

Large grommets were used for padding, as head rings or as supports for pots and vessels that did not have a flat base. They were usually made by twisting a strand several times around itself. The strand in the one-system technique moves in two planes, and may vary in material and technique, as is clearly evident in the following grommets. Simple grommets are made by turning the plant around itself in a small circle, followed by wrapping the circle with another fibre which holds the ring together. Thickness of grommets varied according to the number of circles. The wrapping could be in one direction as in pot stand 178 or in two directions almost perpendicular to each other covering the circle as in pot stand 180. It is not clear whether the wrapping in both cases was continuous and parts were lost due to decay, or if it was done leaving spaces at equal distances.
More advanced grommets or pot stands were made of a thick 2-ply rope twisted around it and wrapped with an S-twisted plant of smaller thickness as in pot stand 2428. In another case the strands were totally covered with textile immersed in resin and the technique could therefore not be identified (pot stand 2732). The textile used seems to have been made up of several pieces that were wrapped around the inner strands and presumably glued together. Different weaves (1/1 and 2/2) of linen thread are clearly evident.

**Sieve**

The sieve was constructed using two techniques: The normal coiling technique was used to make a basket without a base, forming the sides of the sieve, followed by the use of a twining technique to make the mesh. The size of both passive (warp) and active (weft) elements, which are unworked, is less than 2 mm (fine). The orientation of twining of the active elements is S-twined in double row, whereas the passive system is a single row. The spaces between the passive elements are ca 3 mm, which makes them open. The spaces between the active elements range between 1–4 mm, making them mainly open spaces with the presence of closed spaces. Differences in spaces and other irregularities could be due to ancient use-wear. The sieve mesh was incorporated into the coils that form the sides of the sieve from the inside, but it was not attached to the first rows of coiling that formed the base of the sieve. It is interesting to note that some white particles adhered to the plant materials forming the mesh, but due to the scarcity of samples these particles were not removed and were left for future researchers who may easily identify these particles using a less destructive method (Fig. 2).

**Small and large baskets**

The shapes, designs and sizes of baskets with and without lids varied. Several methods were used to adjust the lid on to the basket. For example baskets 1908 (Fig. 3a) and 4376 had a flat lid, and basket 1909 had a conical lid, which was simply placed on top of the basket (Fig. 3b). In the other three small baskets additional rows of coiling (supporting ridge) were sewn almost perpendicular to either the lid itself as in basket 1910 (Fig. 3c) or on the inside of the basket, just a few rows lower than the rim itself, as in basket 2407 (Fig. 3d). In other cases, ropes were sometimes found attached to both the lid and the inner basket walls, probably to secure the lid as in basket 1487. It is interesting to note in this basket that a supporting ridge was added to both the basket and the lid (Fig. 3e). In the large basket 1486 two rows of coiling, which may have been used as a supporting ridge, were found almost loose (Fig. 3f). Two of the previous baskets 1909 and 2407 had not been decorated, while other baskets were decorated.

---

Fig. 2. Sieve 679. a) Mesh and rim from the interior; b) detail of mesh incorporation into the coils, with white particles adhering to the plant material (x 10); c) base of sieve; d) detail of twining technique used in the mesh.
using diagonal stitches made from the same winder material forming decorative plaits that strengthen the basket, e.g., baskets 1486 and 1487. Remains of goat skin covered different parts of basket 1908, and a piece of linen textile was found inside. Basket 1910 showed an interesting decorative technique: the dark brown winders that decorated the rim of the basket were made of leather, whereas the brown winders forming decorative plaits on the outer side of the lid were made of brown coloured plant fibres that simulated leather (Fig. 3g). Basket 716 was also decorated using several techniques. Leather was stitched in the winders, in addition to red and brown coloured winder material which was used as decorative stitches in different parts of the basket, and plaited S-spun rope decorated both base and rim (Fig. 3h–k).

**Filled baskets**

Techniques and materials used in four of the five baskets that contained resurrection materials and offerings such as fruits, rhizomes, grains, small pots and textile bundles, did not differ from the previously mentioned baskets. Basket 3269 (Fig. 4a) was neatly coiled, but did not have any decorations. Good workmanship and decorative plaits could be clearly seen in baskets 4463 (Fig. 4b) and 4273. Baskets 3227 and 4402 were poorly coiled using the lazy stitch. The contents of four baskets had been previously identified by CAPPERS & HAMDY (2007). Thin, flat, round shaped bread made from figs, that could be easily identified by naked eye and under the microscope, filled the fifth basket 4273.
Lids

Lids ranged in form from flat to dome shaped. Depending on the basket shape, lids could be oval, round or rectangular, and their designs probably matched the designs of the basket to which they belonged. The three lids that were studied varied not only in material, but also in coiling technique and decoration. Lid 4944 was decorated with red and brown coloured winders both from the inside and the outside of the lid using the "stitch through the previous winder" coiling technique. Previous EDX/SEM studies demonstrated that the winder material was only covered from one side with a pigment layer (thickness was around 8–9 μm) made mostly of an iron mineral containing traces of arsenic (El Hadidi & Hamdy 2010). In the two other brown lids the winders were not coloured, in lid 2682 both the "stitch through the previous winder" and the "stitch through the previous winder and bundle" techniques were used, whereas in lid 2683 a "stitch through the previous winder" technique was used (Fig. 5).

Large plates

The three large plates represent yet more interesting techniques. Plate 1906 is in a terribly fragile state, but is characterized by the Z-twined coiling technique with widely spaced winder, which is unique in the studied collection (Fig. 6a). Plate 4946 is quite ordinary in the sense of coiling, but resinous material scattered at random had the imprint of woven textile, which may have been attached to the basket at some stage or during burial (Fig. 6b). Plate 2398 has an interesting second base with a larger diameter. The additional base had been attached to the bottom of the basket by wrapping a winder around the centre coils of both basket and base (Fig. 6c).

Discussion

In the 25 studied samples eight different plant species were used (Tab. 1). Difficulty arose in finding a trend in the choice of materials. It was not possible to depend on either the site locality or date of the objects, because the museum registers did not have sufficient information. It was therefore necessary to look for other reasons for mainly using seven plant species as either coil bundle or winder materials, whereas flax was only used in woven textile. Several observations can be made for the 25 studied objects. Ten objects were made of Ilphaena thebaica winder and Desmostachya bipinnata coil, but only three objects were made of Phoenix dactylifera winder and Desmostachya bipinnata coil. In seven cases winder and coil were made of the same plant. The remaining five objects were each made of two different plant materials. According to El Hadidi & Waly (2006), vegetative parts such as stem, culm, midrib and leaflet strip were used for making hard and soft basketry.

Hard basketry was made of herbaceous stems or culms such as the flowering branches of Ceruana pratensis identified morphologically and culms of Juncus acutus and J. rigidus. In the first case, mature and dry plants of Ceruana become stiff due to the abundance of thick-walled fibres within the tissues. Therefore,
Ceriana is suitable for making coffins and brooms. In the second case, both Juncus species possess vascular bundles with surrounding lignified sheaths, markedly developed on the phloem and xylem sides. This feature, in addition to triangular subepidermal fibre patches, provides hardness. Its elasticity is due to the ground tissue formed of parenchyma cells with small cavities.

Soft basketry was made of culms of Cyprius papyrus, lamina of Desmostachya bipinnata and leaflet strips of Phoenix dactylifera and Hyphaene thebaica. The hardness of Cyprius papyrus is due to the presence of fibre patches below the epidermis and fibre sheaths surrounding the vascular bundles, while in Desmostachya bipinnata the vascular bundles and fibre patches were distributed along the lamina. In Phoenix dactylifera and Hyphaene thebaica, the hardness is influenced by the presence of thick-walled bundle sheaths surrounding the vascular bundles. Hypodermal fibres and the scattered patches of fibres in the mesophyll, which are more developed in Hyphaene and formed of thick sheaths perpendicular to the surface joining both small and large vascular bundles (Metcalfe 1971), explain why Hyphaene is stronger in comparison to Phoenix, but less flexible during winding.

By studying the plants used as coil bundle or winder (Fig. 7), we observed that Desmostachya bipinnata was often used as a coil bundle (in 56% or 14 of 25 of the studied objects) because it is a very common plant in Egypt growing on canal banks and waste ground. Its earliest record dates to the Neolithic period in El Omari where leaves and culms were used for making ropes (Greiss 1937). Apparently, it was never used as a winder material because of its hardness and low flexibility due to the large amount of fibres in the lamina, but it was largely used as a filling substance (bundle coil material) wrapped outside with palm leaflet (Tackholm et al. 1941). On the other hand, Hyphaene thebaica is the most common winding material
in the studied objects (52%). Due to its hardness and durability, *Hyphaene* leaflet strips were often used for winding around grasses such as *Desmostachya*. It was cultivated since the remotest antiquity (Darby et al. 1977), its leaves were used for various plant works and its fibres from the leaf sheaths were frequently found in tombs of different periods (Greiss 1957). The earliest record of *H. thebaica* comes from the late Paleolithic (BP 18200–18000) in Wadi Kubbaniya where fruit mesocarp fragments were found (De Vartavan & Aensis Amorós 1997). As stated by Wendrich (1999) doum palm trees were probably more common in Egypt in the New Kingdom period. At Amarna, all basketry was made of *Hyphaene*, so was the coiled basketry of Qasr Ibrim. This may also explain why most of Deir el Medineh records are *Hyphaene* leaflet strips and not *Phoenix*.

It is interesting to point out however, that there were no strict rules to the use and choice of materials in the different elements of coiled baskets. Flexibility and hardness played the major role, and generally speaking the strips of the coil bundle were less flexible than those of the winder. Basket 716 represents an interesting case where both coil bundle and winder material were made of the same plant species and the difference in rigidity was reached by selecting thicker plant parts for the coil bundle (e.g., midrib of *Phoenix*) and flexible parts for the winder (e.g., leaflet strips of *Phoenix*).

The state of preservation of the coiled baskets suggests that there is a trend in deterioration. The two pot stands made of *Cyperus papyrus* were in a very fragile state even though *C. papyrus* has a flexible smooth texture due to the thinner fibre walls and the presence of an outer parenchymatous layer surrounding the vascular bundle sheath (Metcalf 1971). It is well suited to ancient Egyptian paper technology, but it does not seem to have been used very often in coiled basketry. We cannot say with certainty if these baskets are in a bad state of preservation because *C. papyrus* was used, or because of ancient use wear. An additional deterioration factor may have been the provenance of these objects. The soil in Fayum, with its mineral composition, is extremely rich in salts, and has a high moisture content (Leach & Tait 2000). The five baskets that were in a poor state of preservation had one thing in common: the technique that was used in making them was either the coarse coiling technique or the "lazy basket-maker's stitch". In three of the five objects, winders were made of *Hyphaene thebaica*, with *Desmostachya bipinnata* coils in basket 4402 and plate 1906 and *Juncus acutus* coil in lid 2683. We may note, however, that the other 10 objects that were made of *H. thebaica* winders were all in a relatively good state of preservation, even though some of them were coarsely coiled. The fourth badly deteriorated basket 1908 was made of *D. bipinnata* coils and *Phoenix dactylifera* winders. These are exactly the same materials used in the sieve 679,
which may date to the same period but from a different location. However, the sieve was in a good state of preservation. *P. dactylifera* was used as winder and coil in basket 716, which is in a good state of preservation. The fifth deteriorated basket 1909 was made of *Juncus acutus* winder and coils. Lid 2862 was made of *J. acutus* winder and lid 2683 was made of *J. acutus* coil. In both lids this material seemed to be in a good state of preservation, even though it appeared to be brittle. The ground tissue of *J. acutus* consists mainly of normal parenchyma cells with narrow air spaces as well as large fibre patches which are located either above or below vascular bundles. The ground tissue of *J. rigidus* consists mainly of normal parenchyma cells with air spaces as well as moderate to small fibre patches which are located either above or below vascular bundles (Cutler 1969; El Hadidi & Waly 2006). The thickness of the fibre wall in *J. rigidus* is 2/3 of the lumen, whereas in the case of *J. acutus* it is 3/4 of the lumen, which makes both materials brittle (El Hadidi & Waly 2006). However, if we look at the state of preservation of basket 3269 and lid 4944 that were made either partially or totally of *J. rigidus*, it seems that they are less brittle than the objects made of *J. acutus*. It may be difficult to compare the qualities of *Phoenix dactylifera* and *Hyphaene thebaica* winders because there were only three objects made of *P. dactylifera* winders in comparison to 13 objects made of *H. thebaica* winders. It may be worth studying the relationship between the anatomy of *P. dactylifera* and *H. thebaica* and the deterioration and preservation of winders in coiled basketry, because that may be a reason why at both Amarna and Deir El Medineh *H. thebaica* was the main material used for making winders.

Conclusion

In previous works, where identification depended only on morphological features, plants described where classified into rush, sedge, reed or halfa grass. Anatomical features used in identification since Greiss (1949, 1957) provided more accurate results. By studying the 25 basketry objects held by the Agricultural Museum, valuable information about the seven native plants that were commonly used in the manufacture of coiled baskets centuries ago was gained. Usually ex- amined samples are minute, therefore it is important to stress that anatomical features help in the accurate identification not only of plants, but also of different plant parts. Only in rare cases could the identification be made with the naked eye, such as in the case of coffin 758, where the flowering branches were easily recognized morphologically. By looking closely at the relationship between the anatomical composition of the studied plants and their state of preservation, it is evident that hardness, flexibility and durability are affected by the plant composition.

Acknowledgements

We wish to thank Mr. Mohammed El Hosainy El Akaad (General Supervisor of the Agricultural Museum and Exhibitions), Mr. Hassan Abd El-Rahman Khattab (former General Director of the Agricultural Museum) for giving us the chance to study and photograph all the studied specimens, Prof. Hasnaa Hosni for revising the manuscript and to Eng. Essam A. Gawad for formatting all the data.
<table>
<thead>
<tr>
<th>Object and registration no.</th>
<th>Locality, Period</th>
<th>Acquisition date</th>
<th>Plant part used as coil bundle</th>
<th>Plant part used as winder</th>
<th>Technique and Dimensions</th>
<th>Note</th>
<th>State of Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>178</td>
<td>Fayum, Tebtynis; Roman</td>
<td>Nov. 1935</td>
<td>Culm of <em>Cyperus papyrus</em></td>
<td>Culm of <em>Cyperus papyrus</em></td>
<td>Wrapping covering turned coil; Dim.: inner 7.9 x 8.7 cm; outer 12.1 x 11 cm; thickness 2 mm.</td>
<td>Italian excavations (1934), donated by the Antiquity Service</td>
<td>Very fragile</td>
</tr>
<tr>
<td>180</td>
<td>Fayum, Tebtynis; Roman</td>
<td>Nov. 1935</td>
<td>Culm of <em>Cyperus papyrus</em></td>
<td>Culm of <em>Cyperus papyrus</em></td>
<td>Wrapping covering turned coil; Dim.: inner 9.4 x 10.7 cm; outer 20 x 18 cm; thickness 2.2 cm.</td>
<td>Italian excavations (1934), donated by the Antiquity Service</td>
<td>Fragile, with new strings holding the grommet together</td>
</tr>
<tr>
<td>2428</td>
<td>Deir el Medineh; New Kingdom</td>
<td>1933</td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Wrapping with S-twisted rope covering turned coil; Dim.: inner 7.3 x 6.9 cm; outer 15.5 x 15 cm; thickness 3.7 cm.</td>
<td>Donated by IFAO</td>
<td>Very good and intact, with a small part of the wrap missing</td>
</tr>
<tr>
<td>2732</td>
<td>Thebes*</td>
<td>27.2.1933</td>
<td>?</td>
<td>Fibres of <em>Linum usitatissimum</em></td>
<td>Wadded textile; Dim.: inner 3.5 x 4.3 cm; outer 11.5 x 10.8 cm; thickness 2.2 cm.</td>
<td>Purchased from an antiquity at Luxor</td>
<td>Very good</td>
</tr>
<tr>
<td>679</td>
<td>Deir el Medineh; New Kingdom</td>
<td>1934</td>
<td>Basal part of lamina of <em>Deinactis dactylifera</em></td>
<td>Leaflet strips of <em>Phoenix dactylifera</em></td>
<td>Lazy stitch, twisted mesh; Dim.: 4 rows of coiling with 7 mm thickness; height 5.5 cm; diameter of base of sieve: 7.7 cm; inner rim: 11.9 cm; outer rim: 13.8 cm.</td>
<td>Donated by IFAO from an antiquity at Luxor</td>
<td>Good</td>
</tr>
</tbody>
</table>

Table 1 (continued on next pages). The studied basketry objects: registration number, origin, identified plant species, techniques, dimensions and state of preservation.
<table>
<thead>
<tr>
<th>Object and registration no.</th>
<th>Locality, Period</th>
<th>Acquisition date</th>
<th>Plant part used as coil bundle</th>
<th>Plant part used as winder</th>
<th>Technique and Dimensions</th>
<th>Note</th>
<th>State of Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small basket</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1487</td>
<td>Deir el Medineh, New Kingdom</td>
<td>30.9.1939</td>
<td>Lower region of lamina of <em>Drosostachys bippinata</em></td>
<td>Leaflet strips of <em>Phoenix dactylifera</em></td>
<td>Coiled, stitch through previous winder, plait; Dim.: lid: 4 cm high; rim: 1.5 cm (3 rows); opening: outer: 18 cm; inner: 1.5 cm; height: 18.5 cm; base: 17 cm in diameter (16 rows from centre outwards)</td>
<td>Donated by the Egyptian Museum</td>
<td>Good and needs very little repair</td>
</tr>
<tr>
<td>1908</td>
<td>Thebes; New Kingdom or late?</td>
<td>27.2.1933</td>
<td>Lower region of lamina of <em>Drosostachys bippinata</em></td>
<td>Leaflet strips and midrib of <em>Phoenix dactylifera</em></td>
<td>Coiled, stitch through previous winder; May have been lined with linen textile 1/1 and lid was covered with leather, it also contained a piece of knotted leather inside. Dim.: 6.5 x 12 cm; height: 9.5; base: 9.5 x 5</td>
<td>Purchased from an antiquary at Luxor</td>
<td>Very fragile and previously restored with thick thread</td>
</tr>
<tr>
<td>1909</td>
<td>Uncertain New Kingdom or late?</td>
<td>28.4.1932</td>
<td>Calm of <em>Junctus acutus</em></td>
<td>Calm of <em>Junctus acutus</em></td>
<td>Coiled, stitch through previous winder; Dim.: 8 x 16 cm; height: 5 cm; height of lid: 2 cm in the collapsed centre, 4 cm on the outside perimeter</td>
<td>Purchased from an antiquary at Cairo</td>
<td>Fragile and previously repaired with thread and thin wire to hold coils together</td>
</tr>
<tr>
<td>1910</td>
<td>Thebes? Late?</td>
<td>15.2.1933</td>
<td>Split midrib of <em>Phoenix dactylifera</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Coiled, stitch through previous winder, decorated; Dim.: lid: 13 cm in diameter; 3 cm high including 2 cm supporting ridge (3 rows); basket height: 16 cm (25 rows); diameter of base 10.5 cm; largest diameter of basket 18 cm; diameter of opening 13 cm</td>
<td>Purchased from an antiquary (Tano) at Cairo, who acquired it from the Egyptian Museum (no.6917)</td>
<td>Very good</td>
</tr>
<tr>
<td>2407</td>
<td>Deir el Medineh; New Kingdom</td>
<td>1933</td>
<td>Lower region of lamina of <em>Drosostachys bippinata</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Coiled, stitch through previous winder; Dim.: lid: 8.5 x 14 cm; 5 cm high; Rim: 2 rows horizontal; 4 rows vertical; opening: inner: 5.5 cm; height: 12 cm (without base); base: 8.5 x 15 (5 rows from centre outwards)</td>
<td>Donated by JfAO</td>
<td>Good</td>
</tr>
<tr>
<td>4376</td>
<td>Deir el Medineh; New Kingdom</td>
<td>1933</td>
<td>Lower region of lamina of <em>Drosostachys bippinata</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Coiled, stitch through previous winder, lazy stitch</td>
<td>Good</td>
<td></td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Object and registration no.</th>
<th>Locality, Period of Collection</th>
<th>Acquisition date</th>
<th>Plant part used as coil bundle</th>
<th>Plant part used as winder</th>
<th>Technique and Dimensions</th>
<th>Note</th>
<th>State of Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large basket</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>716</td>
<td>Thebes, New Kingdom</td>
<td>1934</td>
<td>Split midrib and leaflet strips of <em>Phoenix dactylifera</em></td>
<td>Leaflet strips of <em>Phoenix dactylifera</em></td>
<td>Coiled, stitch through previous winder, decorated; Dim.: inner diameter 29 cm; base outer diameter: 27.5 cm; height: 36 cm in 21 rows (without base); base diameter: 35.5 cm (7 rows)</td>
<td>Purchased from an antiquity at Luxor</td>
<td>Good and intact, with only the handle separated</td>
</tr>
<tr>
<td>1486</td>
<td>Deir el Medineh, New Kingdom</td>
<td>30.9.1939</td>
<td>Calyx of <em>Junus acutus</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Coiled, stitch through previous winder, plates; Dim.: lid: 41 cm long, from centre outwards 25.5 cm, 7.3 cm high; basket (oval shaped): base 50 cm, 36 cm high (43 rows); inner opening 30.5 cm long, from centre outwards 24.5 cm; 2 rows of supporting ridges 2 cm thick</td>
<td>Donated by the Egyptian Museum</td>
<td>Good and needs very little repair</td>
</tr>
<tr>
<td>Filled basket</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3227</td>
<td>Deir el Medineh, New Kingdom</td>
<td></td>
<td>Lower region of lamina of <em>Desmatochyla bipinnata</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Lazy stitch</td>
<td>Donated by IFAO</td>
<td>Good but fragile</td>
</tr>
<tr>
<td>3269</td>
<td>Deir el Medineh, New Kingdom</td>
<td>17.12.1932</td>
<td>Lower region of lamina of <em>Desmatochyla bipinnata</em></td>
<td>Calyx of <em>Junus rigidus</em></td>
<td>Coiled, stitch through previous winder; Dim.: diameter 29 cm, height 9 cm (8 rows); lid: diameter 29.5 cm</td>
<td>Donated by IFAO</td>
<td>Good, but partly detached and brittle. Threads were recently used to reattach the brim</td>
</tr>
<tr>
<td>4273</td>
<td>Deir el Medineh, New Kingdom</td>
<td>1934</td>
<td>Lower region of lamina of <em>Desmatochyla bipinnata</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Coiled, stitch through previous winder, plates; Dim.: height 14 cm, base 17 cm; thickness of coil 7 mm</td>
<td>Donated by the Antiquity service</td>
<td>Good and needs cleaning</td>
</tr>
<tr>
<td>4402</td>
<td>Deir el Medineh, New Kingdom</td>
<td>1933</td>
<td>Lower region of lamina of <em>Desmatochyla bipinnata</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Lazy stitch; Dim.: lid: 12.5 cm, width 8.5 cm; height 7.5 cm (9 rows); thickness of coil 7 - 8 mm</td>
<td>Donated by IFAO</td>
<td>Not fragile, but many winder are missing</td>
</tr>
<tr>
<td>4463</td>
<td>Deir el Medineh, New Kingdom</td>
<td>1933</td>
<td>Lower region of lamina of <em>Desmatochyla bipinnata</em></td>
<td>Leaflet strips of <em>Hyphaene thebaica</em></td>
<td>Coiled, stitch through previous winder, plates; Dim.: lid: 12 x 14 cm, 4.5 cm high (9 rows + 2 vertical rows as a rim), with rope attached in the centre of the lid; basket opening: 14 cm in diameter; base 19 cm in diameter; thickness of coil 5 mm; height: 11 cm (14 rows + 3 rows for lid)</td>
<td>Donated by IFAO</td>
<td>Good and needs cleaning</td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Object and registration no.</th>
<th>Locality, Period</th>
<th>Acquisition date</th>
<th>Plant part used as coil bundle</th>
<th>Plant part used as winder</th>
<th>Technique and Dimensions</th>
<th>Note</th>
<th>State of Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lid</td>
<td>?</td>
<td>?</td>
<td>Lower region of lamina of Desmostachya bipinnata</td>
<td>Calm of Juncus acutus</td>
<td>Previous winder and bundle stitches; Dim.: diameter ca 12 cm</td>
<td>Good and needs cleaning from both sides</td>
<td>Good and needs cleaning from inside</td>
</tr>
<tr>
<td>2683</td>
<td>New Kingdom</td>
<td>15.2.1933</td>
<td>Calm of Juncus acutus</td>
<td>Leaflet strips of Euphycaea thebaica</td>
<td>Lazy stitch; Dim.: diameter ca 10.5 cm</td>
<td>Not intact due to deterioration of the winder material and needs cleaning from the inside</td>
<td>Good and needs cleaning from the inside</td>
</tr>
<tr>
<td>4944</td>
<td>New Kingdom</td>
<td>15.2.1933</td>
<td>Calm of Juncus rigidus</td>
<td>Calm of Juncus rigidus</td>
<td>Coiled, stitch through previous coloured winder; Dim.: diameter ca 17 cm</td>
<td>Purchased from an antiquity (Tano) at Cairo</td>
<td>Good and needs cleaning from the inside</td>
</tr>
<tr>
<td>Plate</td>
<td>Deir el Medineh; New Kingdom</td>
<td>24.12.1934</td>
<td>Lower region of lamina of Desmostachya bipinnata</td>
<td>Leaflet strips of Euphycaea thebaica</td>
<td>Lazy stitch, previous winder and bundle stitch, winder Z-twined; Dim.: diameter: 53–60 cm; height: 10–13 cm</td>
<td>Extremely fragile and materials are crumbling, new linen thread is holding the Z-twined coiling together</td>
<td>Good with winder missing in part of the rim and base</td>
</tr>
<tr>
<td>2398</td>
<td>Late?</td>
<td>1932</td>
<td>Lower region of lamina of Desmostachya bipinnata</td>
<td>Leaflet strips of Euphycaea thebaica</td>
<td>Coiled, stitch through previous winder; Dim: base: diameter 25 cm; thickness of coil 12 mm; basket: inner base 15 cm; height 12 cm; diameter of rim 27 cm; thickness of coil 17 mm</td>
<td>Purchased from an antiquity at Luxor</td>
<td>Good with winder missing in the rim, and new linen thread holding the last row of coiling together</td>
</tr>
<tr>
<td>4946</td>
<td>Saqqara; Late (26th Dynasty)</td>
<td>1934</td>
<td>Lower region of lamina of Desmostachya bipinnata</td>
<td>Leaflet strips of Euphycaea thebaica</td>
<td>Coiled, stitch through previous winder; Dim.: base 20 cm; height 11 cm; thickness of coil 9 mm</td>
<td>Purchased from an antiquity at Luxor</td>
<td>Good with winder missing in the rim, and new linen thread holding the last row of coiling together</td>
</tr>
<tr>
<td>Coffin</td>
<td>Tarkhant; 1st &amp; 2nd Dynasty</td>
<td>1934</td>
<td>Flowering branches of Ceroxanu pratensis</td>
<td>Flowering branches of Ceroxanu pratensis</td>
<td>Very coarsely coiled</td>
<td>Donated by the Antiquity Service (Egyptian Museum)</td>
<td>Very fragile</td>
</tr>
</tbody>
</table>

Table 1 (end). The studied basketry objects: registration number, origin, identified plant species, techniques, dimensions and state of preservation.
References


