CONSERVATION OF A LATE MINOAN BASKET FROM CRETE

Antonio Paterakis

Summary—*The identification of the plant material from a woven basket found in the Late Minoan cemetery of Armenon, Crete, Greece, is reported. The conservation treatment of this basket consisted of measurement of the moisture content, mechanical cleaning, consolidation with Butvar B98 (polyvinyl butyral), calculation of the original dimensions and reconstruction on an Ethafoam support.*

Introduction

In an excavation by the Ephorate of Prehistoric and Classical Antiquities of Chania in the Late Minoan (*c.* 1450–1100 BC) cemetery of Armenon in the province of Rethymnon, Crete (grave 187), a fragmentary woven basket was discovered. The basket was woven from palm which was decorated with numerous small copper rings, many of which are preserved. The fragments were transported in a box as they were found, with soil and associated organic materials from the excavation, to the Direction for the Conservation of Antiquities of the Ministry of Culture in Athens for treatment in December 1987.

History

Woven baskets from Egypt dating from 1580–1085 BC in the Oriental Institute Museum of the University of Chicago resemble the basket in question but without the copper rings (in particular Oriental Institute Museum registration no. 18265). Also, an Egyptian basket with the inventory number UC.28047 in the Petrie Museum, London, displays similarities. Lucas states that the oldest basket found in Egypt dates from 5000 BC [1]. According to this author materials used for the manufacture of baskets included halfa grasses (*Desmostachya bipinnata* and *Imperata cylindrica*), leaves of the doum palm (*Hyphaene thebaica*) and date palm (*Phoenix dactylifera*), flax fibers and *Ceruana pratensis* Forsk, possibly papyrus and rushes (*Juncus arabicus* and *Juncus acutus*). According to Forbes, the earliest example of this shape of basket dates to 2000 BC from Kerma, Nubia, Egypt [2]. Forbes states that the materials which were commonly used to weave baskets in ancient Egypt were reed, wild grass, date palm, doum palm, flax and esparto grass (*Stipa tenacissima*).

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Analysis

A sample of the basket was taken prior to conservation treatment and was sent to the Royal Botanic Gardens, Kew, for identification of the plant material. Two different thicknesses of weave at right-angles to one another were determined to originate from leaf or stem material of the monocotyledonous group of plants which includes grasses, rushes, palms, etc. The thinner weave was too degraded to be identified but the thicker weave contained spherical silica bodies typical of palms and very similar to those found in date palm and doum palm.

Conservation treatment

The very friable condition of the basket prevented handling without damage. The conservation treatment program for the basket consisted of the following steps:

(1) Gradual reduction of the moisture content to a favorable level of 11%.

(2) Cleaning of the surface including the removal of organic materials such as roots and bone fragments.

(3) Consolidation to render the object resistant to handling and transportation.

The moisture content of the basket was determined as 28% using a Timbermini moisture content meter. Moisture content (MC) is commonly used to express the percentage amount of moisture contained in wood and is calculated by the formula

$$MC = \frac{(W_i - W_{od})}{(W_{od})} \times 100$$

where W_i is the weight of the initial sample and W_{od} is the oven-dry weight [3]. The Timbermini moisture content meter measures the direct current electrical resistance in ohms which it translates into percentage moisture content [3]. A moisture content

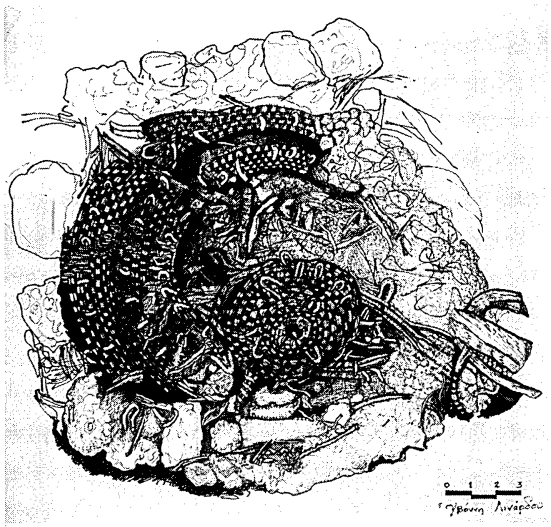

Figure 1 Basket fragments during cleaning, before separation and lifting.

of 11% was considered optimal since it represents the moisture content of wood which has equilibrated to the average environmental conditions of intermittently heated buildings [4]. These environmental conditions approximate those of the Archaeological Museum of Rethymnon, Crete, where the basket is now displayed. The slow drying of the object was monitored until 11% was reached.

The object was then cleaned by mechanical means. The human bone fragments found with the basket were removed in order to treat the basket fragments and returned to the Ephorate of Antiquities. In this case the basket took precedence over the bones since it represented a unique discovery in the cemetery whereas bone recovery was prevalent. After extensive cleaning the pointed top of the lid of the basket was revealed. Several other fragments from the lid were also uncovered. After cleaning, the fragments were drawn on a scale of 1:1 (Figure 1).

The synthetic resin Butvar B98 (polyvinyl butyral) was chosen as the consolidant because its low molecular weight favored better penetration [5–8]. Butvar B98 was used as a 33% solution in ethanol (wt/vol) and applied by dripping onto the surface. Consolidation was regarded as successful: little alteration of color occurred and sufficient strength was imparted to the fragments so they could be handled without damage. When the cleaned and consolidated lid fragments were lifted, another fragment covered with organic material was found underneath. This fragment was subjected to the same conservation treatment. After cleaning and consolidation this fragment was determined to derive from the wall of the basket container.

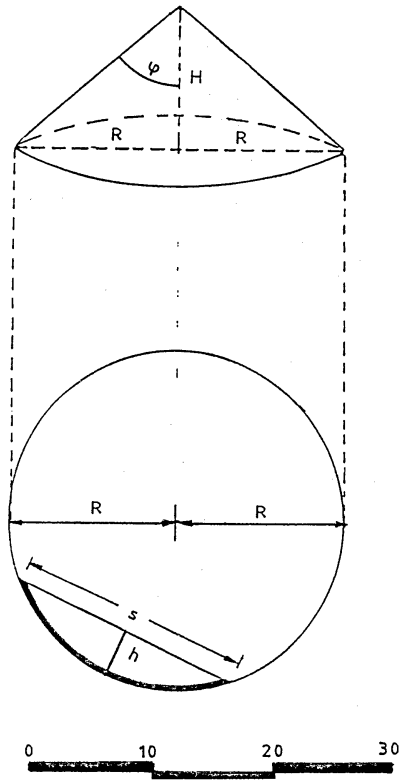

Figure 2 Geometrical method used to reconstruct original dimensions of the basket.

Reconstruction

The original dimensions of the basket were determined geometrically using the existing fragments (Figure 2). Based on the measurements it was determined that s = 18·8cm, h = 3·8cm. Using the formula $R = (s^2 + 4h^2)/8h$ the radius of the base was determined to be R = 13·53cm. From the radius R and the angle ϕ, the height of the lid (H) was found to be 11·33cm. The depth of the basket container was estimated based on baskets in the Oriental Institute Museum of Chicago with lids similar in height to the one in question.

Ethafoam (polyethene foam) was used to construct a base on which to support the basket fragments (Figure 3). Ethafoam was chosen for its stability and inertness in proximity to the organic material of the basket. The Ethafoam form was covered with a cotton fabric before the basket fragments were attached with copper alloy pins. The

Figure 3 Basket fragments mounted on Ethafoam support after completion of conservation treatment.

Ethafoam support approximates the original dimensions of the object and permits the transportation of the object while avoiding direct contact.

Acknowledgements

The identification of the plant material was reported by T. Lawrence of the Royal Botanic Gardens, Kew (UK) in September 1995. Calculations for the reconstruction of the basket were made by Angelos Kabourakis, topographical/civil engineer of the Ministry of Culture, Athens, Greece.

Manufacturers and suppliers

Timbermini moisture content meter: Protimeter Ltd, Meter House, Marlow, Buckinghamshire SL7 1LX, UK.

Butvar B98: Monsanto Europe S.A., Avenue de Tervuren 270–272, Bte 1, 1150 Bruxelles, Belgium.

Ethafoam: Dow Chemical Company, Midland, MI 48640, USA.

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Author

ANTONIO PATERAKIS completed the course in painting at the Academy of Fine Arts, Florence, Italy, prior to studies in the conservation of art at the Istituto Statale d'Arte in Florence and the Artisan Association of the Province of Florence. He has held the position of Chief Conservator of sculpted and polychromed wooden objects at the Direction for the Conservation of Antiquities in Athens since 1979 and has been a professor in the Department of Art Conservation at the Technical Educational Institute in Athens since 1989. *Address: Direction for the Conservation of Antiquities, Ministry of Culture, 4 Dioskouron Street, 105 55 Athens, Greece.*

Résumé—*On rapporte l'identification du matériau d'un panier tissé provenant du cimetière d'Armenon, Crête, Grèce, Minoen tardif. Le traitement de conservation de ce panier a consisté en la mesure du contenu en humidité, le nettoyage mécanique, la consolidation au Butvar B98 (butyral de polyvinyle), le calcul des dimensions originales et la reconstruction sur un support en Ethafoam.*

Zusammenfassung—*Die spätminoische Begräbnisstätte von Armenon, Kreta, Griechenland, ist Fundort eines geflochtenen Korbs; über die Identifizierung seiner pflanzlichen Rohstoffe wird in der vorliegenden Arbeit berichtet. Die konservatorische Behandlung beinhaltete die Bestimmung des Feuchtigkeitsgehaltes, die mechanische Reinigung, die Konsolidierung mit Butvar B98 (Polyvinylbutyral), die Ermittlung der Originalmaße und die Rekonstruktion des Behältnisses auf einer Trägerform aus Ethafoam.*

Resumen—*Se describe la identificación del material vegetal constituyente de un cesto trenzado, encontrado en el cementerio tardo-minóico de Armenón, Creta, Grecia. El tratamiento de conservación de este cesto consistió en la medición del contenido de humedad, limpieza mecánica, consolidación con Butvar B98 (polivinil butiral), cálculo de las dimensiones originales y la reconstrucción en un soporte de Ethafoam.*