NOTE BREVI

Coarseware Stirrup Jars from Cannatello, Sicily: New Evidence from Petrographic Analysis*

Introduction

Coarseware, transport stirrup jars provide us with a rich source of information on production and exchange not only within the Late Bronze Age Aegean, but also in terms of maritime contact and exchange with adjoining areas. Besides their notable presence in both Mycenaean and Minoan centres, they have been found in quantity in Cyprus, perhaps most notably at Enkomi, at Ras Shamra in Syria; in Egypt at Tel el Amarna (Hankey 1995) and in Sardinia (Jones and Day 1987). Their presence on shipwrecks of the Late Bronze Age, at Uluburun, Iria and Cape Gelidonya, provides direct evidence of their transportation by sea (Day 1999). The jars have long been the subject of debate over their origins, especially those that carry inscriptions in Linear B (Catling *et al.* 1980), but recent results indicate the origin of most of these vessels as being the island of Crete. Besides the large group of vessels that have been demonstrated to be connected with West Crete, petrography has indicated that there are other coarseware stirrup jar fabric groups which are likely to have their origin in Central Crete (Day and Haskell 1995; Day and Jones 1991; Day 1995; 1999).

Transport Stirrup Jars from Cannatello

A number of Aegean-style transport stirrup jar fragments have been excavated at Cannatello, near Agrigento, Sicily, some of which display incised Cypro-Minoan signs (De Miro 1996; Vagnetti 1999, 191, 208). Transport stirrup jars with signs incised after firing occur in a number of areas (Hankey 1995; Hirschfeld 1993; possibly also Palaima *et al.* 1984). Indeed four of the transport stirrup jars from the Uluburun shipwreck also have a number of related signs inscribed on their handles. At least some of the incised jars analysed from Uluburun were manufactured in Crete, some having West Cretan fabrics and others Central Cretan. This suggests that they were incised upon re-use in Cyprus and were then sent back travelling west (Day 1999, 68-9). In this context as so many TSJs appear to have a provenance in Crete, the provenance of the stirrup jars in Cannatello is of importance.

The jars join the growing body of Aegean-style pottery identified in Sardinia, Sicily and Peninsula Italy. In fact the area of Agrigento has provided substantial evidence for Aegean and other imported pottery even during the equivalent of LH I-II (Castellana 1998; De Miro 1999). In projects fully integrated with typological study, the Aegean-style pottery has been analysed by chemistry and thin section petrography, revealing both geo-

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graphical and chronological patterns in the contact of the Minoan and Mycenaean world with the West Central Mediterranean (Jones and Vagnetti 1991; Jones *et al.* 2002; Buxeda i Garrigós *et al.* 2003).

Two body sherds of the coarseware stirrup jars were sampled for thin section examination. Listed as catalogue numbers AG 4774 (De Miro 1996, Cat. No. 149) and AG 4927 (De Miro 1996, 1010, Cat. No. 124), they both have dark-on-light painted decoration, the latter ostensibly with deep wavy lines, related to the octopus motif on stirrup jars, the other simply with bands.

The purpose of the analyses presented here is to compare the jars sampled from Cannatello with a substantial number of comparative thin sections of coarseware stirrup jars from the Aegean and East Mediterranean. In this way it was hoped to integrate Cannatello within a picture of the movement of such vessels and to suggest the provenance of the jars.

Petrographic analysis

The descriptive system used here is a modified version of that proposed by Whitbread (1989, 1995). Both samples belong to the same broad fabric type (Fig 1).

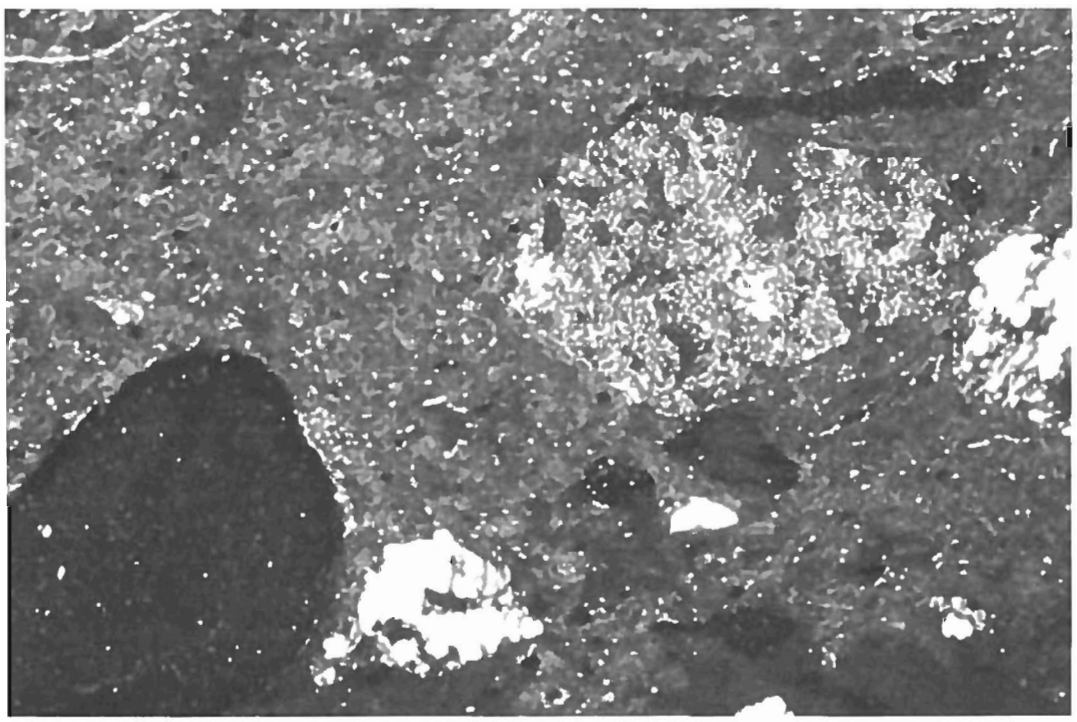

Fig 1. Photomicrograph of AG 4774, showing frequent sand sized inclusions of siltstone and polycrystalline quartz in fine matrix. The matrix is mostly masked by secondary calcite. XP, horizontal dimension = 4 mm.

Microstructure: There are few to very few voids in these samples, which comprise mesovughs and microvughs. While there are rare macro and meso planar voids, and rare mega channels in AG/4774, AG/4927 has very rare macro channels and no planar voids.

Channel voids are infilled with microcrystalline calcite, while vughs and planar voids are unfilled. The elongate voids have a crude long axes parallel orientation with the vessel margins. The elongate non-plastic inclusions also have a long axes parallel orientation with the vessel margins. The voids are open-spaced while the non-plastic inclusions tend to be open to double-spaced.

Groundmass: The groundmass is homogeneous in AG/4927 and rather heterogeneous in AG/4774 because of clay mixing. AG/4927 is yellow brown in plane polarised light (PPL) and is orange brown under cross polars (XP, x40). In AG/4774 the micromass is yellow grey brown to orange brown in PPL and is grey brown with red brown speckles in places and in other areas is orange brown in XP (x40). The micromass in AG/4927 is optical very slightly active, and in sample AG/4774 there are areas of apparent optically inactivity which correspond to a patchy calcitic zoning, and areas of optically moderate activity.

Inclusions: c:f:v10µm ca.15:80:5 to 15:83:2
Coarse fraction = 2.5mm to 0.3mm (granules to medium sand)
Fine fraction = 0.3mm or less (medium sand and below)

The non-plastic inclusions are poorly sorted and have what appears to be a bimodal grain size distribution.

Coarse Fraction

Frequent to few: **Siltstones** - grey in AG/4774 and brown in both samples. Elongate to slightly elongate, wr-r. Size = <2mm, mode = 0.5mm long dimension. A lamination can be seen in some of the grains. Grey grains are composed of a calcareous clay, whereas the brown siltstones are composed of a red firing clay. Silt size inclusions of monocrystalline quartz can be seen (subangular-subrounded); some are coarser grained than others.

Few to rare: **Mudstones**, generally dark brown. Elongate, sr-r. Size = <1mm, mode = 0.5mm long dimension. Very small sporadic inclusions of monocrystalline quartz.

Common to few: **Polycrystalline Quartz** - generally inequigranular, some show evidence of straining (stretched metamorphic quartz). Usually elongate, subangular-subrounded. Size = <1.8mm, mode = 0.6mm long dimension.

Few to rare: **Sandstone**, medium to fine-grained. Generally elongate, subangular-subrounded. Size = <2.5mm, mode = 0.75mm long dimension. Composed of moderately to poorly sorted monocrystalline quartz grains with a clay-rich matrix. In some there is little to no matrix present. Rarely they contain alkali feldspar grains.

Few to very rare: **Monocrystalline Quartz**, equant to slightly elongate, angular-subangular. Size = <0.55mm, mode = 0.25mm long dimension.

Rare: **Metamorphic Rock Fragments**, possibly phyllite/schist? Biotite mica and quartz having a developed schistosity. Slightly elongate, subangular-subrounded. Size = <1mm, mode =0.42mm long dimension. Another fragment type is composed of white mica and chlorite, with a well-developed schistosity with relict grains of quartz, possibly indicating a microbreccia or greywacke parent rock.

Very few to absent: **Chert,** angular-subangular. generally elongate. Occasionally contains radiolaria tests infilled with chalcedonic quartz. Size = <1.25mm, mode = 0.7mm long dimension.

Rare to absent:	**Limestone fragment**, subangular-subrounded, equant for the most part. Calcimudstone (micrite), grading in places into sparite. Size = 0.5mm long dimension. **Monocrystalline calcite** grain, elongate, subrounded, size = 0.3mm long dimension. **Microfossils**, foraminifera.
Fine fraction	
Common:	**Monocrystalline Quartz**, approximately equant, subrounded. Mode = 0.2mm long dimension. Straight extinction. **Polycrystalline Quartz**, slightly elongate, subrounded. Equigranular to inequigranular. Mode = 0.25mm long dimension.
Few to very rare:	**Siltstones**, approximately equant, subangular-subrounded, mode = 0.14mm long dimension. **Chert**, equant to slightly elongate, subangular. Mode = 0.16mm long dimension. **Biotite mica**, laths.
Rare:	**Monocrystalline calcite**, slightly elongate, subangular, mode = 0.12mm long dimension.
Very rare:	**Opaques**

Textural Concentration Features: There are very few to rare textural concentration features in these samples. They are orange brown in PPL and are red brown in XP (x40), with diffuse to merging boundaries, high to neutral optical density, usually equant to slightly elongate, and appear concordant with the micromass. They contain silt-size sporadic inclusions of monocrystalline quartz. Size = <0.5mm, mode = 0.12mm long dimension. They are probably clay pellets.

Comment: This fabric is characterised by sparse, large, fairly well-rounded inclusions of sedimentary and low grade metamorphic rocks set in a very fine-grained groundmass. The sedimentary rock inclusions include siltstones, mudstones, sandstones and chert. The clay used in sample AG/4774 appears to have been mixed; perhaps being composed of a calcareous clay and a red firing clay.

Discussion

These samples are related to Riley's Fabric Ci from Mycenae (Riley 1981); Day's fabric description 3 from the same site (Day 1995, 312) and are similar to a vessel found in Cyprus, described by Palaima *et al.* (1984). They belong to a well known broad fabric type which has been recorded as being present in coarseware stirrup jars from the Iria shipwreck, Mycenae, and Kommos; and in part to other vessels from the Uluburun shipwreck and Cyprus. These contain siltstones, sometimes tuffaceous in appearance, biotite schist, altered igneous rocks and chert in a high fired, calcareous clay matrix and resemble fabrics observed in Late Bronze Age contexts from Central Crete, and notably several examples in South-central Crete. The fabric seems to have its origin in Central Crete.

The source of some of the comparative material is the southern Cretan port of Kommos, which has one of the most substantial assemblages of transport stirrup jars (Watrous 1992, 1993). Besides being a major port (Knapp and Cherry 1994, 141; Rutter 1999), Kommos was at the western end of the most agriculturally productive area of the island of Crete, leading to specific suggestions that it was important in the oil-trade whose products were exported in stirrup jars via Kommos (Watrous 1993; Day 1999). In terms of typology, the

deep wavy line motif found on one of these stirrup jar bodies is thought by Haskell to be primarily Central Cretan feature (Day & Haskell 1995, 96).

The stirrup jars from Cannatello are related to the fabric found in the majority of vessels from the Point Iria shipwreck, thus demonstrating further the link of these vessels to maritime trade routes. Furthermore, along with Cananite jars and Cypriot pithoi, these stirrup jars from Crete seem to comprise part of a set of vessels regularly found in major harbours, as well as shipwrecks of this period (Bass 1987; Lolos 1999); a group of vessels of quite disparate origins which epitomise the growing long-distance relations of trade and exchange (Day 1999; Lolos 1999).

There is evidence of two-way movement of pottery, in the form of a distinctive range of dark burnished pottery found at Kommos, imported from Sardinia (Watrous *et al.* 1998); with Cretan pithoi and a transport stirrup jar of Cretan origin found at Nuraghe Antigori on Sardinia (Jones and Day 1987). These specific instances and the 'international' pottery set mentioned above form a firm context for the find of the transport stirrup jars at Cannatello. It joins a growing list of coastal sites in the Near East, Cyprus, Crete, Sicily, Sardinia and mainland Italy which testify to growing maritime exchange during the thirteenth century BC.

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