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Transport stirrup jars in Late Mycenaean Tiryns: Maritime Transport Containers and commodity movement in political context

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Elina Kardamaki, Peter M. Day, Marta Tenconi, Joseph Maran and Alkestis Papadimitriou

For Joseph W. Shaw and Maria C. Shaw
and to the memory of Vincenzo La Rosa

Abstract

Transport jars from the Mycenaean citadel of Tiryns, a coastal centre in the Bronze Age, were analysed in a macroscopic and petrographic study. Over 400 vessels and vessel fragments, mostly Transport Stirrup Jars (TSJs) and Canaanite jars, were recorded; around a quarter of them were selected for analysis. The vessels derive from both the upper and lower citadel, with a few from the lower town. Their chronological span ranges from Late Helladic (LH) IIIB1 to LH IIIC Developed (ca 1300–1070 BC) but the bulk of the material dates to LH IIIB2 (ca 1200 BC), and comes from dumps derived from the final destruction of the palace. Several sources are suggested for the TSJs, some of which are inscribed with Linear B: Kythera, the eastern Aegean (perhaps Kos), Kontopigado-Alimos in Attica, Corinth and several other mainland sources, as yet unidentified. It is suggested that a large group of TSJs with shape and decoration derived from central Cretan types were produced in the vicinity of the Argive Plain. Two thirds of the TSJs, however, come from Crete. With the exception of one from the Vrokastro area of east Crete, these are evenly derived from the Chania plain and the western edge of the Mesara plain in central Crete, where the Minoan centres of Kommos, Phaistos and Ayia Triada are located. We discuss the implications of all this for our understanding of the economy and society of Crete after the destruction of the palace of Knossos, and for the relationship between Crete and the Mycenaean palatial centres in the Argolid.

Introduction: objects and commodity movement

The bodies of evidence for the movement of raw materials and commodities in the Mycenaean world are many and varied. While it is often lamented that the Linear B archives do not concern themselves with trade and exchange between elites as, for example, seen in the royal correspondence of the Amarna tablets from Egypt, the importance of the production of metalwork, textiles, furniture and other value-added goods to the Mycenaean palaces is clear.

Analytical approaches to Late Bronze Age (LBA) material culture in the Aegean offer the potential to break away from expectations and perhaps to surprise ourselves with results that alter our perspective: a ‘bottom-up’ approach. A good example is recent research on the production and consumption of Mycenaean pottery in the Saronic Gulf (Gilstrap 2014; Gilstrap *et al.* 2016). That said, although early work concentrated on the origins of metals and fine ware ceramics, it still allowed Knapp and Cherry (1991) to argue that the movement of goods at this time was characterised by various forms of exchange, from state-directed to the ‘tramping’ of merchants from port to port. This examination of the nature of movement forms a focus of this paper.

Almost all accounts of the movement of objects or organic commodities in the Mycenaean world mention Transport Stirrup Jars (TSJs). Their exalted status results from a variety of properties. Not least of these are their status as a bulk container, their appearance across wide areas of the eastern Mediterranean and—at least in the Aegean—the fact that a proportion of them have pre-firing, painted inscriptions in the Linear B script. It must be noted, however, that inscribed TSJs (ITSJs) are very rare beyond the Aegean (Eder & Jung 2015: 115, fig. 1). Their status as bearers of script links them to the accountancy system of Linear B: the recording in clay of obligations, labour, crafting, the control of aspects of agricultural production, feasting and religious observance. In fact, Linear B even records some goods with a stirrup jar ideogram (Haskell *et al.* 2011: 5). In the case of shipwrecks, the homogeneity of the TSJ cargo on the Point Iria vessel (Day 1999) stands in contrast to the sheer variety of the same vessels on the Uluburun wreck (Day 2011: 78), whose Cypro-Minoan signs were incised in a phase of re-use. In other words, even a single category of material suggests multiple layers in the nature of transactions.

Initial analytical work on inscribed TSJs from the Mycenaean citadel of Tiryns (Catling *et al.* 1980) suggested a special relationship of this Argolid harbour site with the port of Chania in west Crete. The pottery sampled showed an almost exclusive presence of pottery for which Optical Emission Spectrometry (OES) indicated a west Cretan origin (a few were identified as locally made—Catling *et al.* 1980: 76, 79, table 11, 93; Haskell *et al.* 2011: table 27). While the vessels themselves were not subjected to petrographic analysis, in the project as whole petrography and chemistry almost always agreed on ascribing provenance to Chania.

With recent studies of substantial Mycenaean deposits at Tiryns (Stockhammer 2008; Kardamaki 2013) and continuing excavations in the Lower Town by Maran and Papadimitriou, it was considered an opportune moment to carry out a targeted study of the TSJs from this major Mycenaean site, in a manner similar to that carried out in Crete at Kommos (Day *et al.* 2011). The study includes Canaanite jars as well as TSJs, although the analytical results of the former will be discussed elsewhere.

It is suggested that the large number of TSJs analysed here were manufactured in a variety of locations: in Crete, on the Greek mainland and in the Aegean islands (Fig. 1). This movement of pottery containers suggests the existence of a widespread distribution of the jars’ liquid commodities, some far from the control of palatial elites, at least in some areas exporting the jars. We argue below that the provenance of the TSJs originating in Crete provides food for thought about the nature of shipments, the structure of administration and production on the island at this time, and the relationship between Crete and the Mycenaean world, especially the Argolid.

One of these producing centres, Chania, has been discussed extensively, notably in relation to Tiryns. Here, however, we discuss another major Cretan source of the jars in Late Helladic (LH) IIIB2 (second half of 13th century BC) contexts at Tiryns: the coastal area of the western Mesara, around Aghia Triada, Kommos and Phaistos (Shaw & Shaw 1985).

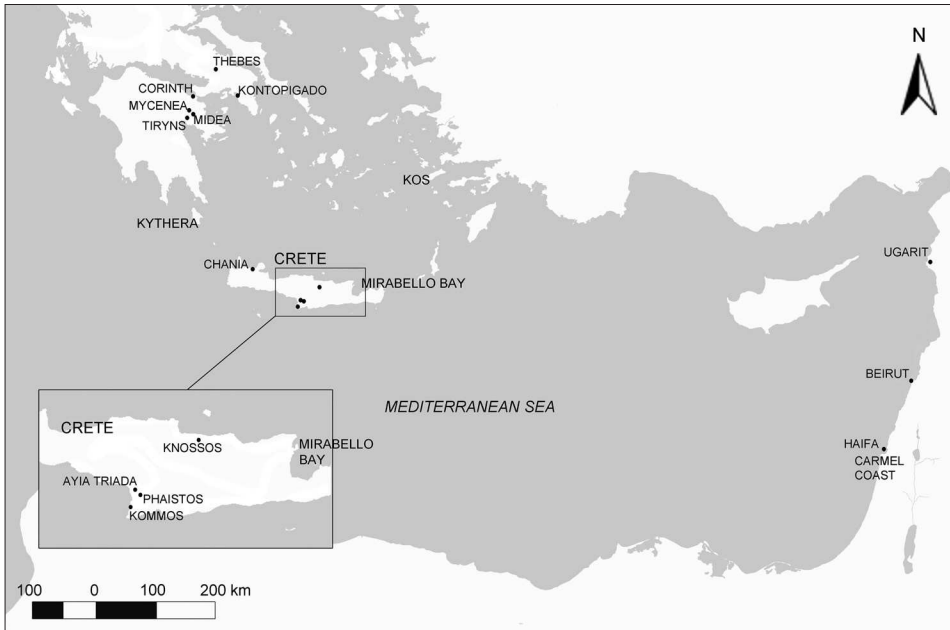


Figure 1. Map with all sites mentioned in the text

Tiryns: citadel of a harbour town

The citadel of Tiryns near the coast of the Argolid Gulf has been labelled the Versailles of the Argolid, on account of its major rebuilding programs (Lauter 1987). It witnessed great prosperity and the impression of a flourishing LBA Aegean centre is based on evidence of close interaction and exchange with the eastern Mediterranean and Crete that seem to reach a peak during the 13th century BC (Maran 2004: 11–30).

To explore these contacts further, in 2013 we initiated a new research project focusing on Maritime Transport Containers (MTCs) and some other related ceramics which, due to their distinct fabric and typology, were assumed to have been imported to Tiryns in the final palatial period (LH IIIB2) (Table 1). The objects identified have been evaluated according to shape, decoration and macroscopic fabric, with a representative sample analysed by thin section petrography in order to identify aspects of raw material choice and manipulation and, where possible, to suggest provenance. Neutron Activation Analysis has also been carried out but will be discussed elsewhere, in the final publication of the project.

This project offers important new information, not least because imported pottery, especially that from Crete, is often considered to be a short-term phenomenon. Yet it is becoming clear that the exchange of such material continued even into the early Post-palatial periods (Late Helladic IIIC) (Table 1) (Maran 2005). This study links analytical samples to a quantitative macroscopic study of transport jars and employs petrographic analyses to accompany chemical investigations of the inscribed and uninscribed TSJs from the site.

Context: the new evidence at Tiryns

During the course of this project, approximately 400 pottery vessels and fragments

Greek mainland/ Crete	Dates BC (after Cline 2010)	Greek mainland	Crete
LH IIIB/LM IIIB	1330/15–1200	LH IIIB1	LM IIIB1
		LH IIIB2	LM IIIB2
LH IIIC/LM IIIC	1200/1190–1075/1050	LH IIIC Early	LM IIIC Early
		LH IIIC Developed	
		LH IIIC Advanced	LM IIIC Late
		LH IIIC Late	Subminoan I

Table 1. Chronological guide to the Late Helladic(LH)/Late Minoan (LM) IIIB–LH/LM IIIC periods. The sequence of LM IIIC is based on D’Agata 2007: 101, table 3

have been recorded. These derive from both the upper and lower citadel and in some cases from the northwestern lower town. Their chronological span ranges from LH IIIB1–LH IIIC Developed, but the bulk of the material dates to LH IIIB2. One of the most crucial contexts, however, derives from recently excavated material in the area of the Western Staircase of the upper citadel (Kardamaki 2015: 80–84). On the northern part of the staircase terrace, debris originating from the LH IIIB2 destruction of the palace was dumped together with many fresco fragments in ‘Zone 2’ (Maran 2012: 152–158; Kardamaki 2015: 80, fig. 1; Maran *et al.* 2015: 90–116). A smaller dump with LH IIIB2 destruction debris was recovered in 1998 in the southern part of the Western Staircase. In both contexts numerous fragments of Cretan TSJs came to light, several fully restorable, some of them inscribed. Also included in the project is the group of ITSJs discovered on the staircase and the upper citadel, some of which have been already analysed by chemistry (OES, AAS [Atomic Absorption Spectroscopy]) but not by thin section petrography (Raison 1968; Sacconi 1974; Catling *et al.* 1980: 49–53, 60–61). The find spots of the TSJs from the Upper Citadel and especially from the dumps in the western staircase and the area outside the west wall known as the *Epichosis* of Verdellis provide evidence for the existence of probably more than one storage area for transport containers, inside a controlled and secured room within the core area of the palace. This stands in contrast to the situation at Mycenae during LH IIIA2 and LH IIIB1, where the storerooms for TSJs were mainly outside the Citadel (Maran 2005).

Cretan MTCs and their imitation

There are essentially two types of Cretan MTCs in the Bronze Age. The most long-lived and perhaps least discussed is the oval-mouthed amphora, which finds currency in the Neopalatial period and has been highlighted as a common import in harbour sites, reflecting the coastal intra-island movement of goods (Day 1991; see also Knapp & Demesticha 2016; Pratt 2016). Rare versions of this shape, with a high and narrow neck, are found at the end of the Bronze Age in Late Minoan (LM) IIIB contexts at Knossos and elsewhere (Hood & De Jong 1958–1959: 186, 189, fig. 5.3, table 45f, left) and are linked to the two examples found at Tiryns (Kardamaki 2015: 88, fig. 6.2).

The classic shape as a specialist container, however, is the coarse TSJ, which emerges in LM I (17th century BC) (Haskell *et al.* 2011: 9–22; Haskell, this volume). Although very much a Cretan shape at first (the jars are found outside Crete only at Akrotiri, Thera), they develop in the LM III period into a widely imitated form

that comprises part of the common set of MTCs within the eastern Mediterranean, alongside Canaanite jars and Cypriot *pithoi* (see also Knapp & Demesticha 2016).

By LH/LM IIIA2 (mid- and late 14th century BC), they are widespread, having been imitated with a variety of surface finishes in the Aegean and beyond. Different production centres have their own versions. For example, Mycenaean Peloponnesian jars tend to have fine clay, and are more globular and dominantly dark-on-light painted; light-on-dark decoration is common at Chania on Crete and Kythera, yet absent in central Crete. Central Crete seems to be the only area that has double-deep wavy line motifs, while the fine-ware TSJs in the newly discovered LH IIIB/LH IIIC Early pottery production centre of Kontopigado in Attica have both dark-on-light versions and others with an all-over paint that fires red/black. In other words, as with many types of MTC, these vessels reveal a general, familiar design, but have their own local versions.

Transport Stirrup Jars and ceramic analysis

TSJs have long attracted interest as a more obvious testimony to the transportation of liquid goods in the Minoan and Mycenaean worlds, especially as some bore Linear B inscriptions, painted before firing. While, rarely, these vessels host Cypro-Minoan signs, incised on the handles after firing (e.g. the Uluburun wreck—Hirschfeld 1992), the pre-fired Linear B specimens suggest that the information recorded or communicated on these containers formed part of a carefully regulated movement of commodities, perhaps linked to palatial oversight in a redistributive economy, or to directed trade between members of Late Bronze Age elites.

This, together with the suspicion that these jars were travelling long distances, and certainly between what we characterise as the ‘Minoan’ and ‘Mycenaean’ worlds, meant that the origins of the jars became a primary target of the emerging field of pottery provenance studies in the early 1960s (Catling *et al.* 1980). To a certain extent, the analysis of the TSJs has mirrored the growing pains of ceramic analysis: for over 30 years it was dominated by developing techniques of chemical analysis, later to be incorporated into a growing acceptance of the potential of thin section petrography to provide more detailed information about the source of these coarse-ware vessels. With certain exceptions (Day *et al.* 2011), this history of analysis, recently summarised in Haskell *et al.* (2011: 23–28), was strongly affected by the rationale of its sampling strategy, even when incorporating petrography.

Sampling involved what we might characterise as four main problems: (1) the lack of macroscopic fabric criteria, (2) the targeted sampling of specific ‘canonical’ TJS shapes, (3) the lack of suitable comparative material and (4) the frequent lack of contextualisation of the jars within their sites of excavation. Taking these in turn, first, it is only in the last 20 years that the macroscopic study of ceramic fabrics has become widespread within the Aegean, with growing confidence in the potential of such observations. Furthermore, while detailed typologies of TSJs (Haskell 1985) suggested regional variation in the form and surface finish, notably in Crete, the concentration of what we might class as ‘canonical’ TSJ forms (FS 164) served to focus sampling on a more restricted range of vessels. More globular forms, often in a finer fabric, that Haskell suggested might comprise mainland Mycenaean products, at times received less attention (Haskell 2011: 21–22, 122). In turn, this led to the third problem, the lack of suitable comparative material. As an example, Riley’s (1981) perceptive petrographic study of TSJs from Mycenae, and even Day’s (1995) re-study of that material, were hampered by a lack of analytical comparatives, other than source material in Crete.

Day and Haskell's (1995) study of Theban jars also relied on left-over chips of samples taken for chemistry, and the lack of detailed knowledge of normal local coarse-ware fabrics for the site made interpretation of fabrics difficult, beyond those well known as west or central Cretan fabrics. Lastly, in some cases, the deposits sampled were not fully contextualised within their host sites, perhaps with specific storerooms represented, at the expense of a site-wide understanding. The latter restriction is relevant to the present study, as indeed is the commonly accepted date for some of these deposits.

With these provisos concerning previous work, the Tiryns study was designed to look afresh at a major Mycenaean site within the context of recent detailed analyses of Bronze Age pottery in the northeast Peloponnese and Attica. While detailed petrographic study of LBA fine- and coarse-ware fabrics at the site is still in progress, a study of transport jars was considered timely, given the appearance at Tiryns of both TSJs and Canaanite jars, which comprised two of the four jar types in the informative study of transport jars from LM I–LM IIIB1 contexts from Kommos, Crete (Day *et al.* 2011).

Another project provided additional information that was incorporated in the present study, namely the analysed pottery from the acropolis overlooking the harbour at Kanakia on Salamina (Marabea 2012) and other sites in the Saronic Gulf (Gilstrap 2014; Gilstrap *et al.* 2016), as well as the pottery production centre of Kontopigado in Attica (Kaza *et al.* 2011). Essentially, these studies stressed the rare occurrence of these containers in Attica and Salamis and only served to accentuate the remarkable presence of transport jars at some of the major palatial centres of the Greek mainland: Thebes, Mycenae and Tiryns (Haskell *et al.* 2011). This fact alone makes the presence of the TSJ with the inscription of *wanakatero* ('house of the king') from Eleusis such a remarkable find in Attica (Petrakis 2014).

The Chania connection: comparison with previous analyses at Tiryns

Previous analytical work at Tiryns has stressed the numbers of west Cretan ITSJs present. The consistency in chemical analysis is mirrored in thin section and it has been argued that relative levels of Ca content (which previously led to this group being split between α and β sub-groups), reflected by the variable presence of micritic calcite and occasional microfossils, might be due to clay mixing (Haskell *et al.* 2011: 82). In the present study, the west Cretan material is also prominent and consistent. However, instead of being, with one exception, the only source of TSJs represented at Tiryns, it is as frequent as central Cretan TSJs. What makes these central Cretan vessels stand out is their petrographic homogeneity, deriving from one source in that region (discussed further below).

The other main petrographic TSJ fabrics identified in this study include pottery from Gournia/Vrokastro on Crete, the eastern Aegean—perhaps Kos (**Fig. 2**), Kythera (**Fig. 3**), Kontopigado-Alimos (**Fig. 4**) and a range of distinctive but non-Cretan, coarse-ware fabrics, probably from mainland centres, including Corinth (**Fig. 5**). Amongst these is a fabric with mudstone breccia (**Fig. 6**), which is familiar from the Neolithic to Early Helladic (EH) periods at Tiryns and Midea. While mudstone is also found in pottery from Nemea and Corinth, the prevalence of this fabric from an early date in the eastern part of the Argive plain, along with characteristic inclusions accompanying it, suggests they are produced near Tiryns. They represent the use of a well-known type (decoration and shape) of TSJ, which had its origin in central Crete, but was adopted as an immediately recognisable MTC that had currency throughout the Aegean world

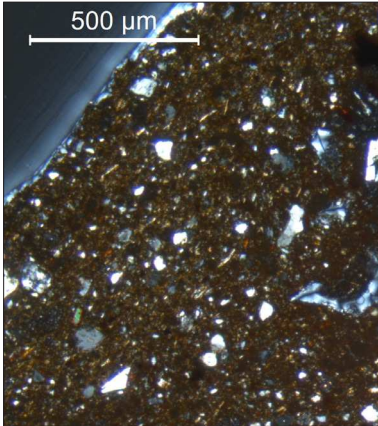


Figure 2. Photomicrograph illustrating volcanic fabric thought to be from Kos, sample T100, XP

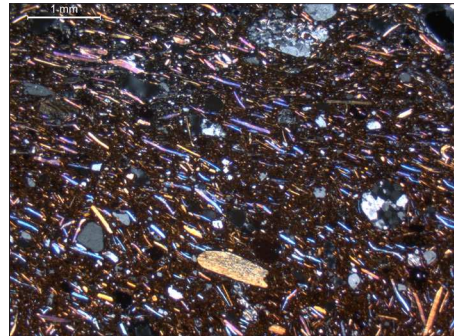


Figure 3. Photomicrograph illustrating metamorphic fabric from Kythera, sample T63 XP

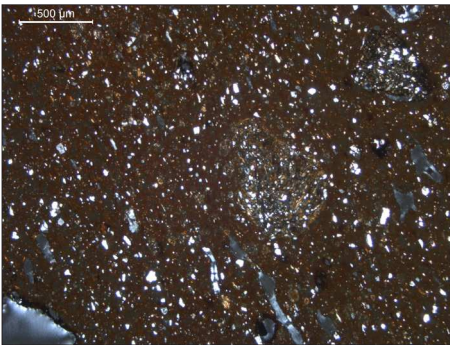


Figure 4. Photomicrograph illustrating fine, micaceous fabric from Kontopigado-Alimos, sample T102 XP

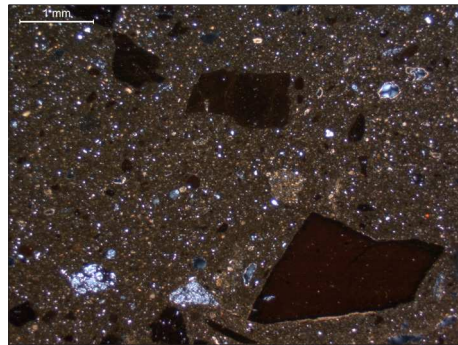


Figure 5. Photomicrograph illustrating characteristic fabric with mudstone from Corinth, sample T74 XP

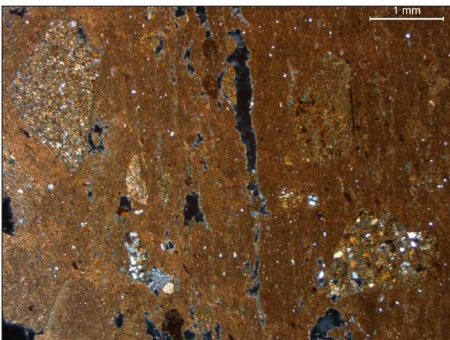


Figure 6. Photomicrograph illustrating characteristic fabric with mudstone breccia, thought to be from the Argive Plain, sample T04 XP

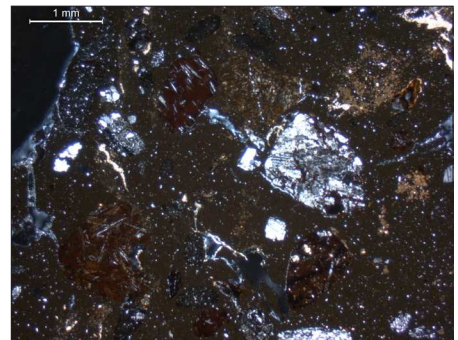


Figure 7. Photomicrograph illustrating characteristic fabric derived from the western Mesara, Crete, sample T11 XP

and, indeed, beyond. It is noticeable that, just as with Canaanite jars, the TSJs varied regionally, with diachronic changes in their distribution patterns.

Polarised production: diachronic change in Cretan TSJ sources

Thin section petrography provides evidence for the confident separation of central Cretan fabrics, sometimes also their place of manufacture, and is now concentrated on discriminating specific sources within previously broad provenance areas. What is striking in the case of this region is the variation in numbers of fabrics in circulation at any one time.

As related in recent studies (Day *et al.* 2011; Haskell *et al.* 2011), those fabrics ascribed a provenance in central Crete dating to LM IIIA–B1 are quite varied, suggesting different sources, some known, such as sand-tempered vessels from the western Mesara (Haskell *et al.* 2011: 58–60, Groups 9, 11), others well characterised but still of uncertain origin within central Crete (e.g. Haskell *et al.* 2011: 52–54, Group 8).

In stark contrast, the central Cretan vessels analysed from LH IIIB2 Tiryns present evidence of only one source, a sand-tempered fabric that is characteristic of the western extreme of the Mesara Plain (Fig. 7). They come from one restricted area, the coast of the western Mesara, matching pottery found in large quantities at the sites of Aghia Triada, Kommos and Phaistos (Buxeda I Garrigos *et al.* 2001; Shaw *et al.* 2001; Belfiore *et al.* 2007; Mentessana *et al.* 2015). The remainder of this paper considers the implications of this finding.

The provenance of the TSJs at Tiryns

Almost all the identified imports at Tiryns are large closed vessels, used as transport containers; other imports, such as small drinking vessels, are rare. By far the most frequently identified shape belongs to coarse-ware TSJs (264 pieces). Most of them belong to the large type (FS 164), whereas medium and small sized coarse stirrup jars are infrequent (see also Maran 2005). The deposits we examined, therefore, probably include material from specific storage areas of the Upper Citadel and palace.

Approximately one third of the identified coarse TSJs have been sampled (92 out of 264 total). On the grounds of macroscopic fabric and typology, imports from Chania in west Crete are dominant but imports from the western Mesara occur also in large numbers at Tiryns (from the total of 264 fragments and vessels, 97 vessels/fragments come from west Crete and 62 vessels/fragments from the western Mesara). The high number of western Mesara products in Tiryns is of particular interest for several reasons. First, the import of TSJs from west Crete was considered to have dominated those from central Crete, and previous analyses from Tiryns suggested that the majority of TSJs was manufactured in Chania (Haskell 1999: 341; Haskell *et al.* 2011). Secondly, most TSJs from the western Mesara have been discovered in LH IIIB2 contexts at Tiryns. However, the evidence from Kommos, the harbour town of the western Mesara where large amounts of transport containers have been excavated, suggests that the peak of TSJs came during LM IIIA2 and LM IIIB1 (Watrous 1992; Rutter 2005; Day *et al.* 2011: 512).

The western Mesara as a central Cretan source at Tiryns

The fabric of these south-central Cretan TSJs from Tiryns matches perfectly with that

identified in previous studies (Day *et al.* 2011, Fabric A; Haskell *et al.* 2011: Fabric 10). Macroscopically, the samples of this petrographic fabric were classified in a number of subgroups which, however, all have dark-on-light decoration.

Overall, the majority of the western Mesara pieces come from the LH IIIB2 destruction deposit (Figs 8.1–7, 9.1, 3). One TSJ comes from a LH IIIB–IIIC Early context (Fig. 9.2) and one piece was found within LH IIIC layers. Finally, the TSJs of western Mesara provenance tend to be more frequent in the area of the palace in the upper citadel than in the lower citadel.

The central Cretan TSJs seem to vary in quality. One group contains vessels with elaborate decoration, a careful finish and a thick slip, some with deep wavy bands characteristic of the region, others carefully finished with more elaborate decoration. The vessels have a thick slip with traces of burnishing on their surface. Their red or dark brown paint is almost always lustrous. Certain of these macroscopic observations are characteristic of the Mesara, especially thick creamy slips and the visibility of the sand inclusions on the surface.

In terms of shape and decoration, the majority of the sherds and vessels belonging to the western Mesara petrographic group find good parallels in central Crete and more particularly at Kommos. The best preserved TSJs from Tiryns have ovoid shapes, tall necks and spouts, displayed and flat bases (see also Ben Shlomo *et al.* 2011: 332, fig. 2a; Haskell *et al.* 2011). In many examples, there is a characteristic thickening at the join of the base section to the body, a product of having been thrown in sections.

Three different sizes have been identified. Large and medium-large vessels are common whereas the small stirrup jar is so far represented by only one example (Fig. 8.6). Good parallels for large and medium large vessels come from Kommos (Watrous 1992: 193), but small, coarse stirrup jars are unusual elsewhere. Finally, the western Mesara TSJs from Tiryns fit well into Haskell's Group B, which includes bulgier vessels with a shorter neck as compared to the TSJs from Chania (Haskell *et al.* 2011: 20, fig. 2.28).

Almost all western Mesara vessels from Tiryns have patterned decoration. The pieces with elaborate decoration show floral motifs, e.g. papyrus, arcs and semicircles (Figs 8.1, 9.1–2), thus reflecting earlier material dated to LM IIIA2 from Kommos and Knossos (Watrous 1992: 87, pl. 37.1509), where stirrup jars and other coarse vessels carry such decoration (Watrous 1992: 43, pls 17.744; 25.1030; 33.1355; see also Ben Shlomo *et al.* 2011: 332, fig. 2, TAH 23). On the mainland, such decoration is rare at Mycenae, but it appears in Thebes (Haskell *et al.* 2011: fig. 16, TH 74). The remaining pieces have unusual decoration (Fig. 8.4) or wavy lines (Fig. 8.3, 7). The latter together with simple linear decoration is the most frequent on TSJs from Kommos during LM IIIB (Watrous 1992: 135–136, 143; Haskell *et al.* 2011: 10). One vessel from the *Epichosis* of Verdelis has double deep wavy bands (Rutter 2006: 545, pl. 3.71, 60/14 [LM IIIB]) and displayed octopus body (Fig. 8.2); it has parallels with TSJs from Thebes and Kommos (Haskell 2011: 17 illustration 2.21; 20 illustration 2.28 [group B]). It is not clear whether a well preserved TSJ from the western staircase has curved stripes (cf. Watrous 1992: 88, pl. 39.1527 [LM IIIB]) or a Linear B-sign between its deep wavy bands (Fig. 8.3).

Of particular interest, however, is the fragment with a thickening on its lower body that can be securely identified as coming from a western Mesara ITSJ; it was found in a secure LH IIIB2 context in the western staircase (Fig. 8.5). The Linear B sign is set among deep wavy lines. ITSJs are much rarer in central Crete than Chania but there are LM IIIB ITSJs from Knossos and Malia (Driessen & Farnoux 1991: 71–97; Day & Jones 1991: 94–97; Haskell *et al.* 2011: 121; Driessen *et al.* 2015: 59–74), and it has to

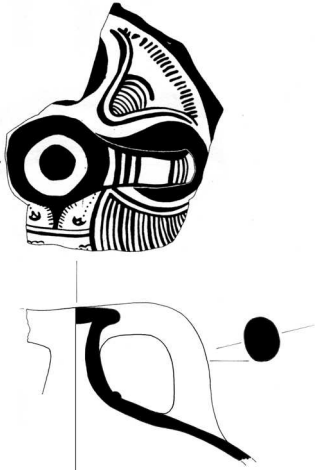


Figure 8.1. TSJ from the Epichosis of Verdalis, Upper Citadel of Tiryns

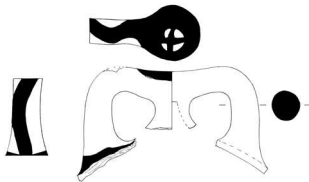


Figure 8.3. TSJ from the Western Staircase, Upper Citadel of Tiryns

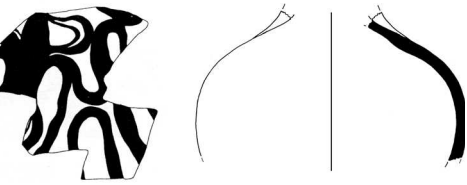


Figure 8.2. TSJ from the Epichosis of Verdalis, Upper Citadel of Tiryns

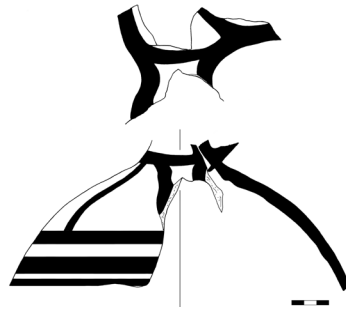


Figure 8.4. TSJ from the Western Staircase, Upper Citadel of Tiryns

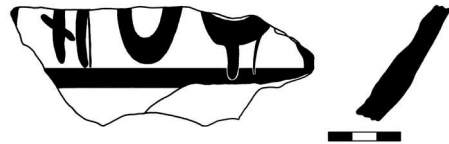


Figure 8.5. TSJ from the Western Staircase, Upper Citadel of Tiryns

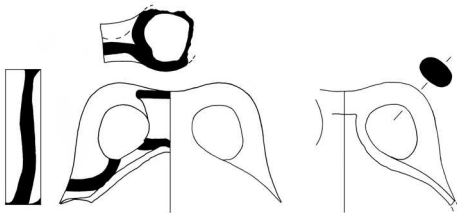


Figure 8.6. TSJ from the Epichosis of Verdalis, Upper Citadel of Tiryns

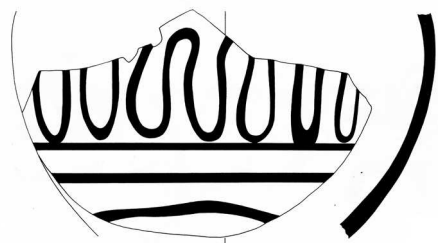


Figure 8.7. TSJ from the Lower Citadel of Tiryns (after Podzuweit 2007: table 92.6)



Figure 9. TSJs from the Lower Citadel of Tiryns

be stressed that the majority of the ITSJs from Mycenae during LH IIIB1 derive from central Crete (Haskell *et al.* 2011: table 27). Notably, two ITSJs from Malia have been assigned to central Crete, one on the grounds of chemical analysis only (Day & Jones 1991: ISJ2) and the other by thin section petrography (Driessen *et al.* 2015: 33, MA Z4). Moreover, the latter is suggested to be a south-central Cretan product (but not from the western Mesara). This placement of a Linear B sign on the lower part of the body among wavy lines, as seen on the vessel from Tiryns, is otherwise very rarely attested, since the central Cretan ITSJs have signs mainly on the shoulder (Haskell 2011: 21; see also Haskell *et al.* 2011: fig. 13, TH25; Driessen *et al.* 2015: 39, fig. 7). On the LM IIIB Early ITSJ from Malia (MA Z4), ascribed by Knappett to south-central Crete, Linear B signs are painted on the shoulder, whereas the body of the vase is decorated with deep wavy lines (Driessen *et al.* 2015: 39, fig. 9, 40, fig. 10). A similar arrangement of Linear B signs among wavy lines, like that from Tiryns, has been observed also in Midea (Demakopoulou 2009: 257, fig. 5γ) and may reflect a later development.

In this respect, the three ITSJs from Thebes (TH30–TH32) that date to LH IIIB1 and bear signs on the body of the vessel between the deep wavy bands, gain importance. These were thought to represent a closed group of ITSJs that bore illiterate inscriptions placed at an unusual part of the vessel (cf. now Killen 2011: 96, fig. 8.1, 101). The example analysed (TH Z867) is in the distinctive chert and serpentine fabric (Haskell *et al.* 2011: Fabric 8) that has been assigned to central Crete, but is distinctly different from the western Mesara fabric (Haskell *et al.* 2011: Fabric 11). The new ITSJ from Tiryns (Fig. 8.5) further supports the existence of an independent inscribing tradition that was located in south-central Crete. Those who inscribed these vessels from south-central Crete were marking them in a distinct way (between the deep wavy bands), separate from the inscription style in western Crete.

The western Mesara TSJs in Tiryns: chronological and political implications

The new TSJ material from Tiryns assigned a western Mesaran provenance is of great importance as it reveals aspects of that region of Crete almost entirely unknown before. Most TSJs assigned to this area are found in LH IIIB2 contexts, considered as a period when exports from that region had ceased. Indeed, the western Mesara is the only central Cretan source determined for these later deposits.

Amongst these TSJs, those with deep wavy lines have good parallels in LM IIIB2 contexts at Kommos (Watrous 1992; Rutter 2006; Day *et al.* 2011). More difficult to interpret are the TSJs with elaborate decoration that reflect a LM IIIA2–LM IIIB1 tradition (Figs 8.1–2, 9.1–2). For the former, their early appearance may suggest that they are of earlier manufacture and circulated over a long period of time before their final deposition (Haskell 2005). Another possibility is that they are early vessels that were kept in Tiryns for a long time. This cannot be excluded, since some TSJs either appear in LH IIIB1 contexts or occur in secondary dumps (Fig. 8.1–2, 6), e.g. at the *Epichosis* of Verdelis (dump outside west wall of the Upper Citadel), which included also earlier LH IIIA2 and LH IIIB1 material (Voigtländer 2003). One argument against the latter possibility has been put forward for the TSJs and Cretan short-necked amphora found in LH IIIC Early contexts of the Northwestern Lower Town (Maran 2005: 422, fig. 3). Due to their good state of preservation, it has been argued that they could hardly have survived the destructions of LH IIIB2 intact (Stockhammer 2008: 279). A similar situation with destructions and large-scale rebuilding took place in the mid-13th century BC (Podzuweit 2007), thus making the preservation of these vessels over a long period of time in Tiryns unlikely. Hence, the best explanation at present is that the TSJs with the floral motifs and arcs occurring in the LH IIIB2 contexts of Tiryns were either (1) late products of the western Mesara workshops that imitated earlier pottery traditions, or else (2) they reached Tiryns indirectly from Crete after being in use and circulation in other areas for a long period. In this respect, it has already been demonstrated that the TSJs from south-central Crete were exported on a large scale and were involved in long distance trade with the Aegean, the Levant and Cyprus (see Leonard 1994; Day 1999; Ben Shlomo *et al.* 2010).

The western Mesara in LM IIIB2

The case of the inscribed TSJ from the western Mesara (Fig. 8.5) also deserves close consideration, but is relevant to a more general discussion concerning the political situation during LM IIIB2, not only in the western Mesara but also more widely in Crete. At this juncture it is worth stressing that a plausible differentiation between LM IIIB1 and LM IIIB2 in terms of pottery sequence is well founded only in Chania (Pålsson Hallager 2003; Rutter 2006). This situation may in fact be part of the problem when attempting to reconstruct the political map of the island, as it is difficult to assess with certainty the durability of the regional LM IIIB1 styles (Pålsson Hallager 2005) or, indeed, their specificity to individual workshops.

The next problem is no less serious, as it is associated with the outstanding problem of the chronology of the Linear B tablets from Knossos. For those who follow the high chronology of the Knossos archive and the destruction of the Palace in LM IIIA2 (ca 1350 BC), the emergence of political entities in Kommos, Ayia Triada and Malia follow as a logical result. The monumental buildings in the western Mesara during LM IIIA2 and the ITSJs in Malia during LM IIIB Early gain additional significance in this light. Privitera (2011: 271–272), who has recently discussed this, suggested that Casa VAP was probably the house of a collector with close relations to the Knossian aristocracy. From another viewpoint, Bennet (1992: 91) has identified Kommos and Ayia Triada as second-order sites under the administration of Knossos. Because of the large amount of west Cretan TSJs in Tiryns and Thebes, and the fact that the majority of ITSJs derive from west Crete, it has been long assumed that Chania had a distinctive administrative role in the collection and export of goods from Crete to the mainland during LH IIIB (Haskell 2005; Stockhammer 2008: 277). Such a contention might be

supported by the suggestion of a west Cretan origin of a clay stopper found in a LH III B1 TSJ from central Crete in Mycenae, but it would be ill advised to base such a complex interpretation on one chemical analysis of an object that is not a canonical vessel (Tomlinson & Day 1995: 317, table 32).

With regard to Kommos, it has been suggested that the harbour town was under direct Knossian administration during LH II–LH IIIA2 (15th–14th centuries BC) (Shaw 2006: 874; Tomlinson & Rutter 2010: 194). During LM IIIB, however, the situation is likely to have changed. Given the major architectural rebuildings in Kommos and Ayia Triada, with new structures of an indigenous character without real predecessors in Minoan architecture, a Mycenaean elite may have been present in both centres during LM IIIB1, in a region that kept at least some of its local cultural traits (D'Agata 2005: 114; Burke 2005; Shaw 2006: 874; Privitera 2011: 263–267). Indeed it has been argued that, at the time of its final abandonment at the end of LM III (without clear signs of destruction), Ayia Triada had emerged as a citadel (Hayden 1987; La Rosa 1997; Privitera 2011: 26).

That Kommos had external contacts with Kythera and the mainland, even up to the beginning of the 12th century BC, is well demonstrated by a LH IIIC mainland import, a small TSJ discovered in the latest layers of the site. Its exact origin is unknown but it is very probably from the mainland (Rutter 2005; Tomlinson & Rutter 2010: 217). Another deep bowl from Kommos coming from the northeast Peloponnese may also date to LH IIIB2. In addition, a *pithos* from Kythera found at the same site and similar pieces from Ayia Triada have been suggested to indicate the connection between Kommos/Ayia Triada and Kythera/the southern Peloponnese (Rutter 2005; D'Agata 2005). In this respect it is interesting to note that a relatively large group of TSJs with light on dark decoration found in LH IIIB2 layers from Tiryns originate from Kythera.

The identification of an inscribed TSJ from the western Mesara, the first ITSJ assigned petrographically to this region, could possibly reflect shifts of power in central Crete and the existence of an autonomous administrative centre in the region of the western Mesara that interacted with the Mycenaean palace of Tiryns during LH IIIB2. In this respect it is worth noting that the LH IIIB2 TSJs found in a homogeneous shipment on the Point Iria wreck are from central Crete (Day 1999; Lolos 1999), while in Mycenae there are several TSJs from central Crete that appear within LH IIIB2 contexts in the Citadel House area (Haskell *et al.* 2011: 130–131).

At the end of LM IIIB2, a reoccupation is observed both in Ayia Triada and Phaistos, the district referred to as *paito* in the Linear B tablets of Knossos (La Rosa 1985: 544; Bennet 1985: 247; 1992: 97; Privitera 2011: 265), and also in Kommos (Borgna 2003: 316–322; Shaw 2006: table 5.1). As Phaistos seems not to have been occupied during LM IIIA2 and LM IIIB Early, Ayia Triada could have been the most important site of the *paito* district (for Kommos or Ayia Triada as *dawo*, see Shaw 2006: 874; for Ayia Triada as *dawo* see Chadwick 1976: 52–54; Bennet 1985: 247; on the gradual abandonment of Ayia Triada in the course of LM IIIB see La Rosa 1997: 264–266; Cucuzza 1997: 75). Hence the possibility cannot be ruled out that these sites once again established contacts with the Greek mainland even into the period that followed the destructions of the palaces, as a number of TSJs from Tiryns found within LH IIIC contexts (Maran 2005) are of western Mesaran provenance.

Inscribed jars and the role of maritime shipments of TSJs

The fact that almost all TSJs from Tiryns derive from western Crete and the western

Mesara may indicate that, during the final palatial period, Ayia Triada and Phaistos, perhaps especially the former, represented (next to Chania) an autonomous polity that was in close interaction with the mainland and in particular with Tiryns. The new evidence from the inscribed TSJ could support this hypothesis. It also suggests that the practice of inscribing these commodities did not vanish after LH IIIB1 (*contra* Catling *et al.* 1980; Haskell 2005), but continued well into the 13th century BC, until the destruction of Tiryns at the end of LH IIIB2 and the collapse of the palatial system on the mainland. Indeed, Pakkanen (2014: 272–274) suggests a new dating of some ITSJs from Tiryns to LH IIIB2.

Of course, such discussions depend on what is projected as the reason for inscribing these jars with information such as place names, personal names and collectors. The suggestions are many and varied. Driessen *et al.* (2015) suggest that ITSJs were *ksenia*, gifts as reminders of a visit, but this seems not to account for the variation in patterns of distribution over space and time. Eder and Jung (2015: 117) have argued that ITSJs are in essence ‘forgery proof’ within the frame of administrative and economic processes at an interregional level; that may indeed be the case. Maran (2005) has suggested that they should be viewed as official vessels identifying tribute, something that has been discussed at length (Zurbach 2006; van Alfen 2008). In this context, Duhoux’s (1985) suggestion that the ITSJs reflect gifts to Mycenaean officials is not incompatible with Maran’s view, although it seems more likely that the effort of inscribing in this manner was part of a carefully planned transaction of obligation. We prefer the interpretation that such vessels represent tribute to the palaces and, in this light, it is no surprise that this practice continued until the end of LH IIIB2. It also adds to the interesting point that such imported vessels in late contexts came only from the two major coastal centres of west and central Crete, Chania and the western Mesara.

Directed shipments after LH IIIB1: reconsidering the date of ITSJs and TSJs at Tiryns

We would argue not only that the shipment of TSJs and ITSJs from Chania did not decrease after LH IIIB1, but also that similar activities were undertaken in the western Mesara. One crucial aspect of this argument is that the recipients may have changed, and that the role of Tiryns (according to the data published so far) as the dominant centre receiving these goods was significant. Of course, similar TSJs from late contexts have been recovered from Midea (Demakopoulou 2009) and are currently being analysed as part of our analytical program.

In this respect, the contexts of the group of the ITSJs from the upper citadel of Tiryns (Raison 1968; Sacconi 1974) are here re-evaluated. This is a significant group, comprising more than 40 ITSJs. Moreover, on another ITSJ discovered directly outside the citadel, the inscription contains the word *wanakatero* (‘house of the king’) (Sacconi 1974). Together with the ITSJs from Thebes and Mycenae, these have been put forward as a homogenous group produced in Chania (Catling *et al.* 1980; Haskell *et al.* 2011; Jones 2011). Their presence was taken to highlight the dominant administrative role of western Crete during LM IIIB Early, which interacted closely with the Mycenaean palaces. Furthermore, the peak of the ITSJs was placed in LH IIIB1 (Catling *et al.* 1980: 103; Zurbach 2006; Haskell *et al.* 2011: 119; Killen 2011: 107; Petrakis 2014: 207–211) and was often connected with a central Knossian administration in Crete (Bennet 1985: 248–249). This position was also underlined by the large amount of fine Mycenaean pottery imports from the mainland to Chania during the early 13th century BC (Pålsson Hallager 2003, 2005: 278–284; 2011). A closer look at the contexts of the ITSJs

from Tiryns, however, does not permit their secure dating in LH IIIB1, the period during which this phenomenon supposedly reached a peak (Catling *et al.* 1980; Killen 2011: 107). Rather, their find contexts were in general later in LH IIIB. Most of these vessels were discovered in the course of the early excavations and their exact location sometimes ranged between two find spots (Rodenwaldt 1912: 3, 67; Müller 1913: 90; Raison 1968: 157). Several were found in the fill of a chamber in the southern part of the citadel ('L') together with fresco fragments, while others were discovered in the fresco dump of the western staircase. Their early dating was based on the stylistic grounds of the frescos and often on epigraphic grounds, perhaps unjustifiably (see also Catling *et al.* 1980).

In the case of the locus 'L', Rodenwaldt (1912: 3) assumed that the frescos belonged to the early style of the palace. Recent evaluation of the pottery from the remaining fresco dump from the western staircase (see above), however, assigned the frescos to the final phase of the palace and the dating of the pottery to LH IIIB2 (Maran *et al.* 2015; Kardamaki 2013, 2015). This important new evidence from Tiryns suggests that directly after the destruction of the palace at the end of LH IIIB2, large dumps resulting from cleaning activities were deposited around the upper citadel and outside the west wall in the course of rebuilding and levelling activities for the construction of the LH IIIC Early Building T at the location of the palatial Throne room (Maran 2012; Kardamaki 2013). The fresco dump deposited on the western staircase in which the new ITSJ and some of the old ITSJs were found is now securely dated in LH IIIB2 (Maran *et al.* 2015). The same may be true for the second deposit in the southern part of the upper citadel which, according to the description, closely resembles the LH IIIB2 dumps recovered elsewhere on the upper palace. Hence, at least the find contexts of the ITSJs from Tiryns are not LH IIIB Early, or generally LH IIIB (Catling *et al.* 1980), as has been accepted so far, but LH IIIB2 Late (also Pakkanen 2014: 272–274). Additional evidence for the shipping of ITSJs during LH IIIB2 is offered by the material in Midea, where at least two such vases were discovered and are almost fully preserved (Walberg 1998: pl. 87.650; Demakopoulou 2009: 257, fig. 5δ), while one ITSJ with a Linear B sign dated to a LH IIIC Early context is known from Mycenae (Raison 1968: MY Z713; French 2011: 485–486).

Discussion

We hope to have shown that a structured study of LBA MTCs, in this case TSJs and Canaanite jars, within an integrated analytical program, offers so much more than the tracing of interconnections between different sites and cultural contexts. Its implications here are argued to be substantial in terms of the relations between Crete and the Mycenaean world during LH IIIB2 and, indeed, for our understanding of the political and economic structure of Crete at that time.

To summarise our results: 66% of the 264 TSJs from Tiryns were found to originate from only two centres in Crete, Chania and the western end of the Mesara plain, roughly in even proportions between the two. Only one other Cretan TSJ was identified, which originated in the Gulf of Mirabello in eastern Crete. All other jars were ascribed a provenance in the Peloponnese, Attica, Kos (?) and Kythera.

Both Chania and the western Mesara triangle of Kommos–Aghia Triada–Phaistos produced TSJs that were inscribed pre-firing in Linear B. In addition, it is important to note that the majority of the TSJs examined at Tiryns date to LH IIIB2, with only a

few of later date. In other words, they post-date the destruction of Knossos, whatever the timing posited for that event. The selective import of pottery from a single source in central Crete during this late period is especially notable, when one considers the existence of other central Cretan fabrics in TSJs of the preceding phases (Haskell *et al.* 2011).

In this respect, the shipment of the TSJs to the Greek mainland and the new evidence from Tiryns may even reflect new political and social formations after the destruction of the palace of Knossos and a new strategy by the Mycenaean palaces concerning the Cretan centres, which at that time may have been vassal states. This strategy may have involved the exploitation of specific regions (west and south central Crete). There is a strong probability that wide distribution *per se* of the TSJs and ITSJs during LH IIIB is not accidental but coincides with the establishment of an administrative relationship between the Mycenaean palaces and Crete during this period (see also Pratt 2016).

In this case, the date not only of the context but also of the production of the jars themselves is of importance. We have highlighted in detail aspects suggesting that the majority of these vessels are LH IIIB2 in date. There are a number of sources of evidence beyond the typological that argue this point. The first is mentioned in the preceding paragraph: the restriction to one source in the Tiryns material compares to multiple fabrics in central Crete in material dated to LM IIIA2–IIIB1 and stands in stark contrast to the evidence of the fabrics from the start of the LBA in that area. Secondly, we have suggested the re-dating of the very important group of the ITSJs from Tiryns, often considered to be LH IIIB1 and which have formed a key part of most arguments about Creto-Mycenaean relations. Thirdly, the jar identified as coming from the Gulf of Mirabello in east Crete is identical to one found in Kontopigado, Alimos (Attica) in a LH IIIB–IIIC Early context and comprises a fabric which is chronologically very specific to LM IIIB late–IIIC (Dalinghaus 1999).

Finally, it is important to consider briefly our analytical results from another aspect of this study, to be published elsewhere: the Canaanite jars from the same contexts. The range of fabrics identified contrast with those from LM IIIA2–IIIB1 Kommos (Day *et al.* 2011), which notably included characteristic fabrics from the Syrian coast around Ugarit. These are absent in the Tiryns material and instead most examples derive from the Carmel coast and present-day Lebanon. This may reflect something more than an accidental case and may be linked to the famous embargo raised by the Hittite kings on the Assyrians that prohibited *Ahhijawa* ships from using the harbours of Amurru (Kühne & Otten 1971; Jung 2006) during the second part of the 13th century BC. The absence of fabrics from the region around Ugarit coincides with the appearance at Tiryns of jar fabrics from the Levantine coast that become common in the Iron Age (Gilboa *et al.* 2015), with production dominant around the city of Tyre.

The particular identification of Kommos, Aghia Triada or Phaistos as a centre sending these jars matters little. Not only are they in analytical terms a single ceramic resource area, but they also form components of the same regional structure. In other words, whether one puts emphasis on the LM IIIB2 deposits, which do exist at Kommos, is irrelevant. What is clear is that in this late phase, the western Mesara, together with Chania, are the two key centres where shipments bound for the Argolid and the port town of Tiryns originated.

This reveals a new picture of the inter-Aegean relations and demonstrates that the decrease in the import of mainland fine ware pottery to Crete does not reflect an interruption in the connection between the two regions. Rather, perhaps we should turn to other developments and more specifically to the destruction of the Berbati workshop in Mycenae that was producing fine wares for export in the eastern

Mediterranean (Jung 2015). Chania continued to export to the mainland—and most specifically to Tiryns—not only TSJs but also ITSJs, and it was most probably not the only centre that did so. ITSJs from the western Mesara are rarer than these from Chania, but together with the rest of the containers from that region they reveal the systematic and continuing connections with the Argolid during the final phase of the Mycenaean palaces (for ITSJs from Chania in LM IIIB2 contexts, see Hallager 2003: 274–275; 2011: 424).

Conclusions

We would do well to contextualise these patterns within the maritime movement of goods at this time between the central and eastern Mediterranean. Beyond their role in connections with the Mycenaean world, it is clear that the ports of Chania and the coastal Mesara were pivotal to shipping, linking regions as far flung as Sardinia and the Levantine coast. Indeed, Mountjoy (2011) has emphasised the role that Crete played in fine ware Mycenaean style pottery production on Cyprus at this time.

The large numbers of Cretan jars found at Tiryns (with only one exception) come from two ports, both of which are situated near important centres of population and rich agricultural production. They are involved in a system that is overseen or recorded by the literate, planned administration of taxes/tribute to the palaces. They appear, in essence, to represent good evidence for directed shipments from Crete to Tiryns and the other major centres of the Argolid before the final destruction of the palaces. The large number of the LH IIIB2 TSJs and ITSJs in Tiryns may underline further the significant role of the site during that period, not only as a port but in general as an economic and political centre.

In terms of our interests in TSJs, this demonstrates that the appearance of the same shape in different locations and at different times may have very different implications. Clearly the movement in LH IIIA–IIIB1 of jars from many centres might reflect more varied modes of exchange; equally the re-used vessels originally from a variety of sources on board the Uluburun ship is very different from the directed pattern we see in LH IIIB2 Tiryns.

With the social and political contexts of LH/LM IIIB2 Crete and the Greek mainland in mind, on the basis of this study and other evidence, we would suggest that Chania and the western Mesara served as two centres of power in Crete that formed part of the economic organisation related to the palaces in the Argolid and that existed until the end of LH IIIB2, when the Mainland palaces and their administrative system were destroyed. Amongst the myriad ways in which maritime ceramic containers can circulate, the evidence from LH IIIB2 Tiryns would seem to indicate directed, targeted shipments. This has important implications for the relationships and obligations between the two areas, perhaps materialised at least in part through the movement of commodities as tribute.

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Bibliography

- Belfiore, C., P.M. Day, A. Hein, V. Kilikoglou, V. La Rosa, P. Mazzoleni & A. Pezzino 2007: Petrographic and chemical characterisation of pottery production of the Late Minoan I kiln at Haghia Triada, Crete, *Archaeometry* 49, 621–653
- Ben-Shlomo, D., E. Nodarou & J.B. Rutter 2011: Transport Stirrup Jars from the southern Levant: new light on commodity exchange in the eastern Mediterranean, *Hesperia* 115, 329–353
- Bennet, J. 1985: The structure of the Linear B administration at Knossos, *American Journal of Archaeology* 89, 231–249
- Bennet, J. 1992: 'Collectors' or 'owners'? An examination of their possible functions within the palatial economy of LM III Crete, in J.P. Olivier (ed), *Mykenaiika (Bulletin de Correspondence Hellénique, Supplément 25)*, 65–101, Paris
- Borgna, E. 2003: *Il complesso di ceramica tardominoica III dell'Acropoli mediana di Festòs (Studi di Archeologia Cretese 3)*, Padova
- Burke, B.B. 2005: Materialization of Mycenaean ideology and the Ayia Triada sarcophagus, *American Journal of Archaeology* 109, 403–422
- Buxeda I Garrigos, J., V. Kilikoglou & P.M. Day 2001: Chemical and mineralogical alteration of ceramics from a Late Bronze Age kiln at Kommos, Crete: the effect on the formation of a reference group, *Archaeometry* 43, 349–371
- Catling, H.W., J.F. Cherry, R.E. Jones & J.T. Killen 1980: The Linear B inscribed stirrup jars and west Crete, *Annual of the British School at Athens* 75, 49–113
- Chadwick, J. 1976: *The Mycenaean World*, Cambridge
- Cline, E.H. (ed) 2010: *The Oxford Handbook of the Bronze Age Aegean*, Oxford
- Cucuzza, N. 1997: The North Sector buildings of Haghia Triada, in J. Driessen & A. Farnoux (eds), *La Crète mycénienne (Bulletin de Correspondence Hellénique, Supplément 30)*, 73–84, Paris
- D'Agata, A.-L. 2005: Central southern Crete and its relations with the Greek mainland in the post-palatial period, in A.L. D'Agata, J. Moody & E. Williams (eds), *Ariadne's*

- Threads. Connections between Crete and the Greek Mainland in Late Minoan III (LM IIIA2 to LM IIIC)*, 109–130, Athens
- D'Agata, A.-L. 2007: Evolutionary paradigms and Late Minoan III. On a definition of LM IIIC Middle, in S. Deger-Jalkotzy & M. Zavadil (eds), *LH IIIC Chronology and Synchronisms II: LH IIIC Middle (Österreichische Akademie der Wissenschaften, Philosophisch-historische Klasse, Denkschriften 362)*, 89–118, Wien
- Dalinghaus, M.L. 1999: The Vrokastro and Ziros Type Fabric Series: A Petrographic Study and Re-evaluation, Unpublished PhD Thesis, University of Sheffield
- Day, P.M. 1991: A Petrographic Approach to the Study of Pottery in Neopalatial East Crete, Unpublished PhD Thesis, University of Cambridge
- Day, P.M. 1995: Petrographic analysis of transport stirrup jars from the House of the Oil Merchant, Mycenae, in I. Tournavitou, *The Ivory Houses at Mycenae (British School at Athens Supplementary Volume 24)*, 309–316, London
- Day, P.M. 1999: Petrographic analysis of ceramics from the shipwreck at Point Iria, in W. Phelps, Y. Lolos & Y. Vichos (eds), *The Point Iria Wreck: Interconnections in the Mediterranean ca. 1200 BC (Hellenic Institute of Marine Archaeology)*, 59–75, Athens
- Day, P.M. 2011: Petrographic analyses, in H.W. Haskell, R.E. Jones, P.M. Day & J.T. Killen, *Transport Stirrup Jars of the Bronze Age Aegean and East Mediterranean (Prehistory Monographs 33)*, 41–78, Philadelphia
- Day, P.M. & H.W. Haskell 1995: Transport stirrup jars from Thebes as evidence for production in Late Bronze Age Greece, in C. Gillis, C. Risberg & B. Sjöberg (eds), *Trade and Production in Premonetary Greece: Aspects of Trade (SIMA 134)*, 87–109, Göteborg
- Day, P.M. & R.E. Jones 1991: Petrographic and chemical analysis of inscribed and other stirrup jars from Malia, in A. Farnoux & J. Driessen, *Inscriptions peintes en linéaire B à Malia (Bulletin de Correspondence Hellénique, Supplément 115)*, 94–97, Paris
- Day, P.M., P.S. Quinn, J.B. Rutter & V. Kilikoglou 2011: A world of goods: transport jars and commodity exchange at the Late Bronze Age harbor of Kommos, Crete, *Hesperia* 80, 511–558
- Demakopoulou, K. 2009: Οι αποθηκευτικοί ψευδόστομοι αμφορείς της Μιδέας. Νέα στοιχεία για τις σχέσεις Κρήτης και Αργολίδας κατά τον 13ο αι. π.Χ., in D. Daniilidou (ed), *ΔΩΠΟΝ. Τιμητικός τόμος για τον καθηγητή Σ. Ιακωβίδη (Σειρά Μονογραφιών 6)* 243–259, Athens
- Driessen, J. & A. Farnoux 1991: Inscriptions peintes en linéaire B à Malia, in A. Farnoux & J. Driessen, *Inscriptions peintes en linéaire B à Malia (Bulletin de Correspondence Hellénique, Supplément 115)*, 71–94, Paris
- Driessen, J., A. Farnoux & C. Langohr 2015: Two more Linear B inscribed stirrup jars from Malia, in D. Panagiotopoulos, I. Kaiser & O. Kouka (eds), *Ein Minoer im Exil: Festschrift für Wolf-Dietrich Niemeier (Universitätsforschungen zur prähistorischen Archäologie 270)*, 59–74, Bonn
- Eder, B. & R. Jung 2015: ›Unus pro omnibus, omnes pro uno‹: the Mycenaean palace system, in J. Weilhartner & F. Ruppenstein (eds), *Tradition and Innovation in the Mycenaean Palatial Polities (Österreichische Akademie der Wissenschaften, Philosophisch-historische Klasse, Denkschriften 487, Mykenische Studien 34)*, 113–140, Wien
- French, E.B. 2011: *The Postpalatial Levels (Well Built Mycenae 16/17)*, Oxford
- Gilstrap, W.D. 2014: Indirect evidence for pottery production on the island of Aegina

- during the transitional LH IIIB–LH IIIC Early period, in V. Kassianidou & M. Dikomitou-Eliadou (eds), *The Narnia Project: Integrating Approaches to Ancient Material Studies*, 32–41, Nicosia
- Gilstrap, W.D., P.M. Day & V. Kilikoglou 2016: Pottery production at two neighbouring centres in the Late Bronze Age Saronic Gulf: historical contingency and craft organization, *Journal of Archaeological Science: Reports*. Online: doi:10.1016/j.jasrep.2016.03.004
- Hallager, E. 2003: The Linear B Inscriptions: a note, in E. Hallager & B. Pålsson Hallager (eds), *The Greek-Swedish Excavations at the Agia Aikaterini Square, Kastelli, Khania 1970–1987 and 2001 III. The Late Minoan III B Settlement*, 274–275, Stockholm
- Haskell, H.W. 1985: The origin of the Aegean stirrup jar and its earliest evolution and distribution (MB III–LB I), *American Journal of Archaeology* 89, 221–229
- Haskell, H.W. 1999: Aspects of the nature and control of Mycenaean foreign trade, in P.P. Betancourt, V. Karageorghis, R. Laffineur & W.-D. Niemeier (eds), *Meletemata: Studies in Aegean Archaeology Presented to Malcolm H. Wiener as He Enters His 65th Year (Aegaeum 20)*, 339–342, Liège and Austin
- Haskell, H.W. 2005: Region to region export of transport stirrup jars from LM IIIA2/B Crete, in A.-L. D’Agata, J. Moody & E. Williams (eds), *Ariadne’s Threads. Connections between Crete and the Greek Mainland in Late Minoan III (LM IIIA2 to LM IIIC)*, 205–221, Athens
- Haskell, H.W. 2011: Typology, in H.W. Haskell, R.E. Jones, P.M. Day & J.T. Killen, *Transport Stirrup Jars of the Bronze Age Aegean and East Mediterranean (Prehistory Monographs 33)*, 9–22, Philadelphia
- Haskell, H.W., R.E. Jones, P.M. Day & J.T. Killen 2011: *Transport Stirrup Jars of the Bronze Age Aegean and East Mediterranean (Prehistory Monographs 33)*, Philadelphia
- Hayden, B.J. 1987: Crete in transition: LM IIIA–IIIB architecture. A preliminary study, *Studi Micenei ed Egeo-Anatolici* 26, 199–234
- Hirschfeld, N. 1992: Cypriot marks on Mycenaean pottery, in J.-P. Olivier (ed), *Mykenaika (Bulletin de Correspondence Hellénique, Supplément 25)*, 315–319, Paris
- Hood, S. & P. De Jong 1958–1959: A Late Minoan III kitchen at Makritikhos (Knossos) (Knossos Survey 90), *Annual of the British School at Athens* 53–54, 182–193
- Jones, R.E. 2011: Chemical analyses, in H.W. Haskell, R.E. Jones, P.M. Day & J.T. Killen, *Transport Stirrup Jars of the Bronze Age Aegean and East Mediterranean (Prehistory Monographs 33)*, 29–38, Philadelphia
- Jung, R. 2006: Die mykenische Keramik von Tell Kazel (Syrien), *Damaszener Mitteilungen* 15, 147–218
- Kardamaki, E. 2013: Ein neuer Keramikfund aus dem Bereich der Westtreppe von Tiryns, PhD Dissertation, University of Heidelberg (<http://www.ub.uni-heidelberg.de/arciv/14756>)
- Kardamaki, E. 2015: Conclusions from the new deposit at the Western Staircase terrace at Tiryns, in A.-L. Schallin & I. Tournavitou (eds), *Mycenaeans Up to Date. The Archaeology of the North-Eastern Peloponnese—Current Concepts and New Directions (Acta Instituti Atheniensis Regni Sueciae, series 4°, 56)*, 79–97, Stockholm
- Kaza-Papageorgiou, K., E. Kardamaki, P. Koutis, E. Markopoulou & N. Mouka 2011: Κοντοπήγαδο Αλίμου Αττικής. Οικισμός των ΠΙΕ και ΥΕ χρόνων και ΥΕ εργαστηριακή εγκατάσταση, *Αρχαιολογική Εφημερίς* 150, 197–274

- Killen, J.T. 2011: The Linear B inscriptions, in H.W. Haskell, R.E. Jones, P.M. Day & J.T. Killen, *Transport Stirrup Jars of the Bronze Age Aegean and East Mediterranean (Prehistory Monographs 33)*, 91–107, Philadelphia
- Knapp, A.B. & J.F. Cherry 1991: Quantitative provenance studies and Bronze Age trade in the Mediterranean: some preliminary reflections, in N.H. Gale (ed), *Bronze Age Trade in the Mediterranean (SIMA 90)*, 91–119, Göteborg
- Knapp, A.B. & S. Demesticha 2016: *Mediterranean Connections: Maritime Transport Containers and Seaborne Trade in the Bronze and Early Iron Ages*, London and New York
- Kühne, C. & H. Otten 1971: *Der Šaušgamuwa Vertrag (Studien zu den Boğazköy-Texten 16)*, Wiesbaden
- La Rosa, V. 1985: Preliminary considerations of the relations between Phaistos and Hagia Triadha, *Scripta Mediterranea* 6, 45–54
- La Rosa, V. 1997: Haghia Triada à l'époque mycénienne: l'utopie d'une ville capitale, in J. Driessen & A. Farnoux (eds), *La Crète mycénienne (Bulletin de Correspondence Hellénique, Supplément 30)*, 249–266, Paris
- Lauter, H. 1987: Nouveaux aspects du palais de Mycènes au HR III B, in E. Lévy (ed), *Le système palatial en orient, en Grèce et à Rome*, 219–225, Straßburg
- Leonard, A.Jr. 1994: *An Index to The Late Bronze Age Aegean Pottery from Syria-Palestine (SIMA 114)*, Göteborg
- Lolos, Y.G. 1999: The cargo of pottery from the Point Iria wreck: character and implications, in W. Phelps, Y.G. Lolos & Y. Vichos (eds), *The Point Iria Wreck. Interconnections in the Mediterranean ca. 1200 B.C. (Hellenic Institute of Marine Archaeology)*, 43–58, Athens
- Marabea, Chr. 2012: Η εγκατάλειψη της Μυκηναϊκής ακρόπολης στα Κανάκια Σαλαμίνας: Μαρτυρίες από το Ανατολικό Συγκρότημα και άλλα οικοδομήματα, in Γ.Γ. Λώλος (ed), *Σαλαμινίς Ι. Συμβολή στην Αρχαιολογία του Αργολοσαραωνικού (Επιστημονική επετηρίδα του τμήματος Ιστορίας και Αρχαιολογίας της Φιλοσοφικής Σχολής του Πανεπιστημίου Ιωαννίνων Παρ. Αρ. 83)*, 161–217, Ioannina, Greece
- Maran, J. 2004: The spreading of objects and ideas in the Late Bronze Age eastern Mediterranean: two case examples from the Argolid of the 13th and 12th centuries BCE, *Bulletin of the American Schools of Oriental Research* 336, 11–30
- Maran, J. 2005: Late Minoan coarse ware stirrup jars on the Greek mainland. A post-palatial perspective from the 12th century BC Argolid, in A.-L. D'Agata, J. Moody & E. Williams (eds), *Ariadne's Threads. Connections between Crete and the Greek Mainland in Late Minoan III (LM IIIA2 to LM IIIC)*, 415–431, Athens
- Maran, J. 2012: Architektonischer Raum und soziale Kommunikation auf der Oberburg von Tiryns—Der Wandel von der mykenischen Palastzeit zur Nachpalastzeit, in F. Arnold, A. Busch, R. Haensch & U. Wulf-Rheidt (eds), *Orte der Herrschaft. Charakteristika von Machtzentren (Forschungscluster 3, Politische Räume)*, 149–162, Rahden/Westfallen, Germany
- Maran, J., A. Papadimitriou & U. Thaler 2015: Palatial wall paintings from Tiryns. New finds and new perspectives, in A.-L. Schallin & I. Tournavitou (eds), *Mycenaeans Up to Date. The Archaeology of the North-Eastern Peloponnese—Current Concepts and New Directions (Acta Instituti Atheniensis Regni Sueciae, series 4°, 56)*, 99–116, Stockholm

- Mentesana, R., P.M. Day, S. Todaro & V. Kilikoglou 2015: United in our differences: the production and consumption of pottery at EM IB Phaistos, Crete, *Journal of Archaeological Science: Reports*. Online: <http://www.sciencedirect.com/science/article/pii/S2352409X15300663>
- Mountjoy, P.A. 2011: The kylix and the basin in 12th century BC Cyprus with particular reference to Hala Sultan Tekke, in V. Karageorghis & O. Kouka (eds), *On Cooking Pots, Drinking Cups, Loomweights and Ethnicity in Bronze Age Cyprus and Neighbouring Regions*, 331–348, Nicosia
- Myer, G.H. & P.P. Betancourt 1990: The fabrics at Kommos, in P.P. Betancourt, *Kommos II: The Final Neolithic through Middle Minoan III Pottery*, 1–13, Princeton
- Müller, K. 1913: Tiryns. Vorbericht über die Grabungen 1905–1912, *Athenische Mitteilungen* 38, 78–91
- Pakkanen, J. 2014: A reappraisal of the first publication of stirrup jar inscriptions from Tiryns by Johannes Sundwall: photographs, lost sherds and the 'a-nu-to/no-di-zo workshop', *Arctos* 48, 261–277
- Petrakis, V. 2014: The inscribed stirrup jar (EL Z 1), in M.B. Cosmopoulos, *The Sanctuary of Demeter at Eleusis: The Bronze Age (Archaeological Society at Athens Library 295–296)*, 177–216, Athens
- Pålsson Hallager, B. 2003: The Late Minoan IIIB:2 pottery, in E. Hallager & B. Pålsson Hallager (eds), *The Greek-Swedish Excavations at the Agia Aikaterini Square, Kastelli, Kania 1970–1987 and 2001 III. The Late Minoan IIIB Settlement*, 197–265, Stockholm
- Pålsson Hallager, B. 2005 B: The synchronisms mainland–west Crete in the LM IIIA2–III B period, in A.-L. D'Agata, J. Moody & E. Williams (eds), *Ariadne's Threads. Connections between Crete and the Greek Mainland in Late Minoan III (LM IIIA2 to LM IIIC)*, 277–292, Athens
- Podzuweit, C. 2007: *Studien zur spätmykenischen Keramik (Tiryns XIV)*, Wiesbaden
- Pratt, C.E. 2016: The rise and fall of the transport stirrup jar in the Late Bronze Age Aegean, *American Journal of Archaeology* 120, 27–66
- Privitera, S. 2011: Looking for a home in a houseless town: exploring domestic architecture in final palatial Ayia Triada, in K.T. Glowack & N. Vogeikoff-Brogan (eds), *Στέγαι: The Archaeology of Houses and Households in Ancient Crete (Hesperia Supplement 44)*, 263–272, Princeton
- Raison, J. 1968: *Les Vases à inscriptions peintes de l'Âge Mycénien et leur contexte archéologique (Incunabula Graeca 19)*, Rome
- Riley, J.A. 1981: Petrological examination of coarse-ware stirrup-jars from Mycenae, *Annual of the British School at Athens* 76, 335–340
- Rodenwaldt, G. 1912: *Die Fresken des Palastes (Tiryns II)*, Athens
- Rutter, J.B. 2005: Southern triangles revised: Lakonia, Messenia, and Crete in the 14th–12th centuries BC, in A.-L. D'Agata, J. Moody & E. Williams (eds), *Ariadne's Threads. Connections between Crete and the Greek Mainland in Late Minoan III (LM IIIA2 to LM IIIC)*, 17–64, Athens
- Rutter, J.B. 2006: Ceramic imports of the Neopalatial and Later Bronze Age eras, in J.W. Shaw & M.C. Shaw (eds), *Kommos V: The Monumental Minoan Buildings at Kommos*, 646–688, 712–715, Princeton
- Sacconi, A. 1974: *Corpus delle Iscrizioni Vascolari in Lineare B (Incunabula Graeca 57)*, Rome

- Shaw, J.W. 2006: Kommos in the Mesara landscape, in J.W. Shaw & M.C. Shaw (eds), *Kommos. An Excavation on the South Coast of Crete by the University of Toronto under the auspices of the American School of Classical Studies at Athens*, Volume V. *The Monumental Minoan Buildings at Kommos*, 863–878, Princeton
- Shaw, J.W. & M.C. Shaw (eds) 1985: *A Great Minoan Triangle in South-Central Crete: Kommos, Hagia Triadha, Phaistos (Scripta Mediterranea 6)*, Toronto
- Shaw, J.W., A. Van de Moortel, P.M. Day & V. Kilikoglou 2001: *A LM IA Ceramic Kiln in South-Central Crete. Function and Pottery Production (Hesperia Supplement 30)*, Princeton
- Stockhammer, P. 2008: *Kontinuität und Wandel. Die Keramik der Nachpalastzeit aus der Unterstadt von Tiryns*, PhD Dissertation, University of Heidelberg 2007 (<http://www.ub.uni-heidelberg.de/archiv/8612/>)
- Tomlinson, J.E. & P.M. Day 1995: Appendix D: comparison of petrographic and chemical results, in I. Tournavitou, *The 'Ivory Houses' at Mycenae (Annual of the British School at Athens, Supplement 24)*, 317–320, London
- Tomlinson, J.E. & J.B. Rutter 2010: Mycenaean and Cypriot Late Bronze Age ceramic imports to Kommos: an investigation by neutron activation analysis, *Hesperia* 79, 191–231
- Van Alfen, P.G. 2008: The Linear B inscribed vases, in Y. Duhoux & A. Morpurgo Davies (eds), *A Companion to Linear B: Mycenaean Greek Texts and their World*, Volume 1 (*Bibliothèque des Cahiers de l'Institut de Linguistique de Louvain* 120), 235–242, Louvain-la-Neuve
- Voigtländer, W. 2003: *Die Palastkeramik (Tiryns X)*, Mainz
- Zurbach, J. 2006: Les vases inscrits en linéaire B: tentative d'interprétation globale, *Athenische Mitteilungen* 121, 13–71
- Walberg, G. 1998: *Excavations on the Acropolis of Midea: Results of the Greek-Swedish Excavations under the Direction of Katie Demakopoulou and Paul Åström*. Volume I.1: *The Excavations on the Lower Terraces 1985–1991 (Acta Instituti Atheniensis regni Sueciae 49.1)*, Stockholm
- Watrous, L.V. 1992: *Kommos III: The Late Bronze Age Pottery*, Princeton
- Whitbread, I.K. 1995: *Greek Transport Amphorae: A Petrological and Archaeological Study (Fitch Laboratory Occasional Paper, British School at Athens)*, Athens