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Canaanite jars and the maritime trade network in the northern Levant during the transition from the Late Bronze to the Early Iron Age

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Abstract

The so-called Canaanite jar is widely viewed as the first known example of an amphora with morphological features suggesting its use in maritime trade. The term 'Canaanite jar', however, represents quite a broad category, and is thus at risk of being overused. It is more useful to distinguish between different morphological types of amphora pertaining to the extended family of 'Canaanite' storage and transport jars. For example, the Late Bronze Age (LBA) angular-shouldered type was widely adopted along the entire length of the Levantine coast and even as far away as Mycenaean Greece. Yet this kind of container is not attested in inland Levantine regions (e.g. inner Syria, central Anatolia), where other types of storage and transport containers were in use during the LBA. Importantly, this specific type of jar went out of production at the end of the LBA. In contrast, another LBA 'Canaanite' jar type, widespread in coastal Syria and at some Cypriot sites, especially during the thirteenth century BC (a 'northern' Levantine type characterised by a slight carination on the shoulder and a more rounded belly) continued to be produced and used in the early Iron Age. The precise reasons why the angular-shouldered type went out of use whilst the 'bellied' northern type remained in use during the Iron Age have yet to be fully investigated. One possible interpretation is that the former type corresponds to trade mechanisms that were only typical of the LBA, while the latter type may be representative of a different kind of maritime network that persisted over the transition between the LBA and the Early Iron Age.

Introduction and theoretical background

In studies of the transition between the Late Bronze Age (LBA) and the Early Iron Age (EIA) in the eastern Mediterranean, analysis of economic processes has played a significant role. This emphasis has been informed by the processual interpretative model typical of the 1960–70s, i.e. the 'New Archaeology'. Indeed, processual archaeologists were deeply interested in analysing socio-economic systems, pointing out that, in the historical interpretation of archaeological data, objects such as pottery containers are valueless in themselves but gain heuristic value if understood as part of a wider 'system'. Thus the main object of enquiry became the whole system rather than the individual pieces of data. Although the limitations of this approach have long

been emphasised, processual archaeology undoubtedly made a unique contribution to the study of archaeological materials, especially pottery, leading it to be viewed as a key source for economic history.

Whereas processual archaeologists often interpreted the shift from one period to another one in terms of continuity rather than discontinuity, cultural historians had adopted a diffusionist perspective, typically attributing discontinuity to migratory phenomena. This is precisely the case of the historical and cultural transition from the LBA to the EIA, a shift traditionally interpreted in terms of the collapse of the prior system, given the profound sociopolitical and economic changes that took place in the Levantine region. The movement in the eastern Mediterranean and particularly along the Levantine coast of the 'Sea Peoples' and other groups, as noted in documentary sources, thus led earlier scholars to adopt a diffusionist perspective, attributing cultural change to the arrival of new ethnic groups. In contrast, the processual critique led to a novel interpretation of the overall historical framework: evidence of continuity during the LBA–EIA transition (e.g. the use of the same or at least very similar domestic vessels and storage or transport containers) was taken as support for the systemic view. The 'migration model' has now come under further critique, e.g. in the recent reassessment of the 'colonisation narrative', with respect to the so-called Aegean colonisation of Cyprus (Voskos & Knapp 2008: 661–662; Knapp 2014: 40).

Therefore, we feel justified in taking storage jars as valuable material evidence that can contribute to our understanding of the LBA–EIA transition: it may help us to piece together a reasonably accurate picture of the socio-economic transformation that took place in the eastern Mediterranean at that time, particularly in relation to continuity or discontinuity in trade networks, sea transport and maritime exchanges. Thus we might suggest that the angular-shouldered Canaanite jar that went out of use after the LBA was representative of trade mechanisms typical of that period, while the 'bellied', northern type may point to maritime networks that persisted over the transition between the LBA and EIA. A first observation in this regard is that morphological changes in jar shapes took place gradually and tend to be subtle. This suggests that EIA potters continued to follow the previous Canaanite pottery tradition within the new cultural and socio-economic framework established after the fall of the palace-centred economic system at the end of the LBA.

Canaanite storage jars: morphological observations

In the archaeological literature, the Canaanite storage jar has generally been viewed as the first known example of an amphora with morphological features that clearly suggest its use in maritime trade. Therefore, this 'morphological type', first described by Grace (1956), has been proposed as the prototype of the classical amphora, the well known and ubiquitous transport vessel employed in Mediterranean merchant shipping during the classical era. One of the first problems with this notion, however, is that the alleged model does not correspond to a true morphological type. In practice, the term 'Canaanite jar' represents a broad category of storage and transport containers, not a single specific type used solely for trading purposes. It follows that this label, despite its popularity, is misleading, as several scholars have recently noted (e.g. Rutter 2014: 53).

The Canaanite jar is generally understood as a closed vessel (thus, typologically speaking, a *jar* in the strict sense), with an average height of about 50cm or greater, equipped with two opposed vertical handles placed on the upper part of the body

(this is why it may also be referred to as an *amphora*). It has a narrow mouth and a generally narrow and sometimes reinforced or protruding base. The overall shape may be ovoid, bi-conical, conical or globular; the shoulder may be rounded, slightly carinated, angular or sloping; the neck is high, medium or low; the rim folded or plain.

Clearly, such variable characteristics may be combined into dozens of individual—and highly diverse—morphological types. Therefore, it is more appropriate to refer to individual specimens of the Canaanite jar category as simply ‘Levantine’ or (even better) ‘Syro-Palestinian’ jars, i.e. storage and transport containers whose shapes were produced or originated along the coast of the Levant (Fig. 1). Within this broader group, scholars have identified specific types specially designed for maritime trade. Killebrew (2005: 123), for example, divided the Canaanite ‘handled storage jars’ into four morphological groups. If all the documented specimens from the entire Levantine coast are taken into account, however, a greater number of categories is required. Such shape categories should be defined in the first instance in terms of their overall body profile because, as Rice (1987) suggested many years ago, an accurate description of a vessel specifies how it relates to the main geometrical shapes.

In my own taxonomic study of LBA and EIA Levantine whole storage jars (Pedrazzi 2007), I identified 18 different jar shapes, distinguishing them from *pithoi* on the basis of their average height, normally not above 50–60cm. It is crucial for morphological analysis of Canaanite jars to be based mainly on complete specimens, given that the great variety of rims and bases, and even of shoulder profiles, makes it impossible to draw firm conclusions from the classification of individual sherds. These jars were employed for both transport and storage purposes, either in solely



Figure 1. Map showing sites mentioned in the text (drawn by Irini Katsouri)

domestic contexts or in medium- and long distance trade (Pedrazzi 2007: 50–145, 368). The 18 basic shapes of the jar are divided into many ‘types’, with a number of further sub-types and variants: for example, Shape (1), the ovoid jar, appears in three different types (1-1, 1-2, 1-3) that vary in terms of having a more or less convex shoulder and a different base (a rounded bottom in Type 1-1 and a narrow flat base in Types 1-2 and 1-3—Pedrazzi 2007: 50–56).

In general, all the jars in Shapes 1–7 have their maximum diameter in the upper part of the body, a characteristic typical of the LBA and the initial stages of the EIA, and specifically designed to enhance the mobility of the vessel, thus making the jar suitable for the transport of goods. In contrast, in jar Shapes 8 to 13 (and Shape 18), the maximum diameter is placed near the mid-point of overall body height, making these vessels more suited for domestic use. A later development in jar shape was the gradual lowering of the maximum diameter, which came to be situated in the lower half of the jar (Shapes 14 to 17). This feature appears to have become widespread between the end of the Iron I period and the beginning of Iron II, or in absolute terms around the tenth or ninth century BC, depending on whether one chooses to follow the high or low chronology for the Levant (on the low chronology, see Finkelstein 1998, 2005). Thus from the end of the Iron I onwards, even the transport jars tended to have a shape that was wider towards the bottom.

Storage jars or transport jars?

Obviously, this is not the place to examine in depth all the various shapes of the ‘Canaanite’ or Syro-Palestinian jar from the LBA–EIA and their morpho-functional features. Instead I explore some of the more significant issues related to the use of jars in trade and shipping by analysing a small number of particularly representative shapes and types.

The first shape I focus on here is the ovoid jar (Shape 1) (**Fig. 2**), which in my view represents the earliest known shape in the LBA repertoire; it is attested from the LB I onwards, and stemmed from the morphological tradition of the Middle Bronze Age. These containers are relatively easy to move, given that their maximum diameter is situated in the upper part of the body and that they possess two opposing handles at the maximum diameter level. Other features, however, such as the ovoid profile without any carination on the shoulder, and (at least in Type 1-1) the rounded bottom, seem less specifically suited for the purposes of maritime trade. The ovoid jar was widespread in the LBA (Pedrazzi 2007: figs 3.1–3.7), with many examples of Type 1-1, with a rounded bottom, attested along the Syrian coast (e.g. Tell Kazel—Badre & Gubel 1999–2000: fig. 32.d) and in the inland and coastal regions of the southern Levant (e.g. Megiddo—Guy 1938: pls 18.3, 33.8, 47.6, 55.8, 56.11; for Tell Abu Hawam—Balensi & Herrera 1985: fig. 16.1). Many further specimens may be attributed to Type 1-2, characterised by a narrow and relatively flat base (e.g. Tyre—Bikai 1978: pl. 52A.4, 19; Byblos—Salles 1980: pl. 27,1–2, 6–7; Megiddo—Guy 1938: pl. 52.1; and Lachish—Tufnell 1958: pl. 87.1015).

A Canaanite jar from a chamber tomb at Asine in Greece (Nauplia Museum, n. 2146—Åkerström 1975: 186, fig. 3), dated to the initial stages of the LB II, belongs to Type 1-2, as does a jar from a shipwreck off the southern Levantine coast (Zemer 1978: pl. 1.1), dated to the LB I. Therefore, ovoid jars (Shape 1) were shipped overseas and reached Mycenaean Greece, despite the fact that they do not seem to be particularly

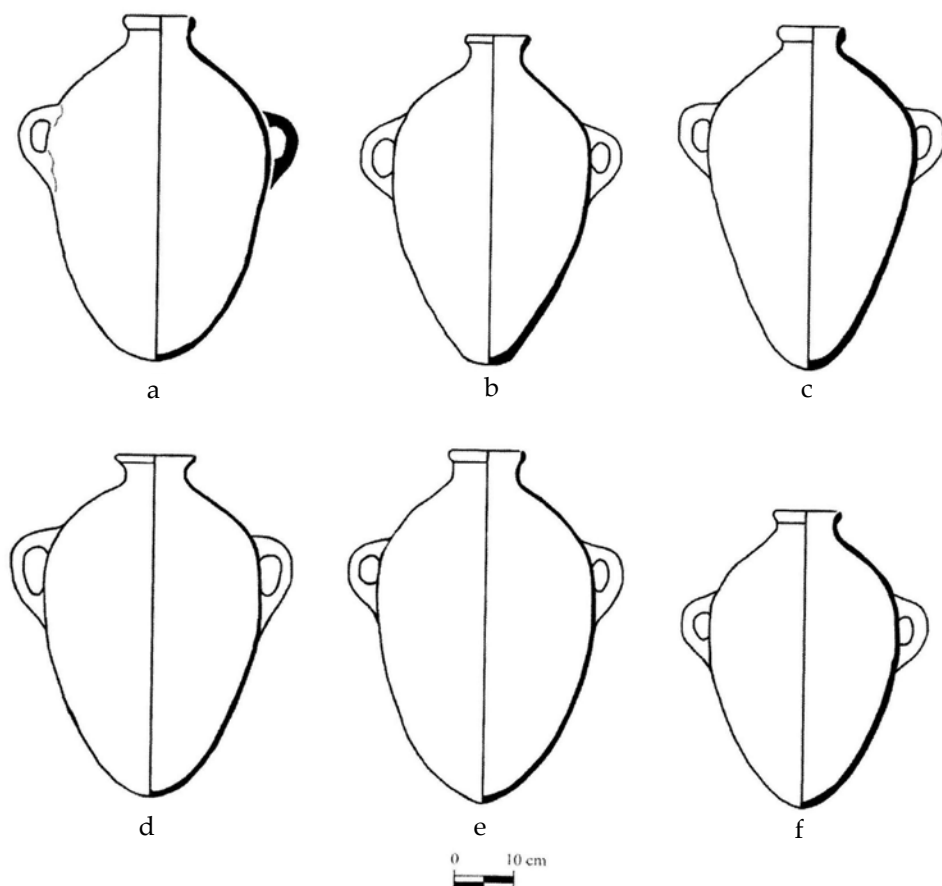


Figure 2. Type 1-1, Pedrazzi 2007: fig. 3.1 (a) Badre & Gubel 1999–2000: fig. 32.d, (b) Guy 1938: pl. 33.8, (c) Guy 1938: pl. 55.8, (d) Guy 1938: pl. 47.6, (e) Guy 1938: pl. 18.3, (f) Guy 1938: pl. 56.11

specially designed for long distance transport because of their lack of a carinated shoulder and a reinforced base. I therefore hypothesise that during the initial stages of the LBA, the Canaanite jar of ovoid shape was employed for storage purposes but also used, perhaps infrequently, in maritime trade.

While many jars—such as the ovoid types—could be used for both domestic and transport purposes, a few jar types seem more suited to household use, i.e. to the short-term storage and short-distance transfer of foodstuffs (predominantly liquids); this is the case, for example, of the small globular jars (Shape 12: Pedrazzi 2007: figs 3.63–3.70). These globular vessels were widely used in the Levant during the LB I and II and even as late as the LBA–EIA transitional period, for example at Ugarit and Tell Kazel (Capet 2003: fig. 43.h) and at Hazor, where a large number of specimens were found (Yadin *et al.* 1960: pl. 121:1-2, pl. 138:7-8, etc.), at Megiddo and Beth Shean in the Jezreel Valley, and at other sites, including in Transjordan (e.g. at Tell es-Saidiyeh—Tubb 1988: fig. 48A.13). These jars never travelled by sea but could have been transported over land. They disappeared at the beginning of the Iron Age, when new shapes of household vessel replaced them.

The specialised morphology of transport jars: the angular-shouldered type (5-4)

Next, there are particular shapes of jar that help us to analyse the mechanisms of maritime trade during the LB and EIA. These display morphological features that clearly facilitate the shipping and the stacking of vessels in a ship's hold.

First, it is noteworthy that during the LBA a new conical-cylindrical form developed, probably from the previous ovoid types. In my own taxonomy, I have labelled this new form Shape 5 (Pedrazzi 2007: 71). These jars are generally characterised by a carination on the shoulder, which may be more or less emphasised. The carination corresponds to the point of maximum diameter. This morphological feature enhances the strength of the vase as well as its resistance to mechanical stress. It is thus clear that the mobility, not the stability of the vessel, was the main goal of those who produced these jar types. For the same reason, the balance point was situated in the upper part of the vessel, facilitating its handling and pivoting, with the latter operation also made simpler by the jar's narrow and protruding base.

Shape 5 may be divided into seven types (labelled 5-1 to 5-7), with many further sub-types; differences among types are a function of shoulder profile (concave, convex and so on), degree of carination and characteristics of the base (Pedrazzi 2007: 71–86). In terms of the manufacturing process, the introduction of carination at the shoulder, and therefore the new idea of an angular shoulder, was a novel practice initiated in LB II, in parallel with a significant rise in sea trade. To enable the shipping of storage jars and avoid breakage due to mechanical stress, potters introduced new morphological features, such as the angular shoulder (thickened and reinforced), and the narrow protruding 'pivot' or 'stump' base, particularly useful not only for pivoting the vessels, but also for stacking them in superposed rows in the ship's hold.

These characteristics are present in the jars that I have labelled Type 5-4, the well-known Canaanite 'commercial' jars, with a conical body, an angular shoulder (with maximum diameter at the shoulder), and with a thickened pivot base; the jar has a medium-high neck, with a rim that turns outwards (**Fig. 3**). Type 5-4 corresponds to Killebrew's (2005: 125, fig. 3.21) Form CA 22.

This pattern of development in LBA jar shapes had already been suggested by Amiran's (1969: 141) study of Levantine pottery, although she regarded all the different shapes and types ascribed to the 'Canaanite' class as solely 'commercial jars'. She noted clear changes in the morphology of Syro-Palestinian jars over the period, in the body, the base and the function of the jar. Archaeological discoveries over subsequent decades, with a large volume of jars unearthed, later confirmed this picture, except for the alleged function of the vessels, as it is now clear that not all types were specifically or exclusively employed for commercial purposes.

In the Levant, the angular-shouldered Shape 5 is widely attested, from north to south: in the storeroom at Minet el-Beida, the harbour of Ugarit, 80 jars of this type were found (Schaeffer 1932: pl. III.3; 1949: fig. 86.7), while it is also documented at Tell Sukas, Tyre, Sidon, Megiddo, Beth Shean, Tell Abu Hawam, Lachish and Tell el-Farah (see, respectively, Buhl 1983: fig. III.24; Bikai 1978: pl. 49.10; Saidah 2004: figs 13.23, 16.31; Guy 1938: pls 17.14, 18.4; James 1966: fig. 19.7; Hamilton 1934: pl. 22.22; Tufnell 1958: pl. 87.1019; Duncan 1930: 43.H1). Complete examples at many of these sites have been often found in chamber tombs.

Concerning the use of this form in maritime trade, it should first be noted that Type 5-4 is well documented by the approximately 150 Canaanite jars recovered from

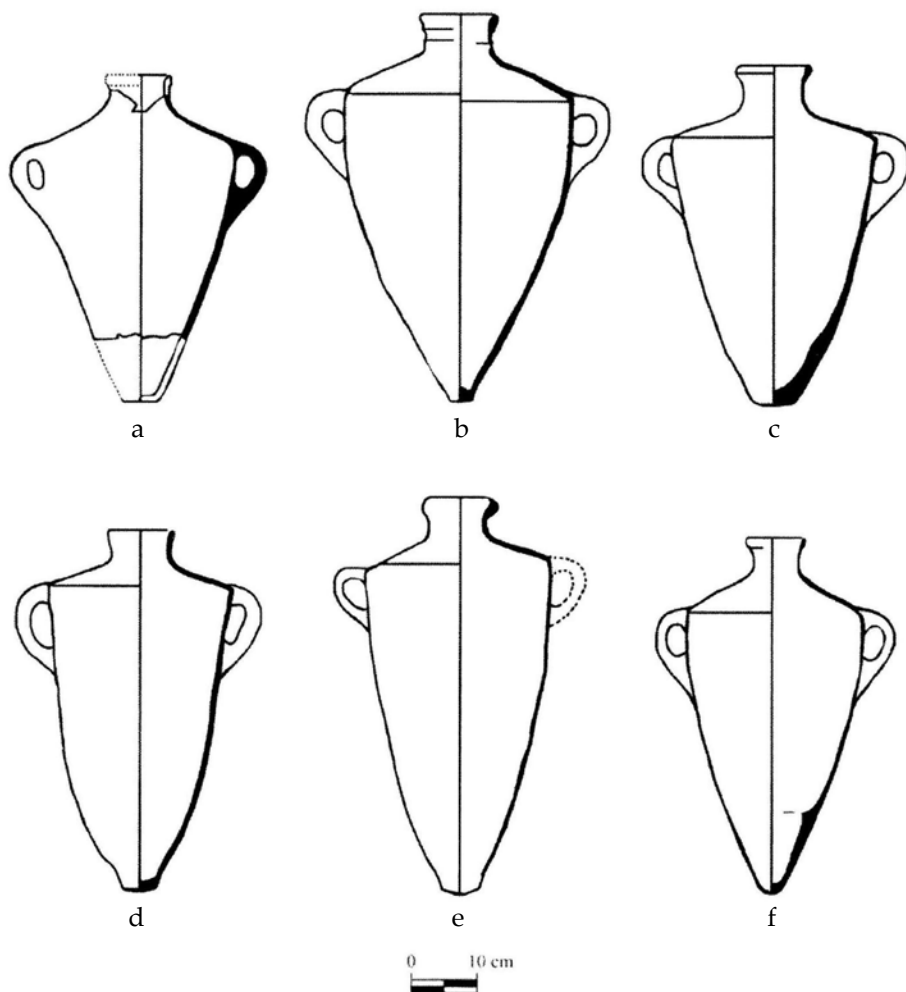


Figure 3. Type 5-4, Pedrazzi 2007: fig. 3.24 (a) Åkerström 1975: 186, fig. 4, (b) Zemer 1978: pl. 1.3, (c) Guy 1938: pl. 18.4, (d) Guy 1938: pl. 17.4, (e) Tufnell 1958: pl. 87.1019, (f) Zemer 1978: pl. 1.2

the fourteenth century BC Uluburun shipwreck (e.g. Bass 1986: 277: fig. 7). All these jars are of the angular-shouldered type, but were further divided into three main groups based on vessel size (small, medium or large). The small-sized jars are those best represented in the Uluburun cargo, with at least 90 specimens; 18 medium-sized jars were found, and 14 of the larger sub-type (the sizes of these three groups are about 7, 15 and 30 litres, respectively—Pulak 2005: 38; cf. discussion of these groups by Monroe, this volume; Cateloy, this volume). The largest examples (e.g. jar KW 652—Lin 2003: fig. 6.1) bear a strong resemblance to jars recovered from the southern Levantine coast (Zemer 1978: pl. 1.3). Indeed the angular-shouldered jar reached Mycenaean Greece, with many complete or almost complete vessels found in chamber tombs at Menidi, Mycenae and Pylos (Åkerström 1975: 186, fig. 4, 189–190, figs 8–13), as well as in domestic contexts. In Crete, such jars were found in residential settings at Kommos, but are absent from the chamber tombs of the inland areas (Rutter 2014: 61).

The angular-shouldered conical jars were also introduced into Egypt in the LBA, as the evidence from Amarna indicates (Peet & Woolley 1923: pl. LII.XLIII/67). Surprisingly, another angular-shaped jar appeared at Amarna in LB II, a type with a very flat horizontal shoulder and an extremely short and straight neck, better described as a rim directly placed on the shoulder (Peet & Woolley 1923: pl. LI.XLIII/105; see also Grace 1956: fig. 7.1). This type (labelled 5-2 in my taxonomy – Pedrazzi 2007: 72–73) is a typical Iron I evolution of LB II Type 5-4 (Fig. 4.a–c). The geographical distribution of Type 5-2 stretches from the central-southern Levantine coast, from Sarepta and Tyre to Tell Abu Hawam, Tel Dor, Tell Qasile and even to Tell es-Saidiyeh in Transjordan (Pritchard 1980: fig. 3.1): all the samples collected are from the EIA, with the exception of the Amarna jar and the LB II jar from Sarepta Level 6 (Pritchard 1988: fig. 43.6). The type is also attested on Cyprus, in the Palaipaphos *Skales* cemetery, dated to a period corresponding to Iron I B–C in the Levantine chronology (Karageorghis 1983: figs CXIV.2, CLIV.46, CLXVI.40).

Thus the Amarna jar with flat angular shoulder (Type 5-2) may represent an early example of what, in the EIA, was to become a further development of the Type 5-4 conical jar. In fact, during the EIA, the angular-shouldered jars evolved into a number of new types, displaying a clear trend towards shorter vertical necks and more cylindrical body profiles. Type 5-5 is a model of jar commonly found in the southern Levant and features a cylindrical body profile and carinated shoulder, with a characteristic rounding of the shoulder above the carination; the base is thickened and protruding (Fig. 4.d–g).

Turning now to the spread of Canaanite jars in Egypt, it should be noted that LB II Type 5-4 has been found in the Nile Valley (and as far as Nubia – Vincentelli 1996: fig. 3.c), together with its later version, the short-necked jar (Type 5-2). Both types were commonly used in maritime trade, and appear to have been shipped mainly from the Levantine coast during the fourteenth–thirteenth centuries BC. The most common and widespread type identified in Egypt, however, a locally produced version of the Canaanite amphora, is a fusiform elongated jar with a very tall neck (Fig. 5.c–e; Shape 7, especially Type 7-1 – Pedrazzi 2007: 91–94 and fig. 3.41). Dothan (1979: 10) recognised this form as an ‘Egyptian variant of the Canaanite jar’. It too is likely to have been used to some extent in LBA maritime trade, given that a small number of examples have also been found in Cyprus (Maa *Palaekastro*) and along the Levantine coast (Akko). Furthermore, analysis of certain fabrics supports the idea that in Egypt these elongated and tall-necked jars (Type 7-1) were mainly locally produced (e.g. of Marl D clay – Aston 2004: 189, fig. 7). Thus, importantly, the Syro-Palestinian angular-shouldered LBA Type 5-4 is attested in Egypt, a place where similar vessels, albeit morphologically distinct and less specialised for maritime trade, were being produced locally.

In this brief overview of the distribution of the specialised angular-shaped type, it should also be noted that, somewhat surprisingly, Type 5-4 is only scantily represented in Cyprus. In the recent excavations at Pyla *Kokkinokremos*, only one example (pub. no. 138) of a jar with angular shoulder has been found (Georgiou 2014: 179). In previous excavations at the same site, only Types 3-1 (conical), 4-2 (bellied and slightly carinated), 5-5 (slightly carinated), 8-1, 15-1 and 18-2, were discovered. Thus the many Canaanite jars found on the island, both those imported from Syro-Palestinian harbours and those that may have been locally produced, are of different (and less specialised) types. This might be explained in terms of the island’s specific role in the dynamics of maritime trade, which encompassed different trade networks in the period between the LBA and the EIA. I discuss this point further in the conclusions.

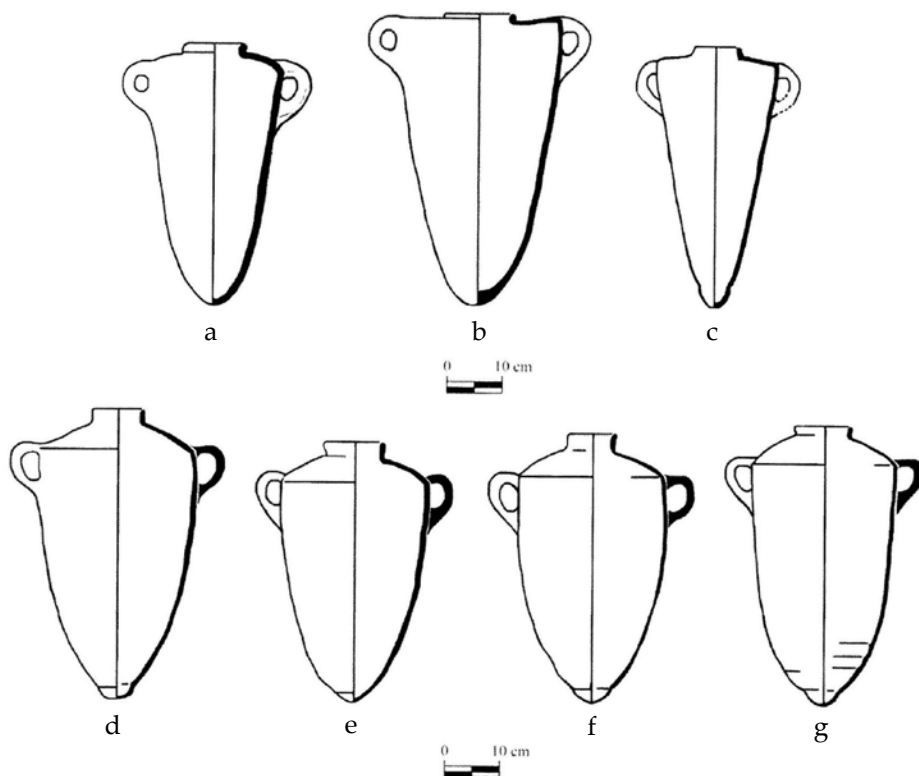


Figure 4. (a–c) Type 5-2, Pedrazzi 2007: fig. 3.22, (a) Karageorghis 1983: pl. CLXVI.40, (b) Bikai 1978: pl. XXXV.12, (c) Grace 1956: fig.7.1; (d–g) Type 5-5, Pedrazzi 2007: fig. 3.26.a–d

Furthermore, as might be expected, the angular-shouldered Type 5-4 jar is not attested in inland regions of the Levant, including inner Syria and Anatolia. This strongly suggests that angular-shaped jar was designed solely for maritime trade, whereas other shapes were used for overland exchanges. One example of a jar type used in the inner regions of the Levant is the one-handed fusiform jar (Type 7-2—Pedrazzi 2007: fig. 3.45), a singular type characterised by an elongated body profile, sloping shoulder, extremely narrow bottom and single vertical handle running from the rim to the shoulder (**Fig. 5.a–b**). Its size is clearly typical of the storage jar as opposed to the jug category, given its medium height of about 50–60cm. This type of jar enjoyed a limited but significant distribution, mainly during the thirteenth century BC. On the one hand, its shape recalls the general Canaanite jar style, and on the other, the Anatolian one-handed spindle jars (or jugs) of the LBA. These fusiform one-handed jars went out of use entirely after the destruction or abandonment of the Syrian and southern Anatolian sites at the end of LB II; this suggests that the type (along with its specific function) may have been linked to the political framework of the LBA, and in particular with the dynamics of Hittite domination in the region (Pedrazzi 2010; Venturi 2015). Notably, at coastal sites such as Tell Kazel in Syria, the one-handed fusiform jar is rare but at any rate attested, together with a vast quantity of ‘regular’ Canaanite jars (especially Type 5-4 and Shape 4).

All of this suggests that at the coastal sites, one-handed fusiform jars cannot have

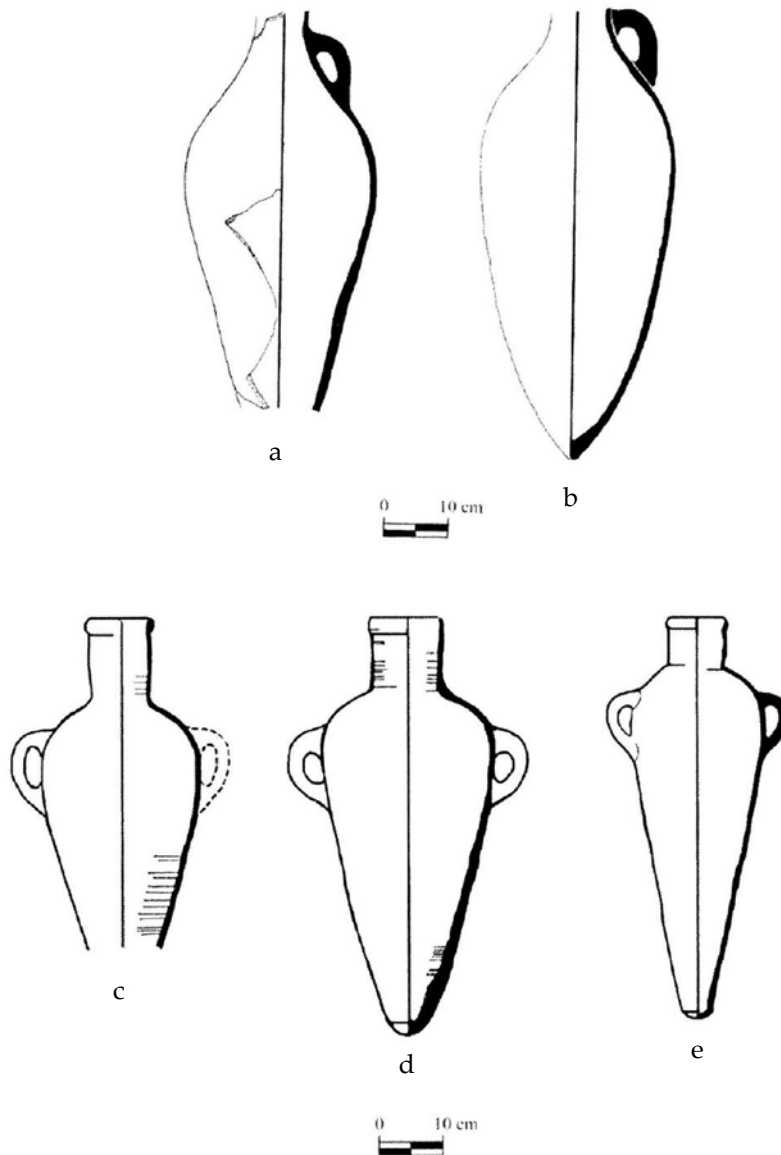


Figure 5. (a–b) Type 7-2, Pedrazzi 2007: fig. 3.45; (c–e) Type 7-1, Pedrazzi 2007: fig. 3.41

fulfilled the role of dedicated transport containers, given the large-scale use of dedicated transport vessels at these locations. Conversely, at inland sites, the fusiform vessels may well have served as transport jars, considering that other types of commercial or transport vessels have not been widely attested in the inner Syro-Anatolian regions, where storage requirements were catered for by huge *pithoi*, and the daily short-term transport of foodstuffs and liquids by jugs. The one-handled fusiform jars, which issued from a combination of Canaanite and Anatolian traditions, were not used for seaborne trade, but only for overland commerce, and so their function did not overlap with the more specific one of the maritime trade containers (MTCs) discussed here.

**Jars used in restricted maritime trade networks:
'bellied' amphorae (4-1 and 4-2)**

In addition to the angular-shouldered type, another form was used in overseas trade: the bellied jar (Shape 4) (Fig. 6), a specifically northern Levantine model, which spread from coastal Syria to Cyprus and southern Anatolia during the transition from the LBA to the EIA (Pedrazzi 2007: 65–70).

Jars of this shape are generally of larger dimensions than the angular Type 5-4 jars. Specifically, the belly is more pronounced and the maximum diameter is greater. They are equipped with either a protruding knobbed base or a bulbous hollow base (enabling sediment from liquid contents to settle, which may have been particularly useful for the storage of wine); several jar bases from Tell Kazel display this morphological feature. The shoulder is separated from the belly by a carination, though not by a sharp well-defined angle; the profile of the shoulder itself, above the carination, may be either slightly rounded (Type 4-1) or sloping/oblique (Type 4-2). Two vertical handles are placed directly on the carination. The jar has a narrow cylindrical neck of medium height, with an outwardly curving rim that is either plain or slightly thickened. The transition from the shoulder to the neck is gradual, without any marked angles, thereby also facilitating the pouring of semi-fluid substances, such as honey or resins.

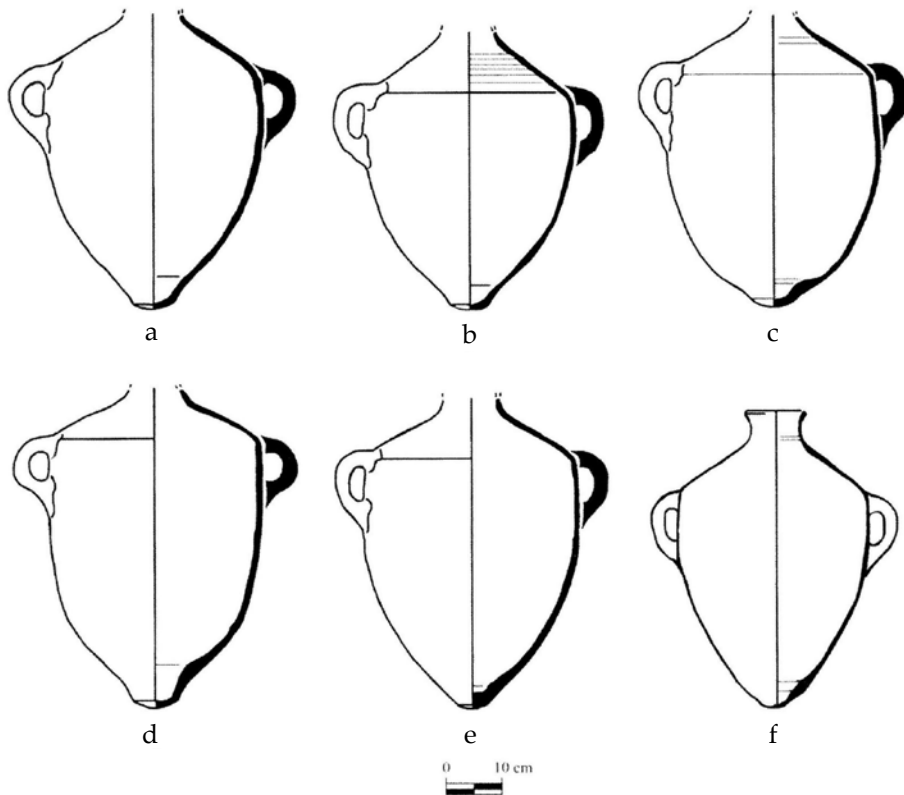


Figure 6. Type 4-2, Pedrazzi 2007: fig. 3.17 (a-f)

Type 4-2 was mainly in use during the LBA (especially LB II), to which over 70% of the samples discussed here are dated (30 complete or almost complete vessels); a further 18% of the jars of this type come from contexts dated to the LBA/EIA transition (Pedrazzi 2007: 67). With regard to geographical distribution, around 70% of the complete vessels considered come from coastal Syria (Ugarit, Ras Ibn Hani, Tell Kazel and Tell Sukas), and 26% from Cyprus (e.g. from Maa *Palaeokastro*, Pyla *Kokkinokremos*, Kition and Kalavassos *Ayios Dhimitrios*—Pedrazzi 2007: appendix 3). This type is also attested by a small number of specimens in Cilicia (Tarsus), at Byblos and at southern sites such as, for example, Tell Qashish and Tell-Farah South (Duncan 1930: pl. 43.K6). A bellied jar of Type 4-2 was also recovered on the Libyan coast, at Zawiyet Umm el-Rakham, where samples of Type 5-4 have also been identified (Snape 2003: 67, fig. 3); this last find may confirm the use of this ‘bellied’ jar as an MTC also, although its shape is less highly specialised than the angular-shaped type. In any case, despite these indications that some jars of this kind were shipped over long distances, the main conclusion to be drawn is that distribution of the type was essentially limited to a restricted northern Levantine trading network, embracing coastal Syria, southern Anatolia (Cilicia) and Cyprus.

A slightly later development of Shape 4 is represented by Type 4-1, which shares the same body profile, but with a more rounded shoulder (Pedrazzi 2007: 65, fig. 3.16) (**Fig. 7**). Again, a carination clearly separates the shoulder from the belly. Bases are generally knobbed and either filled or bulbous and hollow inside. The cylindrical but outward-curving and relatively narrow neck appears designed to favour the pouring of liquid or semi-fluid contents. In some jars from Tell Kazel, the rim itself is slightly thickened on the inside: this feature also allows a stopper to be used (sometimes simply a pebble, as suggested by the jars discovered at Tell Kazel).

Of the jars ascribed to this type (from a data set of almost 40 complete vessels), 27% have been dated to the LB II, but apparently none to the LB I, whereas 32% are dated to the LBA/EIA transitional period, and 32% to Iron I, with some specimens (about 8%) attributed to Iron I/II (Pedrazzi 2007: 66). The type is thus typical of the transitional period and of the EIA proper. While it would be possible to supplement these data by adding the complete vessels unearthed in recent years, to date the overall outcomes of my 2007 survey and statistical analysis appear to remain valid.

A further type related to Types 4-2 and 4-1 is Type 8-1, characterised by a more ellipsoid profile; in my view, the differences between Shape 4 and Shape 8 mainly depend on the low degree of standardisation applied to the broader morphological model with bellied and slightly carinated profile, to which both shapes essentially belong. To Type 8-1, I would ascribe, for example, the Canaanite jar shape identified on the Cape Gelidonya shipwreck (Bass 1967: fig. 132.2). This type is dated mainly to the LBA–EIA transitional period and to the Iron I.

The key implication of this analysis is that the Shape 4, ‘bellied’ but slightly carinated amphora continued to be produced and used throughout the period spanning the end of the LBA and the beginning of the EIA. In terms of its use in maritime traffic, however, this jar is confined to a relatively limited geographical network that encompassed mainly coastal Syria, Cilicia and Cyprus (plus a small number of individual specimens found in Nubia and other regions, together with fragments of other jar types).

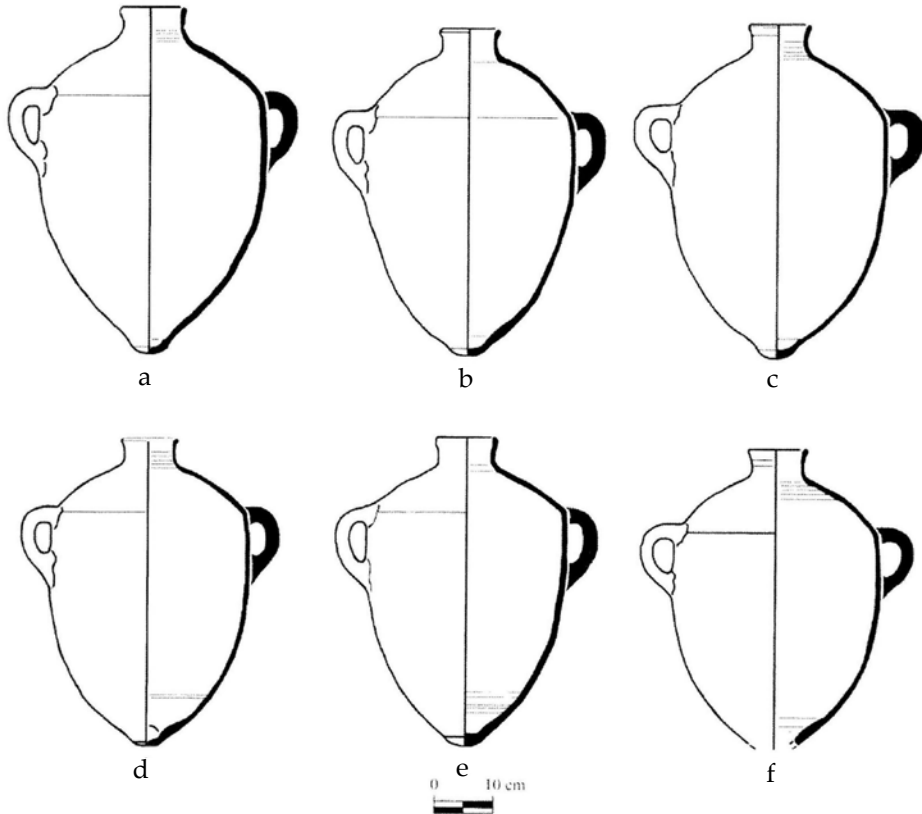


Figure 7. Type 4-1, Pedrazzi 2007: fig. 3.16

Discussion: a comparative analysis of angular-shaped and bellied jars

It is crucial to investigate the reasons for which the angular-shouldered type (5-4) went out of use at the end of the LBA as outlined above whereas, in contrast, the ‘bellied’ northern jars (Shape 4) continued to be used during the EIA. To answer this crucial question, we need to compare Type 5-4, on the one hand, and Types 4-1 and 4-2, on the other (see **Figure 3** and **Figures 6–7**). The morphology, capacity and possible contents of these jar types, as well as their chronological and geographical distribution, must all be included in this comparison.

Morpho-functional characteristics

Earlier in my analysis, I outlined the main morpho-functional features of these types, i.e. the characteristics arguably chosen by potters to facilitate different uses of these vessels. The functional attributes that stem from these features are: portability; stability (or balance); resistance to mechanical stress; accessibility of contents. Taken together, these attributes may suggest the likely main functions of a given vessel. In assessing

them, all parts of the vase must be taken into account: rim, neck, shoulder, number and position of handles, position of maximum diameter, base and so on (Pedrazzi 2007: 234–236).

The angular-shouldered Type 5-4 is mainly characterised by a markedly angular and flat shoulder, and by a conical body shape, with an extremely narrow and reinforced pivot base and pointed toe: these characteristics are designed to enhance *portability* and resistance to mechanical stress, and decrease the stability of the vessel. We may thus justifiably view this vessel as a highly specialised transport container, especially suited to being stacked into ships' holds, thanks to its strengthened shoulder and thickened base. In fact, analysis of the Uluburun wreck suggests that Canaanite jars could be stacked in a two-layer arrangement (Lin 2003: 192): despite a lack of clear archaeological evidence for the LBA specifically, this multi-layered stacking has been confirmed by later shipwrecks.

In contrast, Type 4-2, and its evolved EIA version, Type 4-1, are larger shapes with a 'bellied' profile and a carinated (and therefore somewhat reinforced) shoulder. The shoulder, however, is not flat and short, as in Type 5-4, but on the contrary is oblique (or slightly rounded in its EIA form). Portability is clearly favoured over stability here, given the narrow carinated bases. Resistance to mechanical stress is conceivably lower than in the angular-shouldered type. This jar, therefore, does not seem to have been specifically designed to serve as a specialised maritime trade container: this is mainly because of the bellied profile of Type 4-2, whereas Type 5-4 has a conical profile ending in a very narrow and robust stump base, better suited for stacking on ships. In both types (angular-shouldered and bellied), accessibility of contents (mainly liquid and/or fluid) was enhanced by the vessels' high level of mobility (and consequent ease of handling) and slightly outward-turning necks.

Capacity

In my own earlier study, I used CAD software to obtain a three-dimensional model of selected jar samples, based on published drawings of complete vessels, in order to calculate their internal volume, or capacity (Pedrazzi 2007: 236). For Type 5-4 (the angular-shouldered jar), I identified three different size ranges: a smaller size, with a capacity of about 9–10 litres, a medium size with a capacity of about 11–13 litres, and a larger one with a capacity of about 20–23 litres. These data fit quite well with analyses applied to the Uluburun jars, which also suggested the existence of three size categories, although the small-sized jars were attributed a lower capacity of around 6.4 litres (Bass 1986: 277; Lin 2003; Serpico 2003: 225). These three sizes appear to correspond to standard capacities, also linked, in the case of the smaller-sized jars, with the Ugaritic *kd* (Zamora 2004: 398–399; cf., however, the discussion by Monroe, this volume).

The bellied Types 4-1 and 4-2 are less standardised in size, displaying greater variations in capacity; in any case, their capacity is generally higher than that of the angular-shouldered type, averaging about 35–40 litres for Type 4-1. Only a small number of individual samples display a capacity of about 21–23 litres (see Pedrazzi 2007: 237, fig. 4.14, for selected samples of Type 4-1); the samples of Type 4-2 appear to have an average capacity of 25–30 litres.

Contents

Both the angular-shouldered and bellied jars may have been utilised for the transport of liquid or semi-fluid substances, particularly wine, oil (usually olive oil, but

occasionally also castor, almond and sesame oils, each with its own specific uses), honey and resins.

Several jars from the Uluburun shipwreck contained *Pistacia* resins. While 84 jars were recovered intact from the wreck, over 60 broken jars had lost their contents (McGovern & Hall 2015). Organic residues analysis showed that some of these jars carried traces of *Pistacia* sp. resin (probably terebinth), which was used in medicines or for incense, but also employed in the mummification process, and as a preservative for wine and fruit. In several cases, the jars were a quarter to half filled with resin; the other jars, however, contained chunks of resin. Botanical remains identified included grape seeds. This and other evidence from the Uluburun wreck demonstrates that Canaanite amphorae of Type 5-4 were not only used to hold liquid or semi-fluid substances, as their morphological features might suggest, but also solid foodstuffs.

In ten jars, the stoppers appeared to be preserved. McGovern & Hall (2015) note: 'in the bases ('toes') of these amphorae was a raw clay conglomerate, mixed with terebinth resin and fruit, carbonized grape seeds, weed and other plant seeds, grass and twigs, and other materials, covered by a pottery sherd'. The clay conglomerates may be interpreted as traces of the jars' original contents (a mixed material), or as a sort of stuffing designed to strengthen the bases, but more plausibly as the remains of their stoppers which would have sunk to the bottom of the jars after imploding. Obviously, the contents of jars often get mixed around in shipwrecks. Once again, in the view of McGovern and Hall (2015): 'most of the intact amphorae, which had less than 100 g of resin, and an unknown number of the broken 'empties' might originally have contained wine for trade and gifting in the eastern Mediterranean'. Thus at least part of the cargo may have consisted of resinated wine, although at least some jars contained terebinth resin only. Stern *et al.* (2008: 2202) have suggested a different reading based on their own organic residue analyses, arguing that the Uluburun shipwreck is an example of a mass shipment of resin.

A major analytical project examining both clays and organic residues has been undertaken in relation to Canaanite jar sherds unearthed at Amarna and Memphis in Egypt (Serpico *et al.* 2003). With regard to contents, inscriptions on sherds from Amarna suggest the presence of oil, resins and honey; chemical analyses (Gas Chromatography/Mass Spectrometry, or GC/MS) confirmed the presence of resins (*Pistacia* sp.) and more rarely of lipid matter consistent with oil; no traces of honey have been identified. A related study has attempted to link data from analyses of jar contents with data on clay composition, and thus with the geographical origin of jars (Smith *et al.* 2004). A further, but more difficult step is to link clay composition with the analysis of jar morphology, or shape. At present, with regard to the Canaanite jars discovered in Egypt, researchers can only acknowledge that it is particularly challenging to establish a pattern of correspondence between clay fabrics and morphological shapes. At Amarna, both the ovoid jar (Shape 1 in my own typology) and the angular-shouldered jar (my Type 5-4) occur, and both shapes have been linked to several groups of fabrics and to a range of different contents.

Both the Canaanite jars found on the Uluburun shipwreck and those recovered in Egypt suggest that the idea of a specialised container developed for the wine trade must be rejected: the LBA angular-shaped jar (Type 5-4) did not serve exclusively as a wine container. In addition to resinated wine, these amphorae also held resins or solid foodstuffs.

This synthetic overview of organic residue analyses seems to confirm that a similar range of contents may be assumed for the various types of amphora, regardless of their specific shape. In other words, there is no indication that, during the LBA, either Type 5-4 or Type 4-2 was fully specialised in terms of its designated contents.

Distribution

Having outlined in detail the geographical and chronological distribution of both main types analysed here, I now take up and develop a few of the more crucial points. With regard to chronological distribution, as we have seen the angular-shouldered jar was typical of and virtually exclusive to the LBA, particularly to the LB II; it is likely that production of this jar ceased in the final stages of the LB II. On the contrary, the LBA Type 4-2 bellied jar evolved during the EIA into the very similar Type 4-1 with a slightly modified shoulder profile. Thus the angular-shouldered conical jar is a largely LBA shape, whereas the bellied and slightly carinated jar is a LB–EIA form. In Iron I, new southern types (e.g. my Type 5-5) replaced Type 5-4, but these new EIA types cannot be interpreted as a straightforward evolution of 5-4. Rather they more generally developed in the broader tradition of LBA jars with carinated shoulder, which included both angular-shouldered *and* bellied, slightly carinated LBA amphorae. It follows that the production and diffusion of the angular-shouldered conical jars (Type 5-4) was associated with economic needs specific to the LBA, particularly with the need for a shape suited to maritime trade. In contrast, the bellied shape (Types 4-2 and 4-1) continued to be used during the LBA–EIA transition, within a similar network of exchanges.

With regard to geographical distribution, the angular-shouldered jars were widely spread, occurring along the entire Levantine coast, but also in several other regions, such as Mycenaean Greece and Egypt.

As mentioned above, it is unfortunate that petrographic and chemical analyses of clays have not yielded a clear-cut match between the fabrics identified and the different morphological shapes: each shape is associated with multiple groups of fabrics. For example, in relation to the Canaanite amphorae recovered at Amarna and Memphis in Egypt, at least six groups of fabrics have been identified by those involved in the 'Canaanite Amphorae Project': *Group 1* vessels are thought to have come from the southern Levantine coastal region, south of the modern border between the Lebanon and Israel (in jars belonging to this group, residues of resins have been detected); *Group 2* sherds appear to come from the same area, but more precisely from the region south of Akko (with hieratic inscriptions mentioning incense and honey, but analyses showing only traces of *Pistacia* sp. resin); *Group 3* fabrics seem to be linked with Galilee or more probably with the Akkar plain (with no traces of contents reliably identified); *Group 4* is likely to have been produced in the region of Ugarit or on Cyprus (with inscriptions mentioning oil, and GC/MS analyses confirming the presence of lipid matter); *Group 5* specimens are thought to have come from the Lebanon or Syria (with inscribed sherds referring to oil, and analyses showing the presence of lipids); *Group 6* sherds (which bear neither inscriptions nor residues) may have originated in northern Syria or Cilicia, or perhaps on the southern coast of Cyprus (see Serpico *et al.* 2003: 372–373). Importantly, the only analysed sample of the 80 angular-shouldered jars found in the storeroom at Minet el-Beida belongs to Group 4, believed to have been produced in the region of Ugarit (Serpico *et al.* 2003: 372). We may therefore conclude that Type 5-4 corresponds—at the very least—to the Group 4 fabrics identified in the Amarna Project, as well as to the Group 2 fabrics. Consequently, it has been confirmed that the 'commercial' and 'maritime' Type 5-4 was produced along the entire coast of the Levant and shipped from different Levantine harbours to overseas regions such as Egypt and Mycenaean Greece.

One crucial point, however, is that the LBA Type 5-4 angular-shouldered jar was not widespread in Cyprus, whereas the bellied types 4-2 (LBA) and 4-1 (EIA) were

well known on the island. Analyses of clays have shown that imported specimens are likely to have originated in a number of external regions, mainly concentrated along the Syro-Palestinian coast, but also that several jars could have been manufactured locally in Cyprus (Gunneweg *et al.* 1987; Hadjicosti 1988; Jones & Vaughan 1988; Eriksson 1995). Recent investigations on the provenance of Canaanite jars in Cyprus, combining petrography and lead isotope analysis, have suggested that ‘it is possible to discriminate between Cypriote ‘Canaanite’ ware and imports’, and that several jars may have been produced locally near the Cypriot sites at which they were used, such as at Hala Sultan Tekké in the southeastern part of the island (Renson *et al.* 2014: 276).

Type 4-2 and its evolved version, Type 4-1, mainly occur at Syrian coastal sites (from Ugarit to Tell Kazel), in Cyprus and in Cilicia, with only a few specimens identified elsewhere (in the southern Levant and on the Libyan coast). The distribution of the bellied amphorae therefore suggests a northern Levantine ‘network’ of trade on a smaller scale, but clearly spanning the end of the LBA and the EIA.

Conclusion: MTCs and multiple trade networks in the northern Levant in the LBA–EIA

In conclusion, I highlight a few key implications of the evidence reviewed here. In my view, the angular-shouldered Type 5-4 corresponds to trade mechanisms typical of and exclusive to the LBA. This morphological shape was developed to meet the requirements of maritime transport, within the framework of international trade connected with a palatial system, and therefore conducted by emissaries of the palaces. It may therefore be viewed as a ‘standardised’ shape, not in the sense of a specialised form designed to hold one particular type of contents (such as wine or oil), but rather in the sense of a standard form produced along the entire Syro-Palestinian coast and exported in the context of long distance trade with Greece and Egypt. In contrast, the bellied jar, Types 4-2 and 4-1, may be viewed as representing a different kind of maritime network that seemingly remained unchanged across the LB II and Iron I periods.

We may therefore hypothesise the existence of different patterns of maritime trade in the LBA, particularly in the thirteenth century BC. On the one hand, a large-scale international network, as reflected in the distribution of Type 5-4 jars, was arguably managed by the rulers of the main political entities in the eastern Mediterranean, acting through their middlemen and dependents, such as merchants and mariners. There is some evidence that Cypriots played a role as middlemen, given all the Cypriot pottery and oxhide ingots found on the Uluburun ship, as well as the spread of ‘the practice of marking vases after firing’, which was ‘a peculiarly Cypriot habit’ (Rutter 2014: 61). Nonetheless, the products shipped in angular-shouldered jars were not directly transported to the island, nor locally produced there; these products—oil, wine, or resins, but also olives, honey and other foodstuffs—were rather shipped to Greece or Egypt, in the context of core-core and core-periphery relations among rulers of higher and/or lower rank, and within the broader framework of the international trade network in the LBA. The latter ‘international’ and long distance distribution network also involved many intermediaries and agents.

On the other hand, the products contained in the bellied, slightly carinated jars of Types 4-2 and 4-1 arguably were shipped within a more limited but highly dynamic network: goods were bought and sold along a sort of ‘trading channel’ connecting

nearby regions, such as coastal Syria, southern Anatolia and Cyprus. This pattern of trade likely involved a vast number of actors, such as merchants or middlemen, wholesalers, agents, distributors and retailers.

While it is impossible to identify a regular pattern of correlation between jar shapes and contents, I surmise that the products contained in these different types of amphorae were likely not wholly equivalent, because the evidence suggests that, while various kinds of oils or honey (and maybe wine) were commonly transported in both types of vessel, resins may have been more typically shipped in the angular-shaped jars (in advancing this hypothesis, I only take into account the jars that are likely to have been filled with resins and not those that may have carried resinated wines).

In sum, the morphological study of complete vessels clearly can advance our understanding of trade dynamics in the LBA and EIA eastern Mediterranean, especially in the northern Levantine area. In the dialectic among different interpretative models, such as the peer-polity model on the one hand, and the core-periphery model on the other, we may observe that in the LBA these two distinct perspectives seem to have been integrated, insofar as they undoubtedly co-existed. International maritime trade, as evidenced by the distribution of the angular-shouldered jars, may be understood as an expression of the dynamics of interaction among the main political players, thus as hierarchical exchanges taking place within a world-system model of which core/core or core/periphery relations are a part. However, this maritime high rank trading network stood side by side with multiple inter-societal, low rank exchange networks, such as the maritime trading network indicated by the Syrian bellied and slightly carinated jars, which were imported to and perhaps locally produced in Cyprus. A sort of decentralized *interstitial* trade came into existence in the thirteenth century BC (Sherratt 2013: 636) and subsequently developed even further, with Cyprus as its core centre (Sherratt 1998: 292–313; 2003; Pedrazzi 2010: 53).

Within this overall scenario, merchants played a truly 'transformative' role, as Monroe (2011: 93) recently pointed out. They contributed to the creation of a multi-centred economy, with various overlapping trading patterns, involving different kinds of actors, and not only the 'great powers' of the LBA, but also the supposedly 'marginalised' people (such as those of Cyprus, Syria, Palestine, and Nubia—Monroe 2011: 93), and—most importantly—not only involving a periphery supplying the core (or cores), but also peer-polity interaction. Obviously enough, the first of our two hypothesised models, international maritime trade, was destined to collapse at the end of the LBA, whereas the more dynamic and 'interstitial' maritime trade flourished in the new era, the EIA, given the decline of the palatial system throughout the eastern Mediterranean.

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