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BETWEEN EAST AND WEST: AMORGIAN POTTERY IN EARLY BRONZE AGE HERAION (SAMOS)

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Abstract

The island of Samos occupies a key position between the central Aegean and western Anatolia during the third millennium BC. A recent study of the substantial pottery assemblages from the pivotal site of Heraion has defined a rich stratigraphy covering the entire Early Bronze Age (EBA). Currently the only known EBA site on Samos, Heraion has provided the opportunity to undertake a holistic ceramic study with the aim of defining and characterising local pottery production and, by extension, determining for the first time a secure provenance of suspected imported vessels, through the application of an integrated typological/morphological, macroscopic and microscopic (ceramic petrography) analytical methodology. This diachronic ceramic study,

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alongside a comparative fabric study of pottery of known origin from a number of contemporary sites, shows clear evidence for the exchange/importation of specific vessel shapes and, in the case of the collared jars, presumably their contents. This enables the reconstruction of patterns of interaction during the later phases of EB II, when there was a particular acceleration in the movement of goods. The present paper draws on a distinctive ceramic class (blue and red schist/phyllite fabrics/wares) and vessel types (transport jars with incised/slashed handles and beaked jugs with a two-stage neck profile) particular to the EB II late period and discusses them in relation to already published or analysed data from selected Cycladic and Anatolian sites.

INTRODUCTION

The archaeology of the Aegean and Anatolian EBA, covering chronologically the third millennium BC (cf. Rahmstorf 2016 with references), has been dominated largely by efforts to seek the roots of societal complexity which characterise the second millennium palace societies and early states, building on or reacting to Renfrew's influential work (1972). Fundamental to such research has been the recognition of transformations in the scale and frequency of movement of goods and people.

The EB II period (ca. 2750-2200 BC), characterised by Renfrew (1972, 451) as a time of the 'International Spirit', has received special attention in the investigation of long-distance exchange networks, cultural interaction and connectivity, and technological transfer (e.g. Broodbank 2000, 279-287; Knappett and Nikolakopoulou 2015; Gauss *et al*. 2016), particularly discernible in the identification of ceramic links between distant sites or distinct cultural regions (Alram-Stern and Horejs 2018). This has entailed narratives of maritime interaction and communication in an area dominated by the Cycladic archipelago and a range of islands only a short distance offshore from the Asia Minor coast. Broodbank's examination of the Cyclades concentrated on connectivity and the social standing that comes from journeying, seafaring, and technologies of mobility (Broodbank 2000). Currently, popular network approaches and developments in social network analysis theory also privilege ideas of mobility (Leidwanger and Knappett 2018; Tartaron 2018; Knappett and Kiriatzi 2016), pointing towards the active participation of a range of agents, causes, and incentives in the transmission of goods

and knowledge. These have shifted away from generalised models of similar trends between one geographical node/link to another.

It is clear, therefore, that maritime routes and the ports of call that facilitate such movement are crucial in the understanding of social and economic activity at this time. These are usually investigated in archaeological contexts by ceramic material culture and EB II (cf. mature/developed-late) is characterised by the spread of a number of drinking/serving, transport, and storage vessels across a wide area (Maran 1998, 432-433; Şahoğlu 2005; Angelopoulou 2008; Wilson 2013; Pullen 2013; Day and Wilson 2016). The later phase of EB II has attracted special attention as it hosts a westward extension of Anatolian cultural traits, including pottery types, in the islands of the Eastern Aegean, the Cyclades and specific areas of Mainland Greece as part of the much discussed Kastri Group/Lefkandi I phenomenon (Pullen 2013; Broodbank 2013; Kouka 2013).

[Figure 1 near here]

Pottery has been key to investigating these issues, mainly through typological and stylistic analysis and the identification of similarities between sites/regions (Rutter 1979; Sotirakopoulou 1997; 2008), with morphology and design traditionally being interpreted in terms of cultural affiliation, 'influence', the mobility of populations and the passage of time. This has followed the various interpretational orthodoxies and developments in archaeological theory, originated in culture-historical approaches that favour exogenous factors and the evolutionary nature of cultural change.

Recently, however, there has been a turn in ceramic studies which highlights technological variability and transmission, characterising craft practices in detail and moving beyond vessel form and surface finish (Day *et al*. 2019; Menelaou 2018; Mentesana 2016). This allows an investigation of the transfer of technological practice and even the movement of craftspeople, though, of course, the detection of such movement and change of time requires the establishment of locations of production. Without knowing whether different pottery categories are made in the same location or preferably where they are manufactured, our attempts at reconstructing patterns of

cultural variability and even chronological phases are compromised (Burke *et al*. in press). Thus, the integration of new analytical methodologies in ceramic analyses has demonstrated that questions of the distribution of pottery can be approached in a more meaningful way, examining not only the movement of the pottery itself, but also its technological character revealing mobilities and transmission.

Petrography, integrating macroscopic study of whole ceramic assemblages, has become a regular part of most work in EB Crete (Wilson and Day 1994; Wilson *et al*. 1999; Nodarou 2011; Mentesana 2016; Papadatos and Nodarou 2018) and the Cyclades (Hilditch 2013; 2015), with analytical programmes commenced in the Peloponnese and Attica more recently (Burke *et al*. 2016; Burke *et al*. 2018). However, the rarity of such work in the eastern Aegean, or even western Anatolia (e.g. Day *et al*. 2009; Semiz *et al*. 2018), has impeded a better understanding of the very islands often thought of as intermediaries or stepping stones in the transmission of finished products (e.g. ceramic containers), knowledge and ideas, and people from East to West. When some influential models of contact (e.g. Şahoğlu 2005; Efe 2007) postulate such E-W routes, such an understanding is vital.

Despite being rather neglected within Aegean-Anatolian prehistoric archaeology, the Asia Minor coast forms a significant interface between the Aegean basin and the Anatolian plateau, itself linked through long distance exchange with early complex societies across the Eastern Mediterranean. It is with this background that a project of integrated ceramic analysis of the rich EBA pottery sequence from Heraion on Samos was undertaken as a doctoral research project (Menelaou 2018). This major study has enabled a renewed understanding of ceramic development and the interaction between the Asia Minor coast and the island world of the Aegean.

The present article draws on results from this integrated analytical programme of pottery at the island settlement of Heraion on Samos (Figure 1) and considers anew issues of connectivity and ceramic exchange by the detailed characterisation of local ceramic production throughout the EBA and the targeted analysis of suspected imports. This aims at building a regional and inter-regional understanding of ceramic interactions

characterising the later third millennium BC, and especially shifts or continuities in connectivity.

A number of suspected imports have been identified at Heraion by macroscopic and microscopic analysis (Menelaou *et al*. 2016; Kouka and Menelaou 2018). In this article, two vessel types, namely the beaked jug with a two-stage neck profile and the collared jar with incised/slashed horizontal handles, thought by some to be transport jars (Wilson 1999; Day and Wilson 2016; Knapp and Demesticha 2017), are at the centre of our analytical focus. Whether or not these types are entirely contemporary in all sites discussed in this paper, a common agreement exists that dates them to the EB II, mainly its mature and late phase. These particular shapes are of importance in emerging debates, as a change in the general nature of pottery shape repertoires took place during EB II (Day and Wilson 2004; Pullen 2013), perhaps related to the exchange of jars designed to contain liquid produce, an early phase of containerisation (Day and Wilson 2016, 31-33). These changes, including an emphasis on pouring, hosting and the appearance of individual ceramic sets for the table seem to reflect a widespread change in commensal politics (Wilson 1999, 235; Wilson *et al*. 2008, 268).

While these specific pottery types have been shown to have been produced in a range of production centres, they are exchanged widely, emphasising the direction and intensity of interaction. In fact, with the increasing reliance on objects in reconstruction of networks, knowledge of the provenance of pottery types takes on increasing importance, as morphology and surface treatment alone are not sufficient to determine their source. Indeed, the recognition of sources of specific, distinctive types is fundamental, and requires us to work within an avowedly comparative perspective beyond the boundaries of our assemblages and sites.

With the above in mind, whilst concentrating on the jug and jar shapes referred to above, this paper focuses on examples of two specific macroscopic fabrics, namely those labelled here ‘Blue/Purple Phyllite’ and ‘Red Phyllite’ (though the same fabrics have been referred to with other names in previous literature; see below). These have been identified and discussed at other sites, in the Cyclades and linked to production on the island of Amorgos. Here we examine the occurrence of these fabrics at Heraion,

Samos and discuss this in the context of other sites we have studied, along with recent publications of petrographic analysis. The movement of vessels and, in some cases, their contents from the island of Amorgos is then discussed, especially regarding the occurrence of such vessels at the Heraion.

METHODOLOGY

The occurrence of these distinctive fabrics at Heraion has been established during a major macroscopic study of the entire EB sequence at the site by Menelaou. This established contextual and typological information, which was then built upon by detailed microscopic study and a targeted programme of ceramic petrography. The aim of this analytical research was to determine the provenance of suspected imports, taking into consideration ongoing discussions on the establishment of exchange networks in the eastern Aegean region. This methodology has enabled three basic insights:

1. Grouping and fabric characterisation through the identification of petrology and other compositional features of the clay paste.
2. The reconstruction of key components in the production technology of the pottery and of crafting choices, applying the *chaîne opératoire* approach, a socially contextualised approach to the manufacturing process from the choice and manipulation of raw materials through to finished products.
3. Provenance determination through the identification of geological and/or geographical source of raw materials.

Ceramic petrography, the main technique employed in this paper, enables the definition of different fabric groups through the composition of clay and inclusions. Where possible, this grouping has been used to suggest the provenance of specific vessel shapes. Sixteen samples (Table 1) were selected from the EB II late phases at Heraion (see Kouka and Menelaou 2018 for contexts and chronology), out of 300 thin sections of Chalcolithic and EBA pottery examined from the site (Menelaou 2018).

MORPHOLOGICAL AND TECHNOLOGICAL CHARACTERISTICS

The study commenced with the macroscopic examination of pottery and its classification according to morphology, surface modification, wares, and fabrics,

correlated with stratigraphy. This study comprised a full review of ceramic phasing and stratigraphy of both the old and new excavations at the site. The two contemporary pottery shapes considered here, the transport jar with slashed/incised handles and the beaked jug with a two-stage neck profile, are both dated to the EB II late period.

[Table 1 near here]

Beaked Jug with a Two-stage Neck Profile

This jug type is characterised by a two-stage neck profile, where the lower truncated part is separated by a funnel-shaped upper part, a usually leaf-shaped mouth, and a strap or oval, tubular handle. The vertical handle can vary from elliptical to flattened oblong in cross-section and usually appears with incised zig-zag, herringbone decoration or with parallel diagonal incisions from lower right to upper left. Two examples are known from Heraion, identified in the area of the Hera Temple, and comprise of a larger (Milojčić 1961, pl. 44:2; Kouka and Menelaou 2018, 128-129, fig. 5: Heraion II.d; petrographic sample Heraion 15/155) and a smaller beaked jug (Figure 2).

This type is thought to be Cycladic in origin (Sotirakopoulou 1993, 5, 8, 11-13 with further bibliography; 1997, 526; 2008, 541, fig. 2:19). The Heraion examples find exact typological, chronological, and fabric parallels at Panormos on Naxos (Angelopoulou 2003, fig. 30; 2008, 151, fig. 16.12; 2014, 226-228, fig. 3.68:BI.α.3) and probably also Dhaskalio Phase A on Keros (Sotirakopoulou 2016, 48). Further parallels in fabric and in decoration of the strap handle can be found in Markiani Phase III on Amorgos (Birtacha 2006, 137, fig. 7.14:1, pl. 33c-d) (Figure 3).

Examples in ‘Blue Schist’ and ‘Red Schist/Phyllite’ fabrics are known already from Dhaskalio Phase A on Keros (one neck sherd and one strap handle with incised decoration), as well as in Phases B (five sherds) and C (two sherds) (Sotirakopoulou 2016, 116-117, 276, figs. 3.1:32, 3.70; Hilditch 2013, tabs. 23.9-23.10). This evidence adds to the scanty picture we have from the Kavos Special Deposit North on Keros (Broodbank 2007, 147, fig. 6.16:228-229).

[Figure 2 near here]

[Figure 3 near here]

Transport Collared Jar with Incised or Slashed Handles

EB II collared jars are characterised by a globular or elongated ovoid shape with rounded or slightly flattened to indented base, ranging in height from 30cm to 50cm. They have two opposing handles at about the point of maximum diameter. These jars have one of two handle types: vertical strap handles and horizontal handles with an elliptical or semi-elliptical, triangular or circular cross-section, the latter bearing decoration of incised or slashed radiating lines on the upper surface. These two types have meaning in terms of both chronology and regional distribution, according to different production centres across the Aegean, but it is the version with horizontal handles that are discussed here. This latter type represents a developed/mature-late EB II feature, while those with vertical strap handles represent generally an earlier EB II chronology (Day and Wilson 2016, 17).

Day and Wilson (2016, 17) have suggested that this incision on the handles may comprise a skeuomorph of rope or cord tied around the handles to enhance grip. It can vary from deeper incisions/grooves that are parallel and slightly curved to examples that are less dense and thinner, which can also represent chronological and geographical provenance differences. Some jars have 'plug-in' handles, where their attachment to the body causes swellings or cylindrical protrusions on the interior. Jar collars also vary, including concave- or cylindrical-necked jars, short collared necks and two-stage neck profiles. These neck types can also have regional patterns, for example, marked two-stage necks, sometimes with a concave interior to the upper part of the neck, have been argued to be a Western Cycladic trait (Wilson 2013, 400; Day and Wilson 2016, 22).

[Figure 4 near here]

The majority of individual vessels recovered at Heraion comprise horizontal handles (Figure 4), identified in the area of the Hera Temple (e.g. Milojčić 1961, pls. 24:1 and 48:33; Kouka and Menelaou 2018, 128-129, fig. 5: Heraion II.e). Only one vessel is almost entirely preserved and bears incised decoration in the form of a fish motif on its

upper part (Milojčić 1961, pls. 16:3 and 44:3; Figure 4, top). In the context of the present paper, it is important that a similar incised motif occurs also on a beak-spouted jug of a potentially different fabric (Milojčić 1961, pl. 19:7). This decorative motif or other curvilinear ones with concentric arcs are known from Dhaskalio Phase A on Keros (Sotirakopoulou 2016, 53, fig. 2.28) and Markiani Phase IV on Amorgos (Eskitzioglou 2006, 155, fig. 7.17:1, 7.26:14, 17, 18, pls. 36e, 38a). Other examples of collared transport jars at Heraion (Figure 4, bottom) include body sherds (HS13.28.39; HS13.28.54) and rim/neck sherds (HS13.67.11; HS13.69.9), identified in the area north of the Sacred Road (Kouka 2017, fig. 9.7).

Common examples of incised/slashed handles are known throughout Early Cycladic (EC) II in the Cyclades (Figure 5) and, indeed imported to Crete in Early Minoan (EM) IIA levels at Poros-Katsambas and Knossos (Wilson *et al*. 2008, 265, fig. 26.4:a-f). A large number of Cycladic production centres have been identified by recent contextual and analytical studies (Sotirakopoulou 1993, 15, n. 81-93; 1999, 210-212; Wilson 1999, 235; Day and Wilson 2016, 25-30), while a number of Cycladic and east Aegean sites reported the presence of the fabrics under discussion. In addition, growing evidence of imported transport jars is also becoming available from western Anatolian sites (Troy, Liman Tepe, Gümüldür,[1] Çukuriçi Höyük, etc.). (Table 2).

[Table 2 near here]

Research on Keros and Dhaskalio has been more precise than most in terms of the detailed recording of macroscopic fabric and gives us an insight into the frequency there of the specific fabrics that are addressed in this paper. Sotirakopoulou reports one ‘Blue Schist’ jar handle at Dhaskalio in Phase A (2016, 29, 53, tab. 2.2, fig. 22.6), and remarks that out of a maximum number of 50 horizontal slashed handles in Phase B, 28 are in ‘Blue Schist’ or ‘Blue-and-Red Schist’ fabrics. Furthermore, of the 24 slashed handles in Phase C, the majority are made in the Amorgian fabrics (Sotirakopoulou 2016, 307, fig. 4.98, 4.224).

[Figure 5 near here]

MACROSCOPIC FABRIC ANALYSIS

Macroscopic analysis of the Heraion material allowed the identification of distinct technological stages (raw material choice, paste preparation, forming, surface treatment, firing), correlated with typological patterns and stylistic/morphological features. The main features recorded were the colour, texture, hardness, feel of surface, fracture, voids, as well as a preliminary identification of non-plastic inclusions and description of size, shape, roundness, frequency and sorting within the paste (Table 3). The two macroscopic fabrics under consideration here are now described.

Blue/Purple Phyllite Macroscopic Fabric Group

This distinctive group (Menelaou 2018, 142, 615-618) is characterised by angular, platy and elongate blue/purple, low grade metamorphic rock inclusions displaying foliation, most probably phyllite, a low grade metamorphic rock, set in a dark red/reddish brown to reddish yellow (2.5YR 5/6-5/8, 5YR 5/4-5/6) coarse clay paste with a soapy-smooth feel (Figure 6). The surface is occasionally covered with a matt slip. It is readily identifiable macroscopically and it has clear parallels from other Aegean sites of the EB II period. The fabric and form of these vessels at Heraion clearly represent non-local products.

The fabric corresponds to the 'Blue Schist' macroscopic fabric group described by Broodbank (2007, 124-125, 179) in the EC II Kavos Special Deposit North on Keros and is directly comparable with the 'Blue Schist Ware' frequently encountered in Markiani Phases III-IV on Amorgos (Vaughan 2006, tab. 7.3; Marangou *et al*. 2008, 102), with rare examples in Phase II (Karantzali 2006, 107, 123, 158, tab. 7.6). It is also called 'Glaucophane-Schist' fabric, 'Phyllite-Quartzite' fabric, and more recently 'Coarse or Dark Phyllite' fabric and has been identified in other EB II Cycladic sites, including Panormos on Naxos (Angelopoulou 2003, 172; 2008, 151; 2014, 93-94: 4.33% relative frequency), and Skarkos on Ios (Marthari 2008, 79). It has been documented at Akrotiri on Thera by Sotirakopoulou (1999, 69-71, tab. 10) and by one of the present authors in transport jars from an EB II late deposit in Pillar Pit 35 (Kariotis *et al*. forthcoming), from Phylakopi on Melos (Broodbank 2007, 125) and Kavos on Keros (Hilditch 2007, 239, 247, fig. 6.48; 2015, 220, 234 [V3A Macroscopic Group]; 2018, 447, tab. 7.1). More recent finds include the material from Dhaskalio,

where this fabric shows a considerable increase from Phase A to Phase B (Sotirakopoulou 2016, 18, 71, 74, tabs. 2.6-2.7, 3.6 [braziers, cooking pots, concave/cylindrical-necked jars, horizontal arched handles]; Hilditch 2013, 467, 471-472, tabs. 23.3-23.4). A considerable decrease is noted in Phase C, occurring mainly in barrel jars, and smaller quantities of neckless jars, basins, and cooking pots (Sotirakopoulou 2016, 157, 162, tabs. 4.2, 4.6). It may be of interest that, despite the large number of such jars being present in EM IIA at Poros-Katsambas on the north coast of Crete, this fabric is *not* present.

The fabric has been positively identified as local to the island of Amorgos, as it is present in several sites throughout the island (Broodbank 2007, 124-125; Birtacha 2006, 135: Kastri, Kato Akrotiri, Ta Nera, Vigla, Vouni, Sellades, Xenotaphia, etc.) in larger amounts than at any other sites in the Cyclades (Vaughan 2006; Day and Wilson 2016, 29). At Kavos on Keros and Dhaskalio there appear to be different subgroups with the additional presence of angular crystalline inclusions and occasionally red shale/phyllite, which might reflect the exploitation of different, but still related, clay sources or even the existence of different, contemporary potting traditions (Hilditch 2015, 220-221).

[Figure 6 near here]

Red Phyllite Macroscopic Fabric Group

This fabric is present in only one sample and most likely relates to the previous fabric as they share common inclusions (Menelaou 2018, 142-143, 619-620). It has a coarse, red-orange base clay and is characterised by the presence of red-brown, elongate and angular inclusions that can be identified as phyllite or shale.

As in the case of the Dark Phyllite Macroscopic Group, it finds strong parallels in assemblages from Amorgos, where it has been described as the 'Red Shale' macroscopic fabric (Vaughan 2006, tab. 7.3). It corresponds to the 'Red Schist' group from Kavos Special Deposit North on Keros (Broodbank 2007, 125, tabs. 6.4-6.5) and to 'Red Phyllite' (Macroscopic Group V4) at Dhaskalio, where this fabric shows an increase from Phase A (2.8%) to Phase B (4.8%) and a decrease in Phase C (1.7%) (Hilditch 2013, 472). Broodbank (2007, 125) suggested an Amorgian provenance,

perhaps reflecting a different production location/unit or different raw material sources to that of his 'Blue Schist' macroscopic fabric group. However, a more detailed understanding of the variation within these fabrics is needed for such interpretations to be valid. It is represented in comparative material in various shapes, but beaked jugs with a two-stage neck profile are made in this fabric only in Phase B (Hilditch 2013, tabs. 23.9). A similar picture is observed between Phases II and IV at Markiani on Amorgos (Renfrew 2006, 97, tab. 7.1), but 'Red Schist' is generally less frequent than 'Blue Schist' (Birtacha 2006, 131, 138, 162, tab. 7.10; Eskitzioglou 2006, 139, 143, 146, 149, 164, tab. 7.14 [tankards, baking pans, hearths, collared jars with slashed handles]). Other parallels include examples from Panormos on Naxos (Angelopoulou 2014, 93).

[Table 3 near here]

PETROGRAPHIC ANALYSIS AND PROVENANCE DETERMINATION

Petrographic analysis provides a visual continuum from the morphostylistic and macroscopic fabric analyses. It aims at the reconstruction of technological practice (raw material processing and clay preparation, forming techniques, firing characteristics) and where possible, to suggest provenance through comparison with geology and petrographic data from comparative assemblages. In order to investigate the distribution of the two characteristic vessel types found in this fabric at Heraion, comparative material included contemporary sites across the Aegean and Western Anatolia, either published or currently being studied, including pottery by Day and collaborators from Ayia Irini on Kea, Akrotiri on Thera, Panormos on Naxos, Liman Tepe and Bakla Tepe. In the case of both the jugs and collared jars, petrography and the infrequent presence of these fabrics at Heraion suggested their non-local provenance. A full description of the fabrics is provided in the Appendix (see Supplementary file).

Coarse/Dark Phyllite Petrographic Fabric

Corresponding to the Blue/Purple Phyllite Macroscopic Fabric Group, this is characterised by a red to dark brown clay base and the dominant presence of coarse non-plastic inclusions that consist predominantly of low-grade, fine-grained metamorphic rock fragments and more specifically of red-brown, manganese and iron-

rich phyllite fragments grading into slate (Figure 7:A-B). The coarse fraction also contains mica schist, possible sedimentary rock fragments (quartz arenites/quartzites or sandstones), and quartz-feldspar aggregates. Judging from its weak optical activity, the fabric was fired to a relatively high temperature, probably in an oxidising atmosphere. Despite slight variability in texture, inclusion density and the ratio of phyllite/shale to quartz-rich rocks, this fabric is generally consistent and represents a tight group. Although easily recognisable macroscopically, the variation identified in thin section may reflect different raw material sources or even the existence of more than one production unit, although metamorphic material of this sort is inherently varied.

[Figure 7 near here]

This petrographic group has been recorded at a number of other sites:

Akrotiri, Thera: Akrotiri 03/120, 128, 132: three collared jars with slashed handles (Figure 7:C). These come from a large, late EB II fill of a rock-cut chamber (Chamber 35; Kariotis *et al*. forthcoming).

Panagia Koimisis, Therasia: Fabric Θ occurs in 1 sample (Kordatzaki *et al*. 2018, 12-13, fig. 7:l).

Keros and Dhaskalio: Petrographic Group P4 (Kavos Special Deposit North: Hilditch 2007, 239, 247, fig. 6.48; Kavos Special Deposit South: Hilditch 2015, 228; Dhaskalio: Hilditch 2013, 479).

Markiani, Amorgos: Phyllite-Quartzite Fabric occurs in 22 samples (Vaughan 2006, 99-100).

Panormos, Naxos: Coarse Phyllite fabric, Panormos 03/29 = B VI.β.3 (Angelopoulou 2014, 297), beaked jug with incised handle; 03/30 (Angelopoulou 2014, plate 3.58, right), jug/jar body with incised cross-hatching (Figure 7:D); 03/42 = B II.α.9 (Angelopoulou 2014, 281, pl. 3.55), transport jar; 03/44, transport jar with incised horizontal handle.

The petrographic analysis of selected samples from various assemblages from Kavos and Dhaskalio resulted in the identification of at least three sub-variants, according to the presence of calcite and quartzite and the combination of dark phyllite and red phyllite/shale (Hilditch 2018, 454, 485-486, P4A-C Groups, tab. 7.5, pl. 15). All

assemblages from Keros revealed a broad range of shapes in this fabric, including several jar types with incised handles, baking pans, cooking pots, pyxides, one-handled tankards, and depas cups (Hilditch 2015, 220, 231; 2018, 447, 454).

Wherever it is found, the consistency of this fabric demonstrates that it derives from one broad source. It is compatible with the flysch deposits of southern Amorgos where the sites of Markiani and of Minoa are located. The flysch contains deposits of blue shale/slate known locally as *patelia* that are used traditionally in the sealing of roofs. Its frequency and compatibility indicate a provenance in Southern Amorgos.

Red Phyllite Petrographic Fabric

This fabric is very similar to the Coarse/Dark Phyllite Petrographic Fabric in compositional and textural terms and is characterised by a red/orange-firing clay paste. It is characterised by the presence of elongate, low-grade metamorphic rock fragments, principally phyllite/shale, but also a substantial amount of medium to coarse-grained quartz-mica schist (Figure 8:A).

It is represented at Heraion by two transport collared jars with horizontal, slashed handles. Macroscopically it was not distinguished from the previous fabric, as the colour of the inclusions could conceivably be due to relative oxidation of the inclusions. This petrographic fabric was first identified by Vaughan (2006) at Markiani on Amorgos and was named 'Red shale' fabric (10 thin sections were included in this group). It was suggested to be local on the basis of its correlation with the 'Phyllite-Quartzite' fabric (see previous fabric group). Other possible petrographic parallels derive from the Kavos Special Deposit North on Keros, where it is named as 'Shale and quartzite' fabric (Hilditch 2007, 247, 253). At Dhaskalio it corresponds to petrographic fabric 'P4: Phyllite and marble' ('Dark/red phyllite sub-group') and covers a range of shapes (Hilditch 2013, 479). The same picture emerges for the Kavos Special Deposit South, both macroscopically and petrographically, and corresponds to a wide range of domestic shapes (Hilditch 2015, tab. 6.1, 220-221, 228, 231). Other parallels are found at the late EB II site of Panormos on Naxos (sample Panormos 03/16, a collared transport jar, Figure 8:B); in addition to an example in the late EC II fill referred to above at Akrotiri on Thera of the 'Red phyllite fabric' (samples Akrotiri 03/133, 134,

representing a two-stage jar neck and a transport jar with slashed handles; Figure 8:C-D).

[Figure 8 near here]

AMORGIAN FABRICS IN COASTAL ASIA MINOR

Grooved/incised horizontal handles and cylindrical necks belonging to a total of nine amphorae have been reported recently from Çukuriçi Höyük (Phase III) dated to the EB I period (Horejs and Weninger 2016, 130, Fig 4,8; Horejs *et al*. 2017, fig. 5.16; Röcklinger and Horejs 2018, 91, fig. 8). These vessels appear with a characteristic red-brown clay paste with metamorphic inclusions, most likely corresponding to the Slate Fabric from the same site. The latter fabric has been presented as being compatible with local manufacture (Peloschek 2017), yet this is part of a narrative that seeks to accommodate the wide variety of fabrics within a model of local production, interpreting the variability as different local fabrics and interpreting that in terms of practice of raw material selection and the structure of production.

However, such a level of variability in Aegean sites of the EBA and other periods almost always indicates the consumption of non-local pottery, even in the Neolithic. A model of 'compatibility' of local production of petrographic fabrics is usually based on broad geological characterisations. Yet the primary material for comparison with pottery should be pottery from other assemblages, preferably with an indication of provenance.

Instead, we note both the macroscopic and microscopic similarities between the familiar incised handled collared jars and the well-studied blue and phyllite fabric and contend that its similarities with the equivalent slate/phyllite fabrics from Amorgos imply importation from that island.[2]

The dating of these vessels at Çukuriçi Höyük also requires some discussion. It is argued that "Large closed jars with grooved decorated handles had already appeared in the earlier phase ÇuHö IV and were still in use in phase III (fig. 4, 8)" (Horejs and Weninger 2016, 130). ÇuHö III is dated to Troy I and EB I in Anatolian terms. Yet

collared jars such as these are well documented across the Aegean and never occur in undisturbed EB I contexts. Instead they are characteristic of EC II pottery production, with some suggestion of the Amorgian examples that they are more frequent in mature and late sub-phases. Their presence at Çukuriçi Höyük could reflect either an incompatibility of the relative chronological schemes used between western Anatolia and the Aegean, or the presence of an EB II phase at Çukuriçi Höyük that lacks architectural remains. The suggestion that "the assumed time of first emergence of these shapes might be reassessed at least for the eastern Aegean" (Röcklinger and Horejs 2018, 91) should be reassessed, as the occurrence of this vessel type is clearly recorded in a whole variety of other assemblages. Even when such jar handles occur at Liman Tepe they are in assuredly (local) EB II contexts (Şahoğlu 2011, 138-9, 265-6, cat no. 108, 109). Indeed we should be wary of special pleading, as it may mask problems of synchronicity in our terminology and chronology, between the Aegean and the Asia Minor littoral, which we try to explain as regionalism and a time-lag or precociousness in the adoption of specific stylistic elements.

This has been acknowledged further in Şahoğlu's research in Liman Tepe, where EC II dark-on-light painted (Şahoğlu 2011, cat. nos. 96-100) and urfirnis black slipped (Şahoğlu 2011, cat. nos. 101-107) sauceboats have been found in local EB I contexts. Sauceboats are assuredly an EB II phenomenon in the Aegean. Not only that, but the urfirnis sauceboats, for example, occur at Liman Tepe is in a well-known fabric (macro- and microscopic) found in the Cyclades and Crete in EB II contexts (for Ayia Irini, Wilson 1999, 71-75, 134). When found at Akrotiri-Thera, Knossos, Poros-Katsambas and Ayia Irini, these sauceboats are consistent in their fabric and share a single (probably Cycladic) source.

This is, then, the crux of the matter. Our increased ability to provenance pottery provides an extra confirmation that we are talking about the same objects from the same sources. In both the case of the blue schist collared jars at Çukuriçi Höyük and the sauceboats at Liman Tepe, we are dealing not only with morphological similarity, but of products demonstrated to be from the same production centres. In this case arguing for an early appearance of specific types in the East Aegean is not valid. Instead we have to look to the synchronisms of the phases we have constructed and named.

EAST AND WEST: AMORGIAN FABRICS, ROUTES AND THE ROLE OF HERAION

The identification of these characteristic imports in mature to late EB II at Heraion has revealed not only their provenance to be the island of Amorgos, but also has led us to make links with a number of other EB II sites, where the same pottery shapes and fabrics occur, both published (Keros/Dhaskalio; Markiani-Amorgos), so far unpublished (Akrotiri-Thera; Panormos-Naxos), and still others perhaps unrecognised (Çukuriçi Höyük).

These two very diagnostic and well-known ceramic types, namely the beaked jug with a two-stage neck profile and the transport jar with incised/slashed horizontal handles, seem to appear at about the same time in the later part of the EB II period and join other similar examples, especially in the transport jars, which reveal a number of production centres of both the vessels and - presumably - their exchanged contents. This forms part of a general phenomenon, in which the popularity of pouring and drinking vessels coincides with the emergence of the extensive trade in collared jars/amphorae and their liquid contents (Day and Wilson 2016). These sets of containers and serving vessels, which sometimes match in their surface finishes, further signalling the link in their intended usage, can be linked to major changes in commensal practice during EB II based around individual servings, hosting, and pouring. Their typological, compositional and distributional analysis has much to reveal about social practice, identity and competition (Day and Wilson 2004; Halstead 2012; Hamilakis 1999; Peperaki 2004). The mobility of the vessels encourages us to think of the transmission of practice and perhaps of the movement of people.

Of course, with the phenomenon of the Kastri Group/Lefkandi I, the emphasis has been on an East-to-West movement, whether one believes material culture, people - or both - are moving in that direction. The Amorgian pottery found at Heraion is a convenient reminder that, with the increased use of integrated analytical programmes, with a regional and inter-regional scale of investigation, we can acknowledge routes, but perhaps should see them as conduits where goods, ideas and people move in both (all?) directions. In other words, the examination and characterisation of local traditions and

the related context of receptivity of connectivity, and in extension the identification of geographical areas of pottery production and deposition, enables a better understanding of the exchange mechanisms responsible for the movement of ceramics from one place to the other.

The analytical programme at Heraion has demonstrated that the location of Samos on a major route between the Aegean and the Asia Minor littoral does not mean that it is just a receptor of either *Cycladicising* or *Anatolianising* ceramic forms. Instead it is an active participant in the changes in intensity of connectivity with certain areas but also changing consumption practices. Samos is situated in a very advantageous geographical area, on a maritime artery that links communication networks between East and West, and perhaps should be seen as a 'bridge' between western Anatolian littoral - Çukuriçi Höyük, Miletus, Liman Tepe, Tavşan Adası so to name a few sites contemporary with Heraion - and the Cycladic islands or even the west coastlands of Mainland Greece. More particularly, Samos is the last landfall before the Gulf of Kuşadası, if sailing from the South, crossing the passage between the islands of Rhodes, Kasos, and Karpathos, as well as the passage between the Dodecanese and the Cyclades (Papageorgiou 2002, 163-164, 303-321), and the first on the principal route from Asia Minor to the central Aegean and Mainland Greece or in reverse (Agouridis 1997, 8). Particularly important in this communication are the two arteries extending from the interior of Asia Minor: the Gulf of Ephesus northeast of Samos formed by the Kaystros or Küçük Menderes River, and the Meander valley to the southeast formed by the Büyük Menderes River. Thus, the appearance of a range of vessels across the Aegean and western Anatolia and the selective adoption, adaptation, emulation, and experimentation of specific elements indicates among others changes in directionality, intensity, and purposes of interactions. This is shown in its pottery assemblages, whether locally produced or imported (Menelaou 2018).

Our material with a provenance on Amorgos fits well into this picture. Studies of maritime interaction have emphasized the circulation of material goods and have assessed the centrality of EC settlements by geographical proximity. Broodbank, in his consideration of inter-island maritime connectivity, is often led to emphasise the important place that Amorgos occupies in a movement of goods and people between the

Aegean and Asia Minor. This is clear from something as basic as inter-island distance (Broodbank 2000, 75, fig. 15) and target/proximal point analysis (Broodbank 2000,136, fig. 39). While he is dealing with this in the context of colonisation, the clear routes that link Samos to the Central Cyclades, via Leros/Patmos, Levitha, Kinaros to Amorgos, show the importance of the latter island in maritime movement. Nevertheless, new approaches that rely on a combination of geographical distance, frequency of connections based on travel time, and the practicalities of ancient seafaring in the reconstruction of EC maritime connectivity have shown that sites such as Markiani on Amorgos has a limited potential for connectivity with the rest of the Cyclades, unless the connection is made through the north of the island (Jarriel 2018, 62, fig. 4). This 'cost-surface model' has also shown that during the EB II the area between Naxos and Paros and the area around the Erimonisia, including also western Amorgos, emerge as the centre of high connectivity in the Cyclades (Jarriel 2018. 69, fig. 7). While we can consider Panormos to be in the locale of Amorgos, just across the Erimonisia, the confirmation of the presence of these specific EB II maritime containers from Southern Amorgos in Akrotiri-Thera in a late EB II context is important, as the island is a springboard to further afield, though these specific fabrics do not seem to have been present in EM IIA Poros-Katsambas.

The appearance in Heraion of these pottery shapes from Amorgos casts further light on a late EB II phenomenon, where the Anatolian and Cycladic worlds are in intense contact. This is the period of 'longboat ideology' when Cycladic seafarers establish their reputation in the long-distance connectivity on both sites of the Aegean Sea and "through their role as mediators between Greece and the east at a time when - before the advent of sailing ships to this part of the world - the only route into the Aegean from the south-east via the Dodecanese and Cyclades (particularly Amorgos)" (Sherratt 2000, 18). That these pots represent both serving vessels and the means of transport of the contents served in these sets is important. Their indication of a movement *towards* the Asia Minor coast via Heraion is positive, especially if it encourages us to see the late EB II phenomenon of the Kastri Group as a multi-directional relationship.

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REFERENCES

AGOURIDIS, C. 1997: Sea routes and navigation in the third millennium BC Aegean. *Oxford Journal of Archaeology* 16(1), 1–24.

ALRAM-STERN, E., and HOREJS, B. (eds.) 2018: *Pottery Technologies and Sociocultural Connections between the Aegean and Anatolia during the 3rd millennium BC, OREA 10* (Wien, Österreichische Akademie der Wissenschaften-Philosophisch-historische Klasse, Oriental and European Archaeology).

ANGELOPOULOU, A. 2003: Η 'Ομάδα Καστριού' και το Κορφάρι των Αμυγδαλιών (Πάνορμος) Νάξου. In VLACHOPOULOS, A. and BIRTACHA, K. (eds.), *Αργοναύτης. Τιμητικός τόμος για τον Καθηγητή Χρίστο Γ. Ντούμα από τους μαθητές του στο Πανεπιστήμιο Αθηνών (1980-2000)* (Athens), 159–91.

ANGELOPOULOU, A. 2007: Κορφάρι των Αμυγδαλιών (Πάνορμος) Νάξου. Μία οχυρωμένη Πρωτοκυκλαδική ακρόπολη. In PROBONAS, I.K. and PSARRAS, S.E. (eds.), *Η Νάξος δια μέσου των αιώνων. Πρακτικά Γ' Πανελλήνιου Συνεδρίου, 4-7 Σεπτεμβρίου* 2003, (Athens), 101-26.

ANGELOPOULOU, A. 2008: The 'Kastri Group': Evidence from Korfari ton Amygdalion (Panormos) Naxos, Dhaskalio Keros and Akrotiri Thera. In BRODIE, N.J., DOOLE, J., GAVALAS, G. and RENFREW, C. (eds.), *Horizon/Ορίζων. A Colloquium on the Prehistory of the Cyclades* (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 149–64.

ANGELOPOULOU, A. 2014: *Κορφάρι των Αμυγδαλιών (Πάνορμος) Νάξου: μια οχυρωμένη Πρωτοκυκλαδική ακρόπολη* (Athens, Υπουργείο Πολιτισμού, Ταμείο Αρχαιολογικών Πόρων και Απαλλοτριώσεων).

ANGELOPOULOU, A. forthcoming: Astypalaia and the Cyclades: the pottery evidence from Vathy on Astypalaia. In MARKETOU, T. and VITALE, S. (eds), *SASCAR I. The*

Southeast Aegean/Southwest Coastal Anatolian Region: Material Evidence and Cultural Identity. The Early and Middle Bronze Age.Proceedings of the Conference Held at the Italian Archaeological School at Athens, 12th-14th May 2016 (Rome).

AVGERINOU, P. 1997: Ο οικισμός της Μύρινας. Πρώτες εκτιμήσεις. In DOUMAS, C.G. and LA ROSA, V. (eds.), *Η Πολιόχνη και η Πρώιμη Εποχή του Χαλκού στο Βόρειο Αιγαίο, Διεθνές Συνέδριο, Αθήνα 22-25 Απριλίου 1996* (Athens, Scuola Archaeologica Italiana di Atene, University of Athens), 273–81.

BERNABO BREA, L. 1964: *Poliochni, città preistorica nell'isola di Lemnos, I*. Monografie della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente 1 (Rome).

BERNABO BREA, L. 1976: *Poliochni, città preistorica nell'isola di Lemnos, II*. Monografie della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente 3 (Rome).

BIRTACHA, K. 2006: The pottery from Markiani Phase III. In MARANGOU, L., RENFREW, C., DOUMAS, C. and GAVALAS, G. (eds.), *Markiani, Amorgos: An Early Bronze Age fortified settlement. Overview of the 1985-1991 investigations* (London, British School at Athens Supplementary vol. 40), 130–38.

BLEGEN, C.W., CASKEY, J.L., RAWSON, M., and SPERLING, J. 1950: *Troy I. General introduction. The first and second settlements* (Princeton).

BLEGEN, C.W., CASKEY, J.L., and RAWSON, M. 1951: *Troy II. The third, fourth, and fifth settlements* (Princeton).

BROODBANK, C. 2000: *An island archaeology of the early Cyclades* (Cambridge).

BROODBANK, C. 2007: The pottery. In RENFREW, C., DOUMAS, C., MARANGOU, L. and GAVALAS, G. (eds.), *Keros, Dhaskalio Kavos/Κέρος, Κάβος Δασκαλιοῦ. The investigations of 1987–88*. *Keros 1* (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 115–237.

BROODBANK, C. 2013: “Minding the gap”. Thinking about change in Early Cycladic island societies from a comparative perspective. *American Journal of Archaeology* 117(4), 535–43.

BURKE, C., DAY, P.M., and PULLEN, D. 2016: The contribution of petrography to understanding the production and consumption of Early Helladic ceramics from Nemea, Mainland Greece. In OWNBY, M. KELLY, S., MASSUCCI, M. and DRUC, I. (eds.), *Integrative Approaches in Ceramic Petrography* (Salt Lake City), 104–15.

BURKE, C., DAY, P., ALRAM-STERN, E., DEMAKOPOULOU, K., and HEIN, A. 2018: Crafting and consumption choices: Neolithic - Early Helladic II ceramic production and distribution, Midea and Tiryns, Mainland Greece. In ALRAM-STERN, E. and HOREJS, B. and (eds.), *Pottery technologies and sociocultural connections between the Aegean and Anatolia during the 3rd millennium BC. OREA 10.* (Wien, Österreichische Akademie der Wissenschaften-Philosophisch-historische Klasse, Oriental and European Archaeology), 145–59.

BURKE, C., DAY, P.M. and KOSSYVA, A. in press. Early Helladic I and Talioti Pottery: is it just a phase we are going through? *Oxford Journal of Archaeology*.

DAY, P.M., DOUMAS, C.G., ERKANAL, H., KILIKOGLOU, V., KOUKA, O., RELAKI, M. and V. ŞAHOĞLU. 2009: New light on the ‘Kastri Group’: a petrographic and chemical investigation of ceramics from Liman Tepe and Bakla Tepe. *XXX Arkeometri Sonuçları Toplantısı* 24, 335–47.

DAY, P.M. and WILSON, D. 2004: Ceramic change and the practice of eating and drinking in Early Bronze Age Crete. In HALSTEAD, P. and BARRETT, J.C. (eds.), *Food, cuisine and society in Prehistoric Greece* (Oxford, Sheffield Studies in Aegean Archaeology 5), 45–62.

DAY, P.M. and WILSON, D. 2016: Dawn of the amphora: the emergence of maritime transport jars in the Early Bronze Age Aegean. In DEMESTICHA, S. and KNAPP,

A.B. (eds.), *Maritime transport containers in the Bronze-Iron Age Aegean and Eastern Mediterrannean* (Uppsala), 17–37.

DAY, P.M., MÜLLER, N.S., and KILIKOGLOU, V 2019: The Middle Bronze Age pottery: Phase A. In NIKOLAKOPOULOU, I (ed.), *Akrotiri Thera: Middle Bronze Age. Pottery and stratigraphy. Volume I, Stratigraphy, ceramic typology and technology, weaving equipment* (Athens, The Archaeological Society at Athens Library Series No 318), 323–76.

EFE, T. 2007: The theories of the 'Great Caravan Route' between Cilicia and Troy: the Early Bronze Age III period in inland Western Anatolia. *Anatolian Studies* 57, 47–64.

ESKITZIOGLOU, P. 2006: The pottery of Markiani Phase IV. In MARANGOU, L., RENFREW, C., DOUMAS, C. and GAVALAS, G. (eds.), *Markiani, Amorgos: an Early Bronze Age fortified settlement. Overview of the 1985-1991 investigations* (London, British School at Athens Supplementary vol. 40), 139–57.

GAUSS, W., KLEBINDER-GAUSS, G., and VON RÜDEN, C. (eds.) 2016: *The transmission of technical knowledge in the production of ancient Mediterranean pottery. Proceedings of the international conference at the Austrian Institute at Athens 23rd-25th November 2012* (Vienna).

GEORGIADIS, M. 2012: *Kos in the Neolithic and Early Bronze Age. The Halasarna finds and the Aegean settlement pattern* (Philadelphia, Prehistory Monographs 38).

HALSTEAD, P. 2012: Feast, food and fodder in Neolithic-Bronze Age Greece: commensality and the construction of value. In POLLOCK, S. (ed.), *Between feasts and daily meals: towards and archaeology of commensal places* (Berlin, Berlin Studies of the Ancient World 30), 21–51.

HAMILAKIS, Y. 1999: Food technologies/technologies of the body: the social context of wine and oil production and consumption in Bronze Age Crete. *World Archaeology* 31(1), 38–54.

HILDITCH, J. 2007: Appendix D. Petrographic analysis of the ceramics from Kavos, Keros. In RENFREW, C., DOUMAS, C., MARANGOU, L. and GAVALAS, G. (eds.), *Keros, Dhaskalio Kavos/Κέρος, Κάβος Δασκαλιοῦ. The investigations of 1987–88. Keros 1* (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 238–63.

HILDITCH, J. 2013: The fabrics of the ceramics at Dhaskalio. In RENFREW, C., PHILANIOTOU, O., BRODIE, N., GAVALAS, G. and BOYD, M.J. (eds.), *The settlement at Dhaskalio. The sanctuary on Keros and the origins of Aegean ritual practice: the excavations of 2006–2008 Vol. I*, (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 465–82.

HILDITCH, J. 2015: The ceramic fabrics of the Special Deposit South. In RENFREW, C., PHILANIOTOU, O., BRODIE, N., GAVALAS, G. and BOYD, M.J. (eds.), *The settlement at Dhaskalio. The sanctuary on Keros and the origins of Aegean ritual practice: the excavations of 2006–2008 Vol. II*, (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 229–47.

HILDITCH, J. 2018: The fabric study of the pottery of Dhaskalio and Kavos. In RENFREW, C., PHILANIOTOU, O., BRODIE, N., GAVALAS, G. and BOYD, M.J. (eds.), *The marble finds from Kavos and the archaeology of ritual. The sanctuary on Keros and the origins of Aegean ritual practice Vol. III*, (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 445–93.

HOOD, S. 1981-1982: *Excavations in Chios 1938-1955. Prehistoric Emporio and Ayio Gala. Bd. I-II* (Oxford, The British School of Archaeology at Athens. Suppl. Vols. No. 15-16).

HOREJS, B., GRASBÖCK, S. and RÖCKLINGER, M. 2017: Continuity and change in an Early Bronze Age 1 metal workshop. In HOREJS, B. (ed.), *Çukuriçi Höyük 1. Anatolia and the Aegean from the 7th to the 3rd Millennium BC, OREA 5* (Wien,

Österreichische Akademie der Wissenschaften-Philosophisch-historische Klasse, Oriental and European Archaeology), 95–124.

HOREJS, B., and WENINGER, B. 2016: Early Troy and its significance for the Early Bronze Age in Western Anatolia. In PERNICKA, E., ÜNLÜSOY, S. and BLUM, S.W.E. (eds.), *Early Bronze Age Troy: chronology, cultural development and interregional contacts* (Bonn), 123–45.

JARRIEL, K. 2018: Across the Surface of the Sea: Maritime Interaction in the Cycladic Early Bronze Age. *Journal of Mediterranean Archaeology* 31(1), 52–76.

KARANTZALI, E. 2006: The pottery of Markiani Phases I and II. In MARANGOU, L., RENFREW, C., DOUMAS, C. and GAVALAS, G. (eds.), *Markiani, Amorgos: an Early Bronze Age fortified settlement. Overview of the 1985-1991 investigations* (London, British School at Athens Supplementary vol. 40), 101–30.

KARIOTIS, S., DAY, P.M. and WILSON, D. forthcoming: The Early Bronze Age ceramic sequence at Akrotiri, Thera. In DOUMAS, C., GIANNIKOURI, A. and KOUKA, O. (eds.), *The Aegean Early Bronze Age: new evidence. International conference, April 11th-14th 2008 Ministry of Culture – Archaeological Institute of Aegean Studies* (Athens).

KNAPP, A.B. and DEMESTICHA, S. 2017: *Mediterranean connections. Maritime transport containers and seaborne trade in the Bronze and Early Iron Ages* (New York and London).

KNAPPETT, C. and KIRIATZI, E. 2016: Technological mobilities: perspectives from the eastern Mediterranean - an introduction. In KIRIATZI, E. and KNAPPETT, C. (eds.), *Human mobility and technological transfer in the prehistoric Mediterranean* (Cambridge), 1–17.

KNAPPETT, C. and NIKOLAKOPOULOU, I. 2015: Inside out? Materiality and connectivity in the Aegean archipelago. In KNAPP, A.B. and VAN DOMMELEN, P.

(eds.), *The Cambridge prehistory of the Bronze and Iron Age Mediterranean* (Cambridge), 25–39.

KORDATZAKI, G., SBONIAS, K., FARINETTI, E. and TZACHILI, I. 2018: Technological and provenance analysis of an Early and Middle Cycladic pottery assemblage from Therasia, Greece. *The Annual of the British School at Athens* 113, 1–17.

KOUKA, O. 2013: "Minding the gap". Against the gaps: the Early Bronze Age and the transition to the Middle Bronze Age in the northern and eastern Aegean/western Anatolia. *American Journal of Archaeology* 117(4), 569–80.

KOUKA, O. 2017: Η Προϊστορική κατοίκηση στο Ηραίον Σαμου: οι ανασκαφές 2009–2013 Βόρεια της Ιερας Οδου. In TRIANTAPHYLLIDIS, P. (ed.), *Το αρχαιολογικό έργο στα νησιά του Αιγαίου. Διεθνές επιστημονικό συνέδριο, Ρόδος, 27 Νοεμβρίου–1 Δεκεμβρίου 2013* (Athens, Αρχαιολογικό Ινστιτούτο Αιγαιακών Σπουδών, Υπουργείο Πολιτισμού και Αθλητισμού), 163–80.

KOUKA, O. and MENELAOU, S. 2018: Settlement and society in the Early Bronze Age Heraion: exploring stratigraphy, architecture and ceramic innovation after mid–3rdmillennium BC. In ALRAM-STERN, E. and HOREJS, B. (eds.), *Pottery Technologies and Sociocultural Connections between the Aegean and Anatolia during the 3rd millennium BC, OREA 10* (Wien, Österreichische Akademie der Wissenschaften-Philosophisch-historische Klasse, Oriental and European Archaeology), 119–42.

LEIDWANGER, J. and KNAPPETT, C. 2018: Maritime networks, connectivity, and mobility in the Ancient Mediterranean. In LEIDWANGER, J. and KNAPPETT, C. (eds.), *Maritime networks in the Ancient Mediterranean world* (New York) 1–21.

MARAN, J. 1998: *Kulturwandel auf dem griechischen Festland und den Kykladen im späten 3. Jahrtausend v. Chr. Studien zu den kulturellen Verhältnissen in Süd osteuropa*

und dem zentralen sowie östlichen Mittelmeerraum in der späten Kupfer- und frühen Bronzezeit (Bonn, Universitätsforschungen zur prähistorischen Archäologie 53).

MARANGOU, L., RENFREW, C., DOUMAS, C., and GAVALAS, C. 2008: Markiani on Amorgos: an Early Bronze Age fortified settlement – overview of the 1985-91 investigations. In BRODIE, N.J., DOOLE, J., GAVALAS, G. and RENFREW, C. (eds.), *Horizon/Ορίζων. A Colloquium on the Prehistory of the Cyclades* (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 97–103.

MARTHARI, M. 2008: Aspects of pottery circulation in the Cyclades during the early EB II period. Fine and semi-fine imported ceramic wares at Skarkos, Ios. In BRODIE, N.J., DOOLE, J., GAVALAS, G. and RENFREW, C. (eds.), *Horizon/Ορίζων. A Colloquium on the Prehistory of the Cyclades* (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 71–84.

MENELAOU, S. 2018: *A diachronic study of the Early Bronze Age Pottery from Heraion on Samos, Greece: an integrated approach* (Unpublished PhD thesis, University of Sheffield). http://etheses.whiterose.ac.uk/id/eprint/21398

MENELAOU, S., KOUKA, O. and DAY, P.M. 2016: Pottery production and exchange at the Heraion, Samos during the late third millennium BC. First steps in the study of technology and provenance. *Journal of Archaeological Science: Reports* 7, 480–488.

MENTESANA, R.B. 2016: *The Final Neolithic-Early Bronze Age transition in Phaistos, Crete: an investigation of continuity and change in ceramic manufacture* (Unpublished PhD thesis, University of Sheffield). http://etheses.whiterose.ac.uk/15354/

MILOJČIČ, V. 1961: *Die prähistorische Siedlung unter dem Heraion. Grabung 1953 und 1955. SAMOS I* (Bonn).

NODAROU, E. 2011: *Pottery production, distribution and consumption in Early Minoan West Crete: an analytical perspective* (Oxford).

PAPADATOS, Y. and NODAROU, E. 2018: Pottery technology(ies) in Prepalatial Crete: evidence from archaeological and archaeometric study. In ALRAM-STERN, E. and HOREJS, B. (eds.), *Pottery Technologies and Sociocultural Connections between the Aegean and Anatolia during the 3rd millennium BC, OREA 10* (Wien, Österreichische Akademie der Wissenschaften-Philosophisch-historische Klasse, Oriental and European Archaeology), 287–303.

PAPAGEORGIOU, D.K. 2002: *Θαλάσσιοι δρόμοι στο προϊστορικό Αιγαίο κατά τη Νεολιθική και την Πρώιμη Εποχή του Χαλκού* (Unpublished PhD Thesis, University of Athens).

PELOSCHEK, L. 2017: Social dynamics and the development of new pottery signatures at Çukurici Höyük, 7th to 3rd millennium BC. In HOREJS, B. (ed.), *Çukuriçi Höyük 1. Anatolia and the Aegean from the 7th to the 3rd Millennium BC, OREA 5* (Wien, Österreichische Akademie der Wissenschaften-Philosophisch-historische Klasse, Oriental and European Archaeology), 125–35.

PEPERAKI, O. 2004: The House of Tiles at Lerna: dimensions of 'social Complexity'. In BARRETT, J.C. and HALSTEAD, P. (eds.), *The Emergence of Civilisation Revisited* (Oxford, Sheffield Studies in Aegean Archaeology 6), 214–31.

PULLEN, D.J. 2013: "Minding the gap". Bridging the gaps in cultural change within the Early Bronze Age Aegean. *American Journal of Archaeology* 117(4), 545–53.

RAHMSTORF, L. 2016: Emerging economic complexity in the Aegean and western Anatolia during earlier third millennium BC. In MOLLOY, B.P.C (ed.), *Of Odysseus and oddities: scales and modes of interaction between prehistoric Aegean societies and their neighbours* (Oxford, Sheffield Studies in Aegean Archaeology 10), 225–76.

RENFREW, A.C. 1972: *The emergence of civilization: the Cyclades and the Aegean in the third millennium BC* (London).

RENFREW, A.C. 2006: The pottery: Introduction. In MARANGOU, L., RENFREW, C., DOUMAS, C. and GAVALAS, G. (eds.), *Markiani, Amorgos: an Early Bronze Age fortified settlement. Overview of the 1985-1991 investigations* (London, British School at Athens Supplementary vol. 40), 95–99.

RENFREW, A.C. and EVANS, R.K. 2007: The Early Bronze Age pottery. In RENFREW, C. (ed.), *Excavations at Phylakopi in Melos 1974-77. BSA Supplementary Volume 42* (London), 129–80.

RÖCKLINGER, M. and HOREJS, B. 2018: Function and technology: a pottery assemblage from an Early Bronze Age house at Çukuriçi Höyük. In ALRAM-STERN, E. and HOREJS, B. (eds.), *Pottery Technologies and Sociocultural Connections between the Aegean and Anatolia during the 3rd millennium BC, OREA 10* (Wien, Österreichische Akademie der Wissenschaften-Philosophisch-historische Klasse, Oriental and European Archaeology), 77–104.

RUTTER, J.B. 1979: *Ceramic change in the Aegean Early Bronze Age. The Kastri Group, Lefkandi I and Lerna IV. A theory concerning the origin of EH III ceramics, UCLA Institute of Archaeology Occasional Papers* 5 (Los Angeles).

ŞAHOĞLU, V. 2005: The Anatolian Trade Network and the Izmir region during the Early Bronze Age. *Oxford Journal of Archaeology* 24, 339–61.

ŞAHOĞLU, V. 2011: Early Bronze Age pottery in coastal western Anatolia. In ŞAHOĞLU, V. and SOTIRAKOPOULOU, P. (eds.), *Across the Cyclades and western Anatolia during the 3rd millennium BC*, (Istanbul), 136-43.

SEMIZ, B., ABAY, E., DEDEOĞLU, F., KONAKÇI, E. and OZAN, A. 2018. An archaeometric investigation of Early and Middle Bronze Age pottery from the Upper Meander Basin in Southwestern Anatolia. *Mediterranean Archaeology and Archaeometry* 18(3), 121–50.

SHERRATT, S. 2000: *Catalogue of Cycladic antiquities in the Ashmolean Museum: The Captive Spirit*, Volume I (Oxford).

SOTIRAKOPOULOU, P.I. 1993: The chronology of the 'Kastri Group' reconsidered. *The Annual of the British School at Athens* 88, 5–20.

SOTIRAKOPOULOU, P.I. 1997: Κυκλάδες και Βόρειο Αιγαίο. Οι σχέσεις τους κατά το δεύτερο ήμισυ της 3ης χιλιετίας π.Χ. In DOUMAS, C.G. and LA ROSA, V. (eds.), *Η Πολιόχνη και η Πρώιμη Εποχή του Χαλκού στο Βόρειο Αιγαίο, Διεθνές Συνέδριο, Αθήνα 22-25 Απριλίου 1996* (Athens, Scuola Archaeologica Italiana di Atene, University of Athens), 522–42.

SOTIRAKOPOULOU, P.I. 1999: *Ακρωτήρι Θήρας. Η Νεολιθική και η Πρώιμη Εποχή του Χαλκού επί τη βάσει της κεραμεικής* (Athens, Βιβλιοθήκη της εν Αθήναις Αρχαιολογικής Εταιρείας αρ. 191).

SOTIRAKOPOULOU, P.I. 2008: The Cyclades, the East Aegean islands and the western Asia Minor: their relations in the Aegean Late Neolithic and Early Bronze Age. In ERKANAL, H., HAUPTMANN, H., ŞAHOĞLU, V. and TUNCEL, R. (eds.)*, The Aegean in the Neolithic, Chalcolithic and the Early Bronze Age: proceedings of the international symposium, October 13th -19th 1997, Urla - İzmir (Turkey)* (Ankara), 533–557.

SOTIRAKOPOULOU, P. 2016: *The pottery from Dhaskalio. The Sanctuary on Keros and the origins of Aegean ritual practice: the excavations of 2006–2008 Vo.l IV*. (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research).

TARTARON, T.F. 2018: Geography matters: defining maritime small worlds of the Aegean Bronze Age. In LEIDWANGER, J. and KNAPPETT, C. (eds.), *Maritime networks in the Ancient Mediterranean world* (New York) 61–92.

VAUGHAN, S.J. 1990: Petrographic analysis of the Early Cycladic wares from Akrotiri, Thera. In HARDY, D.A., DOUMAS, C.G., SAKELLARAKIS, J.A. and WARREN, P.M. (eds.), *Thera and the Aegean World III, Vol. 1: Archaeology. Proceedings of the Third International Congress, Santorini, Greece, 3-9 September 1989* (London), 470–87.

VAUGHAN, S.J. 2006: Macroscopic and petrographic studies of pottery from Markiani on Amorgos. In MARANGOU, L., RENFREW, C., DOUMAS, C. and GAVALAS, G. (eds.), *Markiani, Amorgos: an Early Bronze Age fortified settlement. Overview of the 1985-1991 investigations* (London, British School at Athens Supplementary vol. 40), 99–101.

WILSON, D.E. 1999: *Keos IX. Ayia Irini: Periods I-III. The Early Neolithic and Early Bronze Age settlements. Part 1. Pottery and small finds* (Mainz on Rhine).

WILSON, D.E. 2013: Ayia Irini II-III, Kea. The phasing and relative chronology of the Early Bronze Age II settlement. *Hesperia* 82, 385–434.

WILSON, D.E. and DAY, P.M. 1994: Ceramic regionalism in Prepalatial Central Crete: the Mesara imports at EMI-EMIIA Knossos. *The Annual of the British School at Athens* 89, 1–87.

WILSON, D.E., DAY, P.M. and JOYNER, L. 1999: EM IIB ware groups at Knossos: the 1907-1908 South front tests. *The Annual of the British School at Athens* 94, 1–62.

WILSON, D.E., DAY, P.M. and DIMOPOULOU-RETHEMIOTAKI, N. 2008: The gateway of Poros-Katsambas: trade and exchange between North-central Crete and the Cyclades in EB I-II. In BRODIE, N.J., DOOLE, J., GAVALAS, G. and RENFREW, C. (eds.), *Horizon/Ὁρίζων. A Colloquium on the Prehistory of the Cyclades* (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 261–70.

ZACHOS, K. and DOUSOUGLI, A. 2008: Observations on the Early Bronze Age sealings from the Cave of Zas at Naxos. In BRODIE, N.J., DOOLE, J., GAVALAS, G. and RENFREW, C. (eds.), *Horizon/Ὁρίζων. A Colloquium on the Prehistory of the Cyclades* (Cambridge, McDonald Institute Monograph Series, McDonald Institute for Archaeological Research), 85–95.

List of tables

Table 1. Catalogue of the ceramic vessels analysed and discussed in this paper.

Context	Phase	Vessel Shape	Inv. No/ Sample No.	Macroscopic Group	Petrographic Group
SO-NW gerichtetes Mauer (E8/51-55)	Heraion II	Beaked jug	HR15/148	Blue/Purple Phyllite	Coarse/Dark Phyllite
Küchenbau (F6/77)	Heraion II	Beaked jug	HR15/155	Blue/Purple Phyllite	Coarse/Dark Phyllite
West of EB II fortification wall (4820/5630)	Heraion III	Collared jar	HR15/192	Blue/Purple Phyllite	Coarse/Dark Phyllite
West of EB II fortification wall (4820/5630)	Heraion II-III	Collared jar	HR15/220	Blue/Purple Phyllite	Coarse/Dark Phyllite
House deposit (4820/5630)	Heraion II-III	Collared jar	HR15/295	Blue/Purple Phyllite	Coarse/Dark Phyllite
Beneath destruction level west of HS13:10 house wall (4820/5630)	Heraion II-III	Collared jar	HS13.28.39	Blue/Purple Phyllite	n/a
Beneath destruction level west of HS13:10 house wall (4820/5630)	Heraion II-III	Collared jar	HS13.28.54	Blue/Purple Phyllite	n/a
Schicht unter den Hausern (G7/79)	Heraion III	Collared jar	Milojčić 1961, pl. 40:17	Blue/Purple Phyllite	n/a
Küchenbau (F6/77)	Heraion II	Collared jar	Milojčić 1961, pls. 16:3, 44:3	Blue/Purple Phyllite	n/a
Mauerteil (F6/16)	Heraion II	Collared jar	n/a	Blue/Purple Phyllite	n/a
Hera Temple area (unclear)	Heraion II-III	Collared jar	n/a	Blue/Purple Phyllite	n/a
Hera Temple area (unclear)	Heraion II-III	Collared jar	n/a	Blue/Purple Phyllite	n/a
Hera Temple area (unclear)	Heraion II-III	Collared jar	n/a	Blue/Purple Phyllite	n/a
Hera Temple area (unclear)	Heraion II-III	Collared jar	n/a	Blue/Purple Phyllite	n/a
Hera Temple area (unclear)	Heraion II-III	Collared jar	HR15/278 (Milojčić 1961, pl. 24:1)	Blue/Purple Phyllite	Red Phyllite
House deposit (4820/5630)	Heraion II-III	Collared jar	HS13.44.96	Red Phyllite	n/a

Table 2. Catalogue of Aegean and Anatolian sites with evidence of transport jars and potential Amorgian fabric imports during the EB II.

Site	Phase(s)	References
Markiani-Amorgos	II, III, IV	Karantzali 2006, 106, 128, figs. 7.2: 6-8, 7.12:2-3; Birtacha 2006, 135, fig. 7.14:4, 6, pl. 33f; Eskitzioglou 2006, 149, fig. 7.22:1-5, 9-11, pl. 36d
Panormos-Naxos	EC II late	Angelopoulou 2003, fig. 26; 2008, 151, 155, 157, figs. 16.5:5-6, 16.7; 2014, 203-218, figs. 3.52-3.57, e.g. BII.α.8 and BII.α.29, 223, fig. 3.65: BIV.12 and 16
Zas Cave-Naxos	IV	Zachos and Dousougli 2008, 86, fig. 10.7:267
Kavos Special Deposit North-Keros	B?	Broodbank 2007, 211, figs. 6.9:79-82, 6.15:201-202, 6.16:203, 6.32:200-203
Vathy-Astypalaia	EC II late	Angelopoulou forthcoming
Phylakopi-Melos	A2	Renfrew and Evans 2007, 150-151, 153, figs. 5.7:13-14, 5.8:7-8
Skarkos-Ios	II (early-developed EC II)	Marthari 2008, 79, fig. 9.18
Ayia Irini-Kea	II, III	Wilson 1999, 36-39, pls. 9, 10 and 50:II-196–II-204, II-215–II-218, II-221, 85, pl. 70:II-757, 111-12, pl. 78:III-155–III-157, 139, pl. 91:III-502; Day and Wilson 2016, tab. 1
Akrotiri-Thera	EC II late	Vaughan 1990, 479; Sotirakopoulou 1999, 167-170:K-B, 2, fig. 57α, pls. 188-196; Angelopoulou 2008, 162, figs. 16.22, 16.24
Panagia Koimisis-Therasia	EC-MB	Kordatzaki *et al*. 2018, 12-13, fig. 7:l
Poliochni-Lemnos	Blue-Green, Yellow, and Brown	Bernabò Brea 1964, pls. LXXVIII:f, g, CXXIV:a-e, CXXX:e; CLIb, CLXII:a; 1976, 331, pls. CCVI:e, f, CCXI:a-e, CCLXXX:i
Mytilene-Lesbos		Avgerinou 1997, footnote 104
Emporio-Chios	V, IV, II, I	Hood 1981, 402, fig. 182, pl. 73:1233, 417, pl. 78a:4; 1982, 434, 460, 468, fig. 206:1717, 498:2046, 542:2412, pls. 88b, 90:1718, 1720; some in off-island micaceous wares
Troy	Ib and II	Blegen *et al*. 1950, pl. 236:27; Blegen *et al*. 1951, fig. 401, 35:479
Liman Tepe	EB II late (LTV2)	Şahoğlu 2011, 138-139, cat. nos. 108-109
Gümüldür		Prof. Koray Konuk, personal communication
Halasarna-Kos	EB II	Georgiadis 2012, 64, 88, 138, fig. 18:Kt.Lh10

Table 3. Summary of information from the macroscopic analysis.[3]

Macroscopic Group	Colour	Clay Body	Inclusions	Firing
Blue/Purple Phyllite	Reddish brown to reddish grey clay paste, dark red core	Coarse to medium-coarse, medium hardness, soapy feel, smooth-fine texture, rare voids	Set in order of abundance from dominant to very few: • purple/red inclusions, a-sa, el, probably phyllite • white-light grey transparent, hard felsic inclusions, occasionally fractured texture, sa-sr, probably quartz • dark grey, hard, crystalline, a-sa, probably feldspar • silver/grey a-sa, el, probably metamorphic rock fragments (mica schist) • silver, sparkling inclusions, a-sa, probably muscovite mica • very rare chalky-white rock fragments, sa-sr, probably limestone	Moderate to high-fired, complete oxidation?
Red Phyllite	Red/reddish brown clay paste	Medium-coarse, medium hardness, soapy feel, fine texture, very rare voids	Set in order of abundance from dominant to very few: • silver/grey a-sa, el, probably metamorphic rock fragments (mica schist) • red inclusions, a-sa, el, probably slate or phyllite • white-light grey transparent, hard felsic inclusions, occasionally fractured texture, sa-sr, probably quartz • dark grey, hard, crystalline, a-sa, probably feldspar • silver, sparkling inclusions, a-sa, probably muscovite mica	Moderate to high-fired, complete oxidation?

Captions of illustrations

Figure 1. Map showing Heraion and selected sites mentioned in the text (by S. Menelaou).

Figure 2. Beaked jugs with a two-stage neck profile from Heraion on Samos (illustrations by C. Kolb and photographs by C. Papanikolopoulos).

Figure 3. Beaked jugs with a two-stage neck profile from Panormos on Naxos (top modified after Angelopoulou 2007, fig. 5; bottom modified after Angelopoulou 2014, fig. 3.68:BI.α.3).

Figure 4. Transport collared jars with incised or slashed handles from Heraion (top after Milojčić 1961, pls. 16:3 and 44:3, no scale).

Figure 5. Transport collared jar with incised or slashed handles from Panormos on Naxos (modified after Angelopoulou 2007, fig. 25).

Figure 6. Macrographs of selected samples (A-B taken with a USB Handheld Digital Microscope and C-D taken with a stereoscope): A. HR15/220; B. HR15/192; C. HR13.28.39; D. HR15/295.

Figure 7. Micrographs of samples of the Coarse/Dark Phyllite Petrographic Fabric from Heraion and comparative sites. A. Heraion 15/155; B. Heraion 15/192; C. Akrotiri 03/128; D. Panormos 03/30. All images taken in crossed-polars.

Figure 8. Micrographs of samples of the Red Phyllite Petrographic Fabric from Heraion and comparative sites A. Heraion 15/278; B. Panormos 03/16; C. Akrotiri 03/134; D. Akrotiri 03/133. All images taken in crossed-polars.

List of appendices

Appendix 1. Petrographic fabric descriptions.

[1] The information about the presence of stray EB transport jar incised handles southeast of Gümüldür was provided by Prof. Koray Konuk (University of Louvain) in June 2019 and we thank him for permission to make reference.

[2] One amphora sample likely corresponds to Ware Group 42, that is petrographically ascribed with a local provenance and is characterised by a metamorphic (mainly mica schist) petrology (Röcklinger and Horejs, 95-96, fig. 11).

[3] For explanation of the abbreviations see the supplementary material in the Appendix.