



www.maajournal.com

Mediterranean Archaeology and Archaeometry
Vol. 20, No 3, (2020), pp. 135-147
Open Access. Online & Print.



DOI: 10.5281/zenodo.3960190

AEGEAN POTTERY IN IRON IIA MEGIDDO: TYPOLOGICAL, ARCHAOMETRIC AND CHRONOLOGICAL ASPECTS

Alexander Fantalkin^{1*}, Assaf Kleiman², Hans Mommsen³ and Israel Finkelstein¹

¹*Department of Archaeology and Ancient Near Eastern Cultures, Tel Aviv University*

²*Institut für Alttestamentliche Wissenschaft, Leipzig University*

³*Helmholtz-Institut für Strahlen-und Kernphysik, Bonn University*

Received: 21/07/2020

Accepted: 02/09/2020

*Corresponding author: Alexander Fantalkin (fantalk@tauex.tau.ac.il)

ABSTRACT

The revival of economic and cultural contacts between Greece and the Levant during the early first millennium BCE has received much attention in scholarship, as Aegean imports found in the Eastern Mediterranean provide a reliable framework for inter-regional synchronization. In this article, we discuss Aegean sherds that were found in stratified Iron IIA contexts during recent excavations at Megiddo, one of the crucial sites for the establishment of Greek Protogeometric and Geometric chronology. An archaeometric analysis of these sherds suggests that some of them originated in Euboea. The specific Aegean provenance of the other fragments remains uncertain, but based on typological observations, two items, probably from the same vessel, appear to have originated from an Aegean milieu. The exposure of such imports at Megiddo, with its well-established stratigraphy, ceramic typology and radiocarbon dating system, is another contribution to the chronological synchronization of Greece and the Levant in the early first millennium BCE.

KEYWORDS: Aegean Pottery, Euboea, Megiddo, Chronology, Iron IIA, NAA Analysis, Greece, Levant

1. INTRODUCTION

The revival of economic and cultural contacts between Greece and the Levant during the early first millennium BCE has attracted much attention in research. Scholars who have dealt with the subject have emphasized the contribution of Greek imports found in the Eastern Mediterranean to the synchronization of the chronologies of the two regions (e.g., Fantalkin 2001, 2008; Kopcke 2002; Coldstream and Mazar 2003; Coldstream 2003; Gilboa and Sharon 2003; Fantalkin, Finkelstein and Piasezky 2015; Mazar and Kourou 2019). With almost no absolute dates for this particular timeframe in the Aegean Basin, scholarly attention was directed at the southern Levant, where excavations in stratified tell-sites have recently provided secure radiocarbon-based chronological sequences (Fantalkin, Finkelstein and Piasezky 2015; Mazar and Kourou 2019). Beyond chronology, the study of the renewed contacts between Greece and the Levant bears implications for crucial historical issues of the early first millennium BCE, such as the renewal of long-distance east-Mediterranean trade (Murray 2017) and the beginning of the Phoenician expansion to the west (Coldstream 1998a; Fantalkin and Finkelstein 2006; Eshel *et al.* 2019; Wood *et al.* 2020).

In theory, Megiddo with its well-established stratigraphy, ceramic typology and radiocarbon dating system (Toffolo *et al.* 2014) is an ideal site for establishing the absolute date of Greek Protogeometric and Geometric pottery (Figure 1). However, until recently only two rim fragments of an early Middle Geometric I Attic skyphos had been found at the site (Clairmont 1955: 99–100, Nos. 1–2; Waldbaum 1994: 57, Fig. 5; Coldstream 2003: Fig. 2) (Figure 2). They were unearthed during the Oriental Institute excavations in a context that was later attributed to Stratum VA-IVB, providing one of the crucial pegs for Greek Geometric Chronology (Coldstream 1968: 303–304; 2003: 249–251). In the course of these excavations, three additional body sherds retrieved from the same stratigraphic context and defined by Clairmont (1955: 99) as Aegean imports, were attributed by Coldstream (1968: 303–304) to local or Cypriot imitations. Yet, the reliability of the stratigraphic context of these finds (Locus 376, an open area between Building 338 and City-wall 325 – Lamon and Shipton 1939: Fig. 49) is questionable (Fantalkin 2001: 119; Coldstream and Mazar 2003: 37–38; for recent excavations in this area, see Kleiman, Kaplan and Finkelstein 2016).

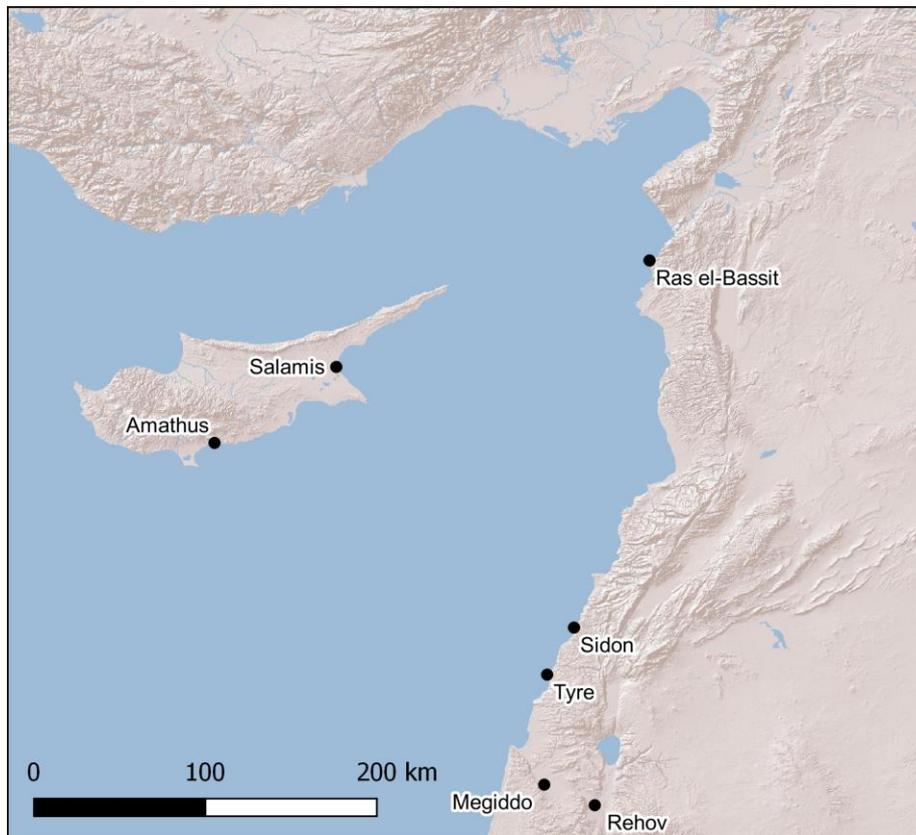


Figure 1. Map of the Eastern Mediterranean with Iron Age sites mentioned in the article.

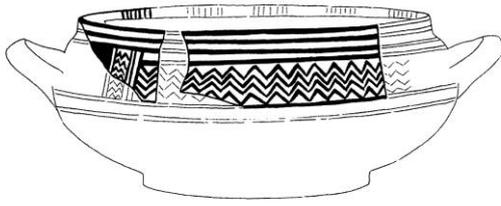


Figure 2. Reconstruction of Early Middle Geometric I Attic skyphos found by the Oriental Institute (after Coldstream 2003: Fig. 2).

Here, we present five pottery fragments that have recently been found in stratified Late Iron IIA contexts at Megiddo and discuss their typological, archaeometric and chronological aspects. Despite the modest number of the fragments discussed, their exposure at Megiddo, with its well-established stratigraphy, ceramic typology and radiocarbon dating system, is significant for any attempt of cross-regional synchronization between the Aegean and Levantine Iron Age chronologies.

2. THE CONTEXTS

The five fragments presented here (Cat. Nos. 1-5; Table 1) were revealed during excavations in the southeastern sector of Megiddo (Area Q; Figures 3-4). Three of them (Cat. Nos. 1-3) were unearthed in Square G/6, on a beaten earth floor of Level Q-5 (Floor 10/Q/68); this layer dates to the early years of the Late Iron IIA (Finkelstein and Kleiman 2019) and is radiocarbon dated to ca. 900 BCE (Boaretto forthcoming). At that time this zone served as an open space south of Pillared-building 12/Q/99; the latter was associated with cult-related activity (Kleiman et al. 2017). Two additional sherds (Cat. Nos. 4-5) came from mixed loci, excavated to the east and west of the pillared building; both were sealed by floors of Level Q-4, dating to the main phase of the Late Iron IIA, meaning that they too probably originated from Level Q-5. Cat. No. 4 was found in Square E/5 (Locus 10/Q/107), below Floor 10/Q/65, and Cat. No. 5 was exposed in Square D/8 (Locus 14/Q/80), below Floor 14/Q/57.



Figure 3. Aerial photo of Megiddo (looking southeast), indicating the location of Area Q.

Table 1. Aegean sherds in Area Q at Megiddo.

| Cat. No. | Vessel No. | Season | Lab. No. | Bonn Lab No. | Context | NAA Group* |
|----------|--------------|--------|---------------|--------------|---|------------|
| 1 | 10/Q/68/VS2 | 2010 | 10/Q/68/LB24 | Meg-1 | Q-5 floor (Square G/6) | EuA |
| 2 | 10/Q/68/VS3 | 2010 | 10/Q/68/LB25 | Meg-2 | Q-5 floor (Square G/6) | 312 |
| 3 | 11/Q/27/VS2 | 2011 | 11/Q/27/LB39 | Meg-3 | Q-5 floor (Baulk G-H/6) | 312 |
| 4 | 10/Q/107/VS8 | 2010 | 10/Q/107/LB30 | Meg-5 | Mixed debris below Q-4 floor (Square E/5) | Single |
| 5 | 14/Q/80/VS2 | 2014 | 14/Q/80/LB24 | Meg-7 | Mixed debris below Q-4 floor (Square D/8) | EuA |

*NAA group name is in accordance with Bonn's databank.

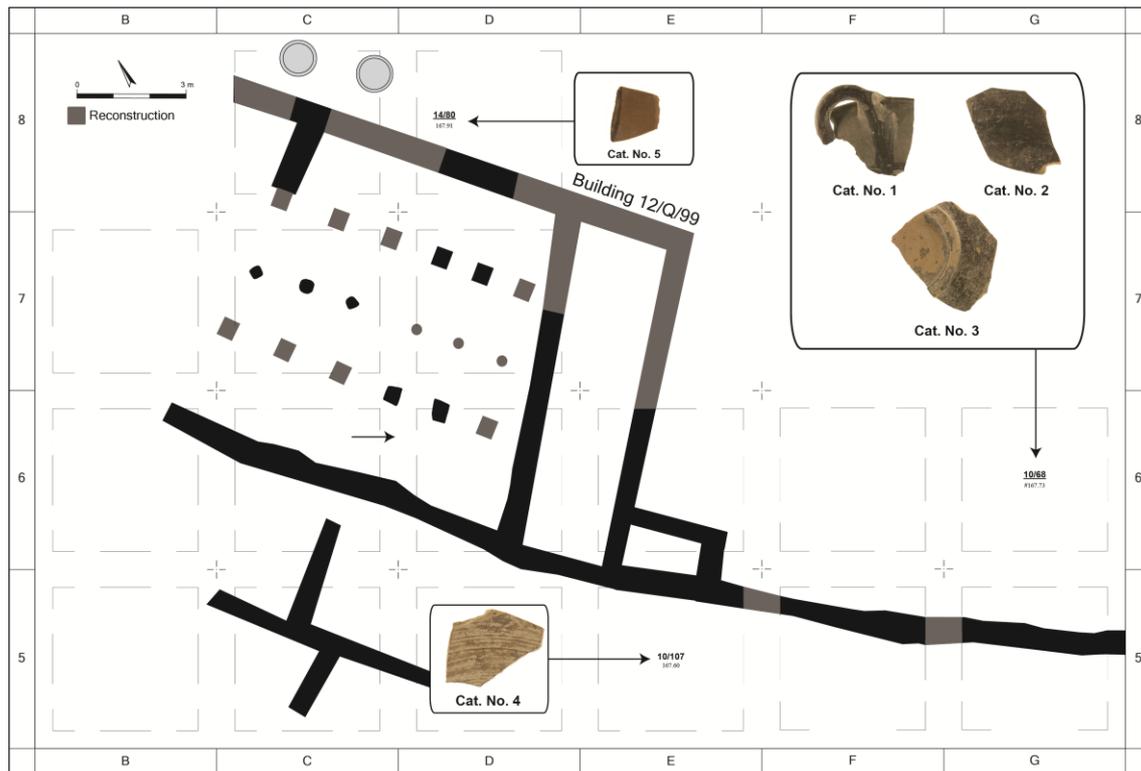


Figure 4. Schematic plan of Level Q-5 with locations of the Aegean sherds.

3. THE FINDS

- Cat. No. 1 (Vessel No. 10/Q/68/VS2; Figure 5: 1; NAA Group: EuA [same as No. 5]): A fragment of a Euboean plate. This type, usually decorated with pendent semicircles (not evident on the preserved part of the Megiddo sherd), appears for the first time in the Euboean Late Protogeometric and continues into the Euboean Sub-Protogeometric I-II (Papadopoulos and Strack 2017: 831, n. 817 with earlier references). At present, this sherd is the southernmost evidence for this type of plates in the Levant with parallels known from Ras el-Bassit (Courbin 1986: 190; Fig. 16), Sidon (Doumet-Serhal 2008: 42–43, Fig. 68), Tyre (Bikai 1978: 53; Pls. XXIIA: 5–6; XXIV: 5) and maybe also the cemetery of Tyre el-Bass (Núñez 2014: 208, Fig. 3.42: a). Additional examples for these plates were exposed in Cyprus (e.g., Gjerstad 1977: 25, Pl. II: 2–12; Coldstream 1998b). For parallels from Lefkandi, see Popham and Lemos 1996: Pls. 102: T. 55, 3–4; 103: T. 79A, 4; 114: A.
- Cat. Nos. 2–3 (Vessels Nos. 10/Q/68/VS3 and 11/Q/27/VS2; Figure 5: 2–3; NAA Group: 312): The first fragment is a lower body-fragment covered with paint on the outer side. Only traces of paint are visible on the inner side. The second one is a lower body fragment with rather shallow ring foot. Black painted monochrome decoration can be traced on the outer side, with several barely visible whitish strips. Brown-red paint appears on the inner side. Both sherds probably originated from the same cup or skyphos, perhaps belonging to the Corinthian Late Protogeometric/Early Geometric horizon (although a variety of other Aegean or Aegean-related alternatives are possible). For parallels from Corinth, see Pfaff 1999: 92–94, Figs. 22: 71; 25: W-13, C-63-616; 2007: 458–459, 468–470, Figs. 12, 22.
- Cat. No. 4 (Vessel No. 10/Q/107/VS8; Figure 5: 4; NAA Group: Chemical singleton): Fragment of a body sherd, covered with asymmetrical black and white bands on both sides. An Aegean attribution is questionable.
- Cat. No. 5 (Vessel No. 14/Q/80/VS2; Figure 5: 5; NAA Group: EuA [same as No. 1]): Small body sherd with traces of reserved band on the outer side and traces of black paint on the inner side, seemingly part of a cup or a skyphos. It probably relates to the same chronological horizon as No. 1.

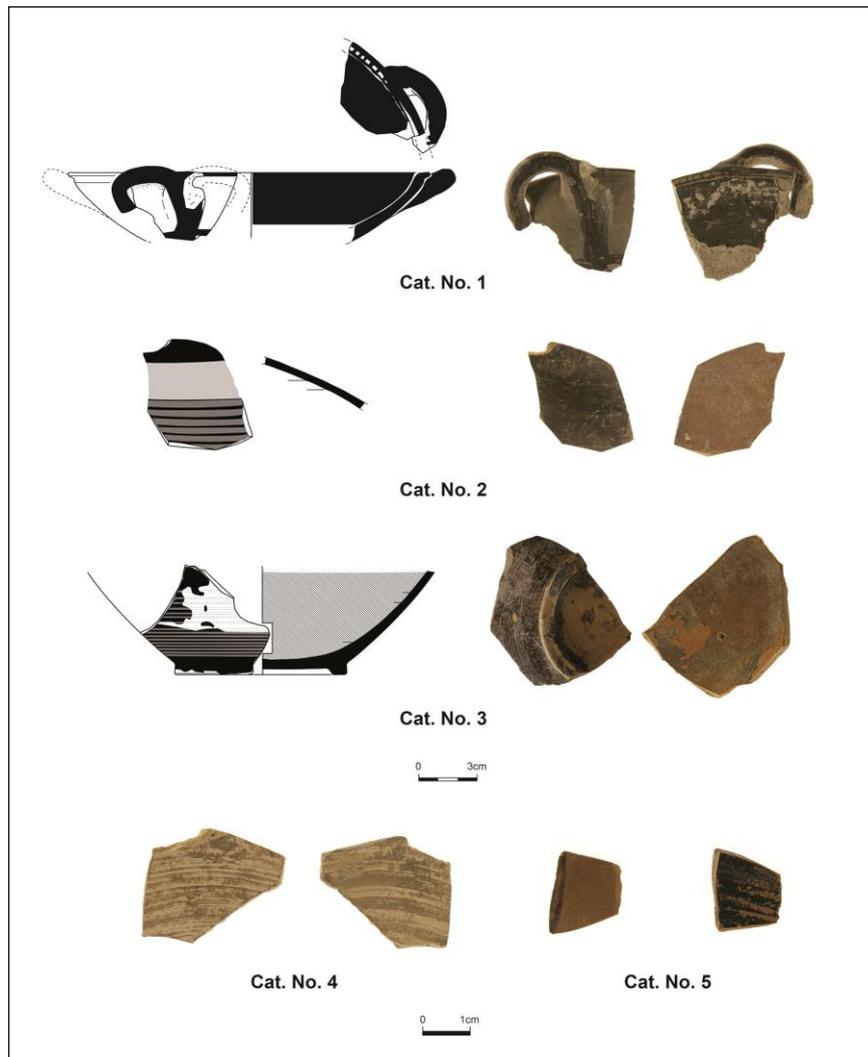


Figure 5. Aegean pottery from Area Q (drawings by Y. Gottlieb; photographs by S. Flit).

4. NEUTRON ACTIVATION ANALYSIS (NAA)

4.1. Procedures

The five sherds in question were subjected to NAA in the Bonn archaeometry laboratory. The measurement procedure is a modified version of the one formerly applied at Berkeley (Perlman and Asaro 1969) and used routinely in Bonn for about 30 years (Mommsen et al. 1991; Mommsen 2001). It is well-accepted today that the pattern of the minor and trace element weight concentrations in pottery is characteristic of the clay paste used by the ancient potters and points, therefore, to the production workshop, assumed to be situated not far from the clay bed(s). If many different elements are measured with high precision, there is a high probability that the pattern is unique; hence it is often compared to the unique pattern of a human fingerprint and the provenancing method is termed chemical fingerprinting (Mommsen 2011 and references therein).

A sapphire (corundum) drill bit with a 10 mm diameter was used to extract about 80 mg of powder from an undecorated and cleaned area, usually on the inner side of the vessel fragment, leaving only a shallow depression about 1 mm deep that points to the location of the analysis. A set of samples together with six samples of the Bonn pottery standard (for composition, see Mommsen and Sjöberg 2007) were irradiated with neutrons (flux 5×10^{12} neutrons/[cm² s], duration 10 h) at the research reactor of the Reactor Institute of the TU Delft. After the samples were transported to Bonn, the radiation that was emitted was measured for a period of four weeks and evaluated for the presence of elemental concentrations of up to 30 elements above the detection limit.

It can be assumed that pottery vessels with the same elemental composition were made in the same or in a neighbouring workshop using a specific well-prepared clay paste. Various methods such as Principal Component Analysis (PCA) and Cluster Analyses (CA) were used to compare compositional patterns

(Baxter 2003). The lab in Bonn developed and now employs a statistical package that acts like a filter (Mommsen, Kreuser and Weber 1988; Beier and Mommsen 1994). When working with a large databank, it has the ability to sort out samples with data patterns similar to those of a given model, taking into account, a) the experimental uncertainties, and b) the possibility that the clay paste might have been diluted

by different amounts of sand (SiO_2), calcite (CaCO_3) or other material poor in trace elements. It does this by calculating a best relative fit factor with respect to the given filter pattern (Mommsen and Sjöberg 2007), the so-called dilution or enhancement factor (if factor > 1 : dilution, < 1 enhancement). Both features a) and b) cannot be taken into account by PCA or CA.

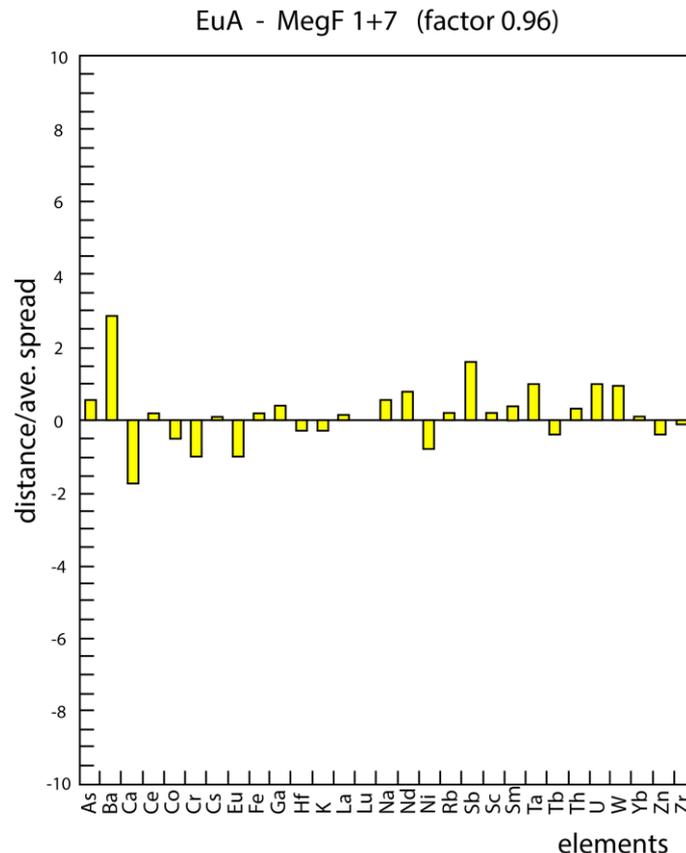


Figure 6. Graphical comparison of chemical compositions of group EuA with the average values of the pair Meg-1 + Meg-7 (see Table 3). Plotted are the differences of the concentration values normalized by the average standard deviations (spreads). The values of the pair have been multiplied first by the best relative fit factor 0.96 with respect to group EuA. The concentrations are statistically similar (length of bar $< \text{about } \pm 2$), except for Ba that is known to scatters often in dependence with possible post-depositional alterations.

4.2. Results

The elemental composition of the fragments under investigation is given in Table 2 for 29 elements. To determine where the items were manufactured, a comparison was carried out between the concentration patterns of the fragments and the patterns stored in Bonn's databank, using the "filter" procedure. The Bonn databank now has over 12,000 data sets of pottery and other products made of clay as well as clay samples from the central and eastern Mediterranean.

A recent archaeometric investigation of Euboean pottery from different localities on the island in particular and in the Mediterranean area in general has contributed significantly to our ability to identify

their provenance. A well-defined NAA group, labeled EuA, has been established as related to the clay beds near Phylla, located at the Lelantine Plain, some 3 km north of Lefkandi (Mommsen 2014; Kerschner and Lemos 2014). Apart from mainland Greece, these Euboean imports have been attested in the Eastern Aegean (including Asia Minor), central and southern Italy and al-Mina in the Levant (Kerschner 2014; Vacek 2014).

The sample pair Meg-1 and 7 (Cat. Nos. 1 and 5) has matching compositions identical to the composition of the EuA group. The best relative fit correction factor for both samples of 0.96 with respect to the pattern EuA is due to a slightly different clay preparation

recipe or to experimental causes like errors in weighing or unknown neutron flux variations during the irradiation. The similarity to Phylla can be seen in Table 3, which shows the concentration values of Meg-1 and 7 compared to the values of the group EuA for 29 Euboean samples. In Figure 6 a bar plot shows the differences between the normalized concentrations of these patterns for each element. Only differences greater than about ± 2 are statistically relevant. Except for Ba all elements have smaller normalized differences and agree statistically. Ba in pottery sherds is sometimes known to scatter, since it is influenced by different conditions during the deposition of the item in the ground (Golitzko et al. 2012). In any event, there is no doubt regarding the Euboean provenance of the two pieces.

Samples Meg-2 and Meg-3 (Cat. Nos. 2–3) were created from the same clay paste and hence form a chemical pair. As shown in **Table 3**, the average concentration values of this pair are very close in composition.

The spread values of about one-third of the 29 elements (10 values) are $< 2\%$. For single samples as given in Table 2, only about 18 elements out of 29 (ca. two-thirds) have such small experimental uncertainties ($< 2\%$). The NAA laboratory in Bonn cannot measure the remaining third with such precision. This exceptional similarity may point to the fact that the two pieces belonged to the same vessel or, at least, were made from the same batch of clay paste and were hence exported together. The geographical location of the workshop is unknown; the pattern is new and none of Bonn's databank samples has the same composition. On the other hand, this composition is not too dissimilar from some known Cypriot patterns attested in the Bonn databank (see discussion below).

Meg-5 (Cat. No. 4) features a unique chemical composition. It may be the first member of an as yet unidentified production site.

Table 2. Concentrations C of 29 elements measured with NAA in $\mu\text{g/g}$ (ppm), if not indicated otherwise, and the experimental uncertainties (errors) δ in % of C .

| Element/Group | Meg-1 1 sample factor 1.00 | | Meg-2 1 sample factor 1.00 | | Meg-3 1 sample factor 1.00 | | Meg-5 1 sample factor 1.00 | | Meg-7 1 sample factor 1.00 | |
|---------------|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
| | C | $\delta(\%)$ |
| As | 24.9 | (0.4) | 6.10 | (1.3) | 6.45 | (1.3) | 5.93 | (1.2) | 9.64 | (1.0) |
| Ba | 317. | (14.) | 375. | (10.) | 361. | (10.) | 186. | (15.) | 487. | (7.7) |
| Ca\% | 7.34 | (3.4) | 11.3 | (1.9) | 11.7 | (1.8) | 1.39 | (12.) | 5.01 | (4.1) |
| Ce | 84.0 | (0.4) | 50.8 | (0.6) | 51.6 | (0.6) | 134. | (0.3) | 81.7 | (0.5) |
| Co | 24.7 | (0.5) | 25.3 | (0.5) | 25.7 | (0.5) | 20.1 | (0.5) | 24.6 | (0.5) |
| Cr | 185. | (0.4) | 99.0 | (0.6) | 107. | (0.6) | 113. | (0.5) | 162. | (0.4) |
| Cs | 8.85 | (1.2) | 3.46 | (2.6) | 3.63 | (2.5) | 7.09 | (1.4) | 10.2 | (1.1) |
| Eu | 1.50 | (1.4) | 1.07 | (1.8) | 1.04 | (1.8) | 1.98 | (1.2) | 1.50 | (1.4) |
| Fe\% | 5.23 | (0.3) | 5.15 | (0.3) | 5.23 | (0.3) | 2.68 | (0.3) | 5.72 | (0.3) |
| Ga | 24.8 | (4.0) | 17.3 | (5.3) | 17.9 | (5.7) | 34.1 | (2.4) | 27.3 | (4.5) |
| Hf | 5.10 | (1.0) | 3.15 | (1.5) | 3.25 | (1.5) | 9.78 | (0.7) | 4.66 | (1.1) |
| K\% | 3.20 | (0.4) | 2.03 | (0.5) | 2.09 | (0.5) | 3.15 | (0.4) | 3.64 | (0.4) |
| La | 39.9 | (0.2) | 25.5 | (0.2) | 25.6 | (0.2) | 61.4 | (0.1) | 38.7 | (0.2) |
| Lu | 0.52 | (1.9) | 0.40 | (2.4) | 0.41 | (2.3) | 0.66 | (1.6) | 0.51 | (2.1) |
| Na\% | 1.14 | (0.2) | 0.73 | (0.3) | 0.82 | (0.3) | 0.12 | (0.8) | 0.89 | (0.3) |
| Nd | 32.2 | (9.7) | 19.6 | (14.) | 21.7 | (13.) | 52.7 | (5.9) | 32.2 | (8.8) |
| Ni | 223. | (12.) | 71.2 | (37.) | 105. | (25.) | 51.4 | (48.) | 147. | (19.) |
| Rb | 150. | (1.6) | 78.2 | (2.5) | 81.4 | (2.5) | 105. | (1.9) | 173. | (1.5) |
| Sb | 1.99 | (1.5) | 0.42 | (5.4) | 0.46 | (5.0) | 0.61 | (3.1) | 1.86 | (1.4) |
| Sc | 21.6 | (.10) | 22.5 | (.09) | 23.1 | (.09) | 22.1 | (.09) | 23.5 | (.09) |
| Sm | 6.61 | (4.2) | 4.03 | (5.3) | 4.21 | (3.8) | 9.17 | (1.3) | 6.33 | (1.7) |
| Ta | 1.03 | (3.8) | 0.72 | (5.1) | 0.79 | (4.7) | 1.76 | (2.4) | 1.01 | (3.9) |
| Tb | 0.98 | (5.6) | 0.62 | (8.4) | 0.75 | (7.1) | 1.15 | (4.8) | 0.87 | (6.5) |
| Th | 14.3 | (0.4) | 7.07 | (0.8) | 7.20 | (0.7) | 21.4 | (0.3) | 15.1 | (0.4) |
| U | 2.16 | (9.3) | 1.49 | (11.) | 0.95 | (18.) | 3.39 | (4.3) | 2.30 | (7.7) |
| W | 3.43 | (3.7) | 1.62 | (6.7) | 1.51 | (7.5) | 2.17 | (4.4) | 3.08 | (4.4) |
| Yb | 3.46 | (1.8) | 2.47 | (2.0) | 2.55 | (2.0) | 4.54 | (1.1) | 3.25 | (1.6) |
| Zn | 116. | (1.7) | 134. | (1.5) | 119. | (1.7) | 46.9 | (3.3) | 131. | (1.6) |
| Zr | 205. | (10.) | 150. | (14.) | 135. | (16.) | 343. | (6.0) | 180. | (12.) |

Table 3. Average concentration values *M* in $\mu\text{g/g}$ (ppm), if not indicated otherwise, and the root mean square deviations (σ) of the two pairs Meg-1 + Meg-7 and Meg-2 + Meg-3 and the group EuA of samples from Euboea.*

| Element/Group | Meg-1 + Meg-7 2 samples | | EuA 292 samples | | Meg-2 + Meg-3 2 samples | |
|---------------|----------------------------|--------------|--------------------|--------------|----------------------------|--------------|
| | M | σ (%) | M | σ (%) | M | σ (%) |
| As | 17.2 | (62.) | 22.0 | (45.) | 6.27 | (2.5) |
| Ba | 404. | (30.) | 690. | (14.) | 368. | (10.) |
| Ca\% | 6.16 | (26.) | 3.63 | (30.) | 11.5 | (1.9) |
| Ce | 82.8 | (1.7) | 79.9 | (3.3) | 51.2 | (0.6) |
| Co | 24.6 | (0.5) | 23.1 | (6.3) | 25.5 | (0.5) |
| Cr | 174. | (9.0) | 154. | (7.3) | 103. | (4.3) |
| Cs | 9.51 | (10.) | 9.24 | (12.) | 3.54 | (2.6) |
| Eu | 1.50 | (1.4) | 1.39 | (3.6) | 1.05 | (3.1) |
| Fe\% | 5.47 | (6.6) | 5.31 | (6.1) | 5.19 | (0.3) |
| Ga | 25.9 | (7.1) | 26.2 | (20.) | 17.6 | (5.5) |
| Hf | 4.87 | (6.0) | 4.56 | (12.) | 3.20 | (1.5) |
| K\% | 3.41 | (9.5) | 3.20 | (9.4) | 2.06 | (0.6) |
| La | 39.3 | (1.9) | 37.9 | (2.8) | 25.5 | (1.2) |
| Lu | 0.51 | (2.0) | 0.49 | (4.6) | 0.40 | (2.4) |
| Na\% | 1.01 | (17.) | 1.07 | (18.) | 0.77 | (6.7) |
| Nd | 32.2 | (9.2) | 32.7 | (5.5) | 20.6 | (13.) |
| Ni | 185. | (29.) | 142. | (27.) | 88.2 | (30.) |
| Rb | 161. | (10.) | 158. | (8.6) | 79.8 | (2.5) |
| Sb | 1.92 | (4.6) | 2.26 | (19.) | 0.44 | (6.1) |
| Sc | 22.5 | (6.2) | 21.9 | (5.8) | 22.8 | (0.4) |
| Sm | 6.37 | (2.2) | 6.20 | (5.1) | 4.13 | (4.4) |
| Ta | 1.02 | (3.8) | 1.02 | (5.3) | 0.76 | (4.9) |
| Tb | 0.92 | (8.2) | 0.86 | (8.4) | 0.68 | (12.) |
| Th | 14.7 | (3.8) | 14.3 | (3.2) | 7.13 | (0.8) |
| U | 2.24 | (8.4) | 2.36 | (10.) | 1.23 | (33.) |
| W | 3.25 | (7.3) | 3.47 | (14.) | 1.57 | (7.1) |
| Yb | 3.35 | (4.2) | 3.22 | (5.0) | 2.51 | (2.0) |
| Zn | 123. | (9.2) | 114. | (11.) | 126. | (10.) |
| Zr | 193. | (11.) | 183. | (25.) | 142. | (15.) |

* The pair Meg-1 + Meg-7 is statistically similar to the group EuA. The individual samples for the group EuA have been corrected with a best relative factor with respect to the grouping value *M*. The best relative fit factors for the samples with respect to the grouping values EuA are 0.96 for both samples Meg-1 and Meg-7. The best relative fit factors used for calculating the average concentration pattern of the pair for Meg-2 is 1.01 and for Meg-3 0.99.

5. DISCUSSION

5.1. Provenance

Our archaeometric analysis shows that two specimens from Megiddo, a plate (Cat. No. 1) and a body sherd (Cat. No. 5), belong to the EuA (Euboean) group. Regarding the former, this type of pendent-semicircle plate is particularly widespread in the Eastern Mediterranean (Coldstream 1998a, 1998b, 2000). Coldstream hypothesized that plates such as this provided an attractive alternative to the eastern Red Slip plates, hinting at Euboean “market research.” Associating the plate from Megiddo with Euboea is also significant because some of the examples of this type may have been of an Attic or Cycladic origin (Lemos and Hatcher 1991: 207; Papadopoulos 2015: 211). Classification of Cat. Nos. 2–3 was more challenging and their exact provenance in the Aegean could not be established. The stylistic examination of the sherds may suggest their identification as a Late Protogeometric/Early Geometric cup or skyphos,

possibly belonging to the Corinthian Late Protogeometric/Early Geometric horizon. However, both the shape of the lower part of Cat. No. 3 and its monochrome design are attested in many corners of the Aegean region (e.g., Papadopoulos and Strack 2017: 808, ff.). The archaeometric analysis revealed a certain similarity but not a match between the chemical composition of Cat. Nos. 2–3 and some known Cypriot archaeometric patterns. This may suggest that we are dealing here with a Cypriot imitation of an Aegean prototype.

5.2. Chronology

As mentioned above, the Euboean plate (Cat. No. 1) appears in the Euboean Late Protogeometric and continues in the Euboean Sub-Protogeometric I–II. In a preliminary assessment, this item was assigned to the former period, based on the observation that the ceramic assemblage of Level Q-5, classified as representing the Early Iron IIA horizon, lacks Cypro-Geometric III imports of the Black-on-Red Ware (Fantalkin, Finkelstein and Piasetzky 2015: 34).

Reevaluation of the finds indicates that a modest number of Cypriot imports is attested in Level Q-5 (Kleiman et al. 2019: 537; Georgiadou, Kleiman and Finkelstein forthcoming). It means that this phase signifies, in fact, an early phase of the Late Iron IIA (Finkelstein and Kleiman 2019; Mazar and Kourou 2019: 383, n. 112). Indeed, also according to past excavations, Black-on-Red imports arrived at Megiddo before the construction of Stratum VA-IVB – the type-layer of the Late Iron IIA (see, e.g., Finkelstein, Zimhoni and Kafri 2000: Fig. 11.27: 2, 5; Arie 2013: Fig. 13.49: 7). A similar picture emerges from the excavations at Tel Rehov, where Cypriot imports of the Black-on-Red family appear for the first time in Stratum V of the Late Iron IIA (Mazar et al. 2005: 229) together with several Late Protogeometric/Sub-Protogeometric imports (Mazar and Kourou 2019: 373–377). Radiocarbon dating puts Level Q-5 at Megiddo and Stratum V at Tel Rehov at ca. 900 BCE (Boaretto forthcoming; Mazar et al. 2005; Mazar 2016: n. 70). There is a good correlation between these two contexts in terms of local pottery sequences, radiocarbon dates and imports. In accordance with these details, the possibility that our Cat. No. 1 belongs to the Euboean Sub-Protogeometric I-II, rather than to the Euboean Late Protogeometric horizon, should be considered. This would correspond to a tentative attribution of the Late Protogeometric/Early Geometric cup or skyphos (Cat. Nos. 2–3) to the Corinthian horizon, due to attested overlapping between Corinthian Late Protogeometric/Early Geometric, Attic Early Geometric and Euboean Sub-Protogeometric I-II (Coldstream 1968, 330). However, the Euboean Late Protogeometric attribution for this Euboean plate (Cat. No. 1), still remains as a plausible option.

None of the sherds discussed here is affiliated with secure contexts of Level Q-4, which produced a rich local ceramic assemblage and many Black-on-Red Cypriot sherds (Kleiman et al. 2019; Georgiadou, Kleiman and Finkelstein forthcoming). To date, Aegean imports have not been attested in any of the contemporaneous “classic” Late Iron IIA layers unearthed during the renewed excavations in other areas at Megiddo (Levels K-2, H-5 and L-3; Finkelstein, Zimhoni and Kafri 2000; Arie 2013). However, the early Middle Geometric I Attic skyphos, which was found at Megiddo during the Oriental Institute excavations in a disturbed context (Figure 2; see above), certainly belongs to this horizon; an almost identical vessel was unearthed in the destruction layer of Stratum IV at Tel Rehov (Coldstream and Mazar 2003: 35, 37–38; Mazar

and Kourou 2019: 380). The latter layer is contemporaneous with Stratum VA-IVB (and Level Q-4) at Megiddo. Both items have good parallels in the early stage of the Middle Geometric I in Attica.

6. CONCLUSIONS

Recently, Mazar and Kourou (2019: 384–387) discussed several possible scenarios that may have led to the deposition of significant quantities of Greek pottery at Tel Rehov, located ca. 30 km to the east of Megiddo and relatively far from the Mediterranean coast. In their view, the most probable one is that these vessels arrived at the site as prestige gifts, possibly by merchants who were active along the copper production networks stretching between the Arabah Valley and Phoenicia through the King’s highway and the Beth-shean Valley. Considering the negligible number of Aegean sherds discovered at Megiddo, as well as their eclectic provenance (Euboea, Attica and maybe Corinth), perhaps a similar explanation should be offered for the sherds discussed here, which were discovered in the vicinity of an elaborate public building, located at the highest point of the site.

From the Pan-Mediterranean perspective, fixing the absolute date of Megiddo Level Q-5 and its Aegean finds at ca. 900 BCE provides a good confirmation of the accepted Aegean Iron Age chronology, corresponding to the transitions from the Attic Protogeometric to Attic Early Geometric; from Euboean Late Protogeometric to Euboean Sub-Protogeometric I; and from Cypro-Geometric II to Early Cypro-Geometric III. This would imply that the preceding Aegean sequence from Early Protogeometric to the end of Late Protogeometric should cover the last few decades of the 11th century BCE and the entire 10th century BCE, parallel with the Cypriot sequence from the Cypro-Geometric IA to the end of Cypro-Geometric II (Kleiman et al. 2019). These observations are independently supported by the radiocarbon dates for the transition from the Sub-Mycenaean to Early Protogeometric in the Aegean in the second half of the 11th century BCE (Toffolo et al. 2013). Recent attempts to raise the Aegean Iron Age chronology by more than a century based on the results obtained from the northern Aegean sites of Assiros (Wardle, Higham and Kromer 2014) and Sindos (Gimatidis and Weninger 2020), cannot be maintained (and see Weninger and Jung 2009; Fantalkin, Finkelstein and Piasetzky 2015; Knapp and Manning 2016).

ACKNOWLEDGEMENTS

The Megiddo Expedition is conducted under the auspices of Tel Aviv University. Consortium members are The George Washington University, Vanderbilt University, The University of Oklahoma, the Jezreel Valley

Regional Project (JVPR), Fuller Theological Seminary and Loyola Marymount University. The Expedition is directed by Israel Finkelstein (Tel Aviv University), Matthew J. Adams (W.F. Albright Institute of Archaeological Research) and Mario A.S. Martin (Tel Aviv University). The excavation of Area Q was carried out during five full-scale seasons, conducted in 2008 and 2010 (supervisor Norma Franklin), 2012, 2014 and 2016 (supervisor Robert S. Homsher), and several short, geoarchaeology-oriented seasons in 2011 and 2013. The current study was supported by the Dan David Foundation, Mark Weissman and Jacques Chahine. We are thankful to the staff of the research reactor of the Reactor Institute Delft, Delft University of Technology, for irradiating the samples.

REFERENCES

- Arie, E. (2013) The Iron IIA pottery. In *Megiddo V: The 2004–2008 Seasons*, Monograph Series of the Institute of Archaeology of Tel Aviv University 31, I. Finkelstein, D. Ussishkin and E. H. Cline (ed.), Tel Aviv, Tel Aviv University, pp. 668–828.
- Baxter, M. (2003) *Statistics in Archaeology*, Arnold, London.
- Beier, Th. and Mommsen, H. (1994) Modified Mahalanobis filters for grouping pottery by chemical composition. *Archaeometry*, Vol. 36, pp. 287–306.
- Bikai, P. M. (1978) *The Pottery of Tyre*, Aris and Phillips, Warminster.
- Boaretto, E. (forthcoming) Radiocarbon dating. In *Megiddo VI: The 2010–2014 Seasons*, Monograph Series of the Institute of Archaeology of Tel Aviv University, I. Finkelstein and M.A.S. Martin (ed.), University Park, PA and Tel Aviv, Pennsylvania State University Press.
- Clairmont, C. (1955) Greek pottery from Near East. Introduction, *Berytus*, Vol. 12, pp. 85–141.
- Coldstream, J. N. (1968) *Greek Geometric Pottery: A Survey of Ten Local Styles and their Chronology*, London, Methuen.
- Coldstream, J. N. (1998a) The first exchanges between Euboeans and Phoenicians: Who took the initiative? In *Mediterranean Peoples in Transition. Thirteenth to Early Tenth Century BCE*, S. Gitin, A. Mazar and E. Stern (ed.), Jerusalem, Israel Exploration Society, pp. 353–360.
- Coldstream, J. N. (1998b) Drinking and Eating in Euboean Pithekoussai. In *Euboica: L'Eubea e la presenza euboica in Calcidica e in Occidente*, M. Bats and B. d'Agostino (ed.), Naples, Collection du Centre Jean Bérard 16, pp. 303–310.
- Coldstream, J. N. (2000) Exchanges between Phoenicians and Early Greeks. *National Museum News*, Vol. 11, pp. 15–32.
- Coldstream, J. N. (2003) Some Aegean reactions to the chronological Debate in the Southern Levant. *Tel Aviv*, Vol. 30, pp. 247–258.
- Coldstream, J. N. and Mazar, A. (2003) Greek pottery from Tel Rehov and Iron Age chronology. *Israel Exploration Journal*, Vol. 53, pp. 29–48.
- Courbin, P. (1986) Bassit. *Syria*, Vol. 63, pp. 175–220.
- Doumet-Serhal, C. (2008) The Kingdom of Sidon. In *Networking Patterns of the Bronze and Iron Age Levant. The Lebanon and its Mediterranean Connections. Symposium "Interconnections in the Eastern Mediterranean; The Lebanon in the Bronze and Iron Ages", 4–9 Novembre 2008, Beyrouth*, C. Doumet-Serhal, A. Rabate and A. Resek (ed.), London, Lebanese British Friends of the National Museum, pp. 1–70.
- Eshel, T., Yahalom-Mack, N., Tirosh, O. and Gilboa, A. (2019) Lead isotopes in silver reveal earliest Phoenician quest for metals in the West Mediterranean. *PNAS*, Vol. 116, pp. 6007–6012.
- Fantalkin, A. (2001) Low chronology and Greek Protogeometric and Geometric pottery in the southern Levant. *Levant*, Vol. 33, pp. 117–125.
- Fantalkin, A. (2008) *Contacts between the Greek World and the Southern Levant during the Seventh-Sixth Centuries BCE*. Unpublished Ph.D. Dissertation, Tel Aviv University, Tel Aviv.
- Fantalkin, A. and Finkelstein, I. (2006) The Sheshonq I campaign and the 8th century BCE earthquake – more on the archaeology and history of the south in the Iron I-IIA. *Tel Aviv*, Vol. 33, pp. 18–42.
- Fantalkin, A., Finkelstein, I. and Piasetzky, E. (2015) Late Helladic to Middle Geometric Aegean and contemporary Cypriot chronologies: A radiocarbon view from the Levant. *Bulletin of the American Schools of Oriental Research*, Vol. 373, pp. 25–48.
- Finkelstein, I. and Kleiman, A. (2019) The archaeology of the days of Baasha? *Revue Biblique*, Vol. 126, pp. 277–296.
- Finkelstein, I., Zimhoni, O. and Kafri, A. (2000) The Iron Age pottery assemblages from areas F, K and H and their stratigraphic and chronological implications. In *Megiddo III: The 1992–1996 Seasons*, Monograph

- Series of the Institute of Archaeology Tel Aviv University 18, I. Finkelstein, D. Ussishkin, and B. Halpern (ed.), Tel Aviv, Tel Aviv University, pp. 244–324.
- Georgiadou, A., Kleiman, A. and Finkelstein, I. (forthcoming) The Cypriot Pottery from Area Q. In *Megiddo VI: The 2010–2014 Seasons*, Monograph Series of the Institute of Archaeology of Tel Aviv University, I. Finkelstein and M.A.S. Martin (ed.), University Park, PA and Tel Aviv, Pennsylvania State University Press.
- Gilboa, A. and Sharon, I. (2003) An Archaeological Contribution to the Early Iron Age Chronological Debate: Alternative Chronologies for Phoenicia and their Effects on the Levant, Cyprus, and Greece. *Bulletin of the American Schools of Oriental Research*, Vol. 332, pp. 7–80.
- Gimatidis, S. and Weninger, B. (2020) Radiocarbon dating the Greek Protogeometric and Geometric Periods: The Evidence of Sindos. *PLoS ONE*, Vol. 15, <https://doi.org/10.1371/journal.pone.0232906>.
- Gjerstad, E. (1977) Pottery from various parts of Cyprus. In *Greek Geometric and Archaic Pottery found in Cyprus*, E. Gjerstad (ed.), Stockholm, Svenska Institutet i Athen, pp. 23–59.
- Golitko, M., Dudgeon, J. V., Neff, H. and Terell, J. E. (2012) Identification of post-depositional chemical alteration of ceramics from the north of Papua New Guinea (Sanduan Province) by Time-Of Flight-Laser-Ablation-Inductively-Coupled-Plasma-Mass-Spectrometry (TOF-LA-ICP-MS). *Archaeometry*, Vol. 54, pp. 80–100.
- Kerschner, M. (2014) Euboean or Levantine? Neutron Activation Analysis of pendent semicircle skyphoi from Al Mina. In *Archaeometric Analyses of Euboean and Euboean Related Pottery: New Results and their Interpretations. Proceedings of the Round Table Conference held at the Austrian Archaeological Institute in Athens 15 and 16 April 2011*, M. Kerschner and I. S. Lemos (ed.), Vienna, Österreichisches Archäologisches Institut, pp. 157–168.
- Kerschner, M. and Lemos, I. S. (2014) Production, export and imitation of Euboean Pottery: A summary of the results of the workshop on the provenance of Euboean and Euboean related pottery and perspectives for future research. In *Archaeometric Analyses of Euboean and Euboean Related Pottery: New Results and their Interpretations. Proceedings of the Round Table Conference Held at the Austrian Archaeological Institute in Athens 15 and 16 April 2011*, M. Kerschner and I. S. Lemos (ed.), Vienna, Österreichisches Archäologisches Institut, pp. 191–194.
- Kleiman, A., Cohen, M. E., Hall, E., Homsher, R. S. and Finkelstein, I. (2017) Cult activity at Megiddo in the Iron Age: New evidence and a long-term perspective. *Zeitschrift des Deutschen Palästina-Vereins*, Vol. 133, pp. 24–52.
- Kleiman, A., Fantalkin, A., Mommsen, H. and Finkelstein, I. (2019) The date and origin of black-on-red ware: The view from Megiddo. *American Journal of Archaeology*, Vol. 123, pp. 531–555.
- Kleiman, A., Kaplan, A. and Finkelstein, I. (2016) Building 338 at Megiddo: New evidence from the field. *Israel Exploration Journal*, Vol. 66, pp. 161–176.
- Knapp, A. B. and Manning, S. W. (2016) Crisis in context: The end of the Late Bronze Age in the Eastern Mediterranean. *American Journal of Archaeology*, Vol. 120, pp. 99–149.
- Kopcke, G. (2002) 1000 B.C.E.? 900 B.C.E.? A Greek vase from Lake Galilee. In *Leaving No Stones Unturned. Essays on the Ancient Near East and Egypt in Honor of Donald P. Hansen*, E. Ehrenberg (ed.), Winona Lake, Eisenbrauns, pp. 109–117.
- Lamon, R. S. and Shipton, G. M. (1939) *Megiddo 1: Seasons of 1925–34: Strata I–V*, Oriental Institute Publications 42, Chicago.
- Lemos, I. S. and Hatcher, H. (1991) Early Greek vases in Cyprus: Euboean and Attic. *Oxford Journal of Archaeology*, Vol. 10, pp. 197–208.
- Mazar, A. (2016) Culture, identity and politics relating to Tel Rehov in the 10th–9th centuries BCE. In *In Search of Aram and Israel: Politics, Culture and Identity*, Oriental Religions in Antiquity 20, O. Sergi, M. Oeming and I. de Hulster (ed.), Tübingen, Mohr Siebeck, pp. 89–120.
- Mazar, A. and Kourou, N. (2019) Greece and the Levant in the 10th–9th centuries BC. *Opuscula: Annual of the Swedish Institutes at Athens and Rome*, Vol. 12, pp. 369–392.
- Mazar, A., Bruins, H. J., Panitz-Cohen, N. and van der Plicht, J. (2005) Ladder of time at Tel Rehov: Stratigraphy, archaeological context, pottery and radiocarbon dates. In *The Bible and Radiocarbon Dating: Archaeology, Text and Science*, T. E. Levy and T. Higham (ed.), London, Equinox, pp. 193–255.
- Mommsen, H. (2001) Provenance determination of pottery by trace element analysis: Problems, solutions and applications. *Journal of Radioanalytical Nuclear Chemistry*, Vol. 247, pp. 657–662.
- Mommsen, H. (2011) Provenancing of pottery. In *Nuclear Techniques for Cultural Heritage Research*, Vienna, International Atomic Energy Agency, Chap. 3, pp. 41–70.

- Mommsen, H. (2014) Provenancing by Neutron Activation Analyses and results of Euboean and Euboean related pottery. In *Archaeometric Analyses of Euboean and Euboean Related Pottery: New Results and Their Interpretations. Proceedings of the Round Table Conference Held at the Austrian Archaeological Institute in Athens 15 and 16 April 2011*, M. Kerschner and I. S. Lemos (ed.), Vienna, Österreichisches Archäologisches Institut, pp. 13–36.
- Mommsen, H. and Sjöberg, B. L. (2007) The importance of the ‘Best Relative Fit Factor’ when evaluating elemental concentration data of pottery demonstrated with Mycenaean sherds from Sinda, Cyprus. *Archaeometry*, Vol. 49, pp. 357–369.
- Mommsen, H., Kreuser, A. and Weber, J. (1988) A method for grouping pottery by chemical composition. *Archaeometry*, Vol. 30, pp. 47–57.
- Mommsen, H., Kreuser, A., Lewandowski, E. and Weber, J. (1991) Provenancing of pottery: A status report on Neutron Activation Analysis and classification. In *Neutron Activation and Plasma Emission Spectrometric Analysis in Archaeology*, BMOP 82, M. Hughes, M. Cowell and D. Hook (ed.), London, British Museum, pp. 57–65.
- Murray, S. C. (2017) *The Collapse of the Mycenaean Economy: Imports, Trade, and Institutions 1300–700 BCE*, New York.
- Núñez, F. J. (2014) The ceramic repertoire of the Iron Age. In *The Phoenician Cemetery of Tyre al-Bass. II. Archaeological seasons 2002–2005*, Bulletin d’Archéologie et d’Architecture Libanaises, Hors-Série IX, M. E., Aubet, F. J. Núñez and L. Trellisó (ed.), Beirut, Ministère de la Culture, pp. 261–371.
- Papadopoulos, J. K. (2015) Owls to Athens: Imported pottery in Early Iron Age Athens. In *Pots, workshops and Early Iron Age society: Function and role of ceramics in early Greece. Proceedings of the International Symposium Held at the Université libre de Bruxelles 14–16 November 2013*, V. Vlachou (ed.), Bruxelles, Université libre de Bruxelles, pp. 201–215.
- Papadopoulos, J. K. and Strack, S. (2017) Pottery. In *The Athenian Agora Volume XXXVI: The Early Iron Age, The Cemeteries*, J. K. Papadopoulos and E. L. Smithson (ed.), New Jersey, American School of Classical Studies at Athens, pp. 689–897.
- Perlman, I. and Asaro, F. (1969) Pottery analysis by neutron activation. *Archaeometry*, Vol. 11, pp. 21–52.
- Pfaff, C. A. (1999) The early Iron Age pottery from the sanctuary of Demeter and Kore at Corinth. *Hesperia*, Vol. 68, pp. 55–134.
- Pfaff, C. A. (2007) Geometric graves in the Panayia Field at Corinth. *Hesperia*, Vol. 76, pp. 443–537.
- Popham, M. R. and Lemos, I. S. (1996) *Lefkandi III: The Toumba Cemetery; The Excavations of 1981, 1984, 1986 and 1992–4; Plates*, British School at Athens Supplementary 29, London, Thames and Hudson.
- Toffolo, M. B., Arie, E., Martin, M. A. S., Boaretto, E. and Finkelstein, I. (2014) Absolute Chronology of Megiddo, Israel, in the Late Bronze and Iron Ages: High-Resolution Radiocarbon Dating. *Radiocarbon*, Vol. 56, pp. 221–244.
- Toffolo, M. B., Fantalkin, A., Lemos, I. S., Felsch, R. C. S., Niemeier, W.-D., Sanders, G. D. R., Finkelstein, I. and Boaretto, E. (2013) Towards an Absolute Chronology for the Aegean Iron Age: New Radiocarbon Dates from Lefkandi, Kalapodi and Corinth. *PLoS ONE* Vol. 8/12: e83117. doi:10.1371/journal.pone.0083117.
- Vacek, A. (2014) Euboean imports at Al Mina in the light of recent studies on the pottery finds from Woolley’s excavation in *Archaeometric Analyses of Euboean and Euboean Related Pottery: New Results and their Interpretations. Proceedings of the Round Table Conference held at the Austrian Archaeological Institute in Athens 15 and 16 April 2011*, M. Kerschner and I. S. Lemos (ed.), Vienna Österreichisches Archäologisches Institut, pp. 141–156.
- Waldbaum J. C. (1994) Early Greek Contacts with the Southern Levant, ca. 1000–600 B.C.: The Eastern Perspective, *Bulletin of the American Schools of Oriental Research*, Vol. 293, pp. 53–66.
- Wardle, K., T., Higham and Kromer, B. (2014) Dating the end of the Greek Bronze Age: A robust radiocarbon-based chronology from Assiros Toumba. *PLoS ONE*, Vol. 9(9): e106672. doi:10.1371/journal.pone.0106672.
- Weninger, B. and Jung, R. (2009) Absolute chronology of the end of the Aegean Bronze Age. In *LH III C Chronology and Synchronisms III: LH III C Late and the Transition to the Early Iron Age; Proceedings of the International Workshop Held at the Austrian Academy of Sciences at Vienna, February 23rd and 24th, 2007*, Denkschriften der philosophisch-historischen Klasse 30, S. Deger-Jalkotzy and A. E. Bächle (ed.), Vienna, Österreichischen Akademie der Wissenschaften, pp. 373–416.

Wood, J. R., Bell, C. and Montero-Ruiz, I. (2020) The origin of Tel Dor hacksilver and the westward expansion of the Phoenicians in the Early Iron Age: The Cypriot connection. *Journal of Eastern Mediterranean Archaeology and Heritage Studies*, Vol. 8, pp. 1-21.