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Provenance of the Early Bronze Age III Khirbet Kerak Ware and Intermediate Bronze Age Vessels from a Burial Cave near Ḥorbat Zelef

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Introduction

The Early Bronze Age III Khirbet Kerak Ware (KKW) has been the subject of several studies (e.g., Burney 1989; Esse 1991:51–53; Leonard 1992:50–57; Philip 1999; Greenberg 2000; Miroschedji 2000; Batiuk 2005). It is a highly distinctive ceramic family, whose hallmark is an intense red/black burnished surface. The main distribution area of KKW is northern Israel, where this ware comprises in some sites 30–50% of the entire EB III assemblage (see Greenberg 2000:189; Mazar, Ziv-Esudri and Cohen-Weinberger 2000:262; Greenberg and Eisenberg 2006:141). The sites of Bet Yeraḥ, Bet She'an and Ḥaẓor are considered to have been centers of production and intensive consumption of this ware (Esse 1991; Greenberg 2000:189; Mazar, Ziv-Esudri and Cohen-Weinberger 2000; Miroschedji 2000:260). Examples of KKW were found in the Jezreel Valley in sites such as 'Afula (Sukenik 1948: Pls. 10, 11), Megiddo (Loud 1948), Yoqne'am (Sharon Zuckerman, pers. comm.), Tel Jezreel (Howard Smithline, pers. comm.) and Tel Qishyon (Carmela Arnon, pers. comm.). South of the Jezreel Valley, KKW becomes very rare (Esse 1991; Miroschedji 2000). Ḥorbat Zelef, the site under study, is located near the village of Shibli (see Covello-Paran, this volume), 3 km from Tel Qishyon and about 20 km west of Bet Yeraḥ, and is within the general geographical distribution of this ware.

Khirbet Kerak Ware has been previously analyzed both petrographically (Matson in Braidwood and Braidwood 1960:360–361; Shenhav 1984; Mazar, Ziv-Esudri and Cohen-Weinberger 2000; Batiuk 2005) and by a multivariate analysis of chemical composition data (Esse and Hopke 1986:332), with samples taken from Bet Yeraḥ, Beth She'an, Ḥaẓor, Tell esh-Shuneh and the 'Amuq sites. These studies indicated that the KKW from those sites was made locally, as the raw material reflects the local geology of each site. Thus, various workshops produced KKW, utilizing a similar technological tradition that achieved the distinctive finish of this ware. The working hypothesis of this paper is that the KKW vessels found in the present burial cave near Ḥ. Zelef were made in one of the neighboring Jezreel Valley production centers. This hypothesis was tested petrographically by identifying the raw materials of the KKW vessels. This study is part of an ongoing project with Adi Ziv-Esudri and Sharon Zuckerman dealing with patterns of trade and the nature of the KKW diffusion in Israel.

In addition, Intermediate Bronze Age vessels from the cave near Ḥ. Zelef were examined petrographically to define and identify the raw material used for the pottery and to compare it with the raw material used in the EB III vessels.

Method

The petrographic method is based on the examination of thin (30-micron) sections under a petrographic (polarizing) microscope, and arranging the pottery into petrographic groups according to the characteristics of the raw material. An assessment of the geological setting of the excavated site and its surrounding area, as well as of other regions suspected of being the origin of the analyzed pottery, was conducted, aimed at identifying the provenance of the raw material (for more details concerning the petrographic method see, e.g., Whitbread 1995; Vaughan 1999).

Five KKW vessels from the cave were analyzed: one thick-walled vessel (krater or stand) in fragmentary condition (Table 1:18); one S-shaped, thin-walled bowl (Table 1:5); and three red, thin-walled bowls, usually known from other sites to have omphalos bases (Table 1:8, 9, 13). Another EB III black-burnished sherd was analyzed (Table 1:20). The raw material used for the KKW was compared to one KKW vessel from Bet Yeraḥ (unpublished data, analyzed by the author) and to the KKW vessels from Bet She'an (Mazar, Ziv-Esudri and Cohen-Weinberger 2000). In addition, 14 Intermediate Bronze Age vessels were petrographically examined.

Geological Setting

Ḥorbat Zelef is located in a diversified geological environment of Pliocene Bira Formation marl, Miocene-Pleistocene basalts (Oppenheim 1959), Eocene limestone, chalk and chert of the Timrat Formation and Cenomanian sedimentary rocks dominated by dolomite of the Kammon, Deir-Hanna and Sakhnin Formations (Sneh,

Table 1. Inventory and Results of the Pottery Analysis

No.	Basket	Period	Type	Petrographic Group	Figure (see Covello-Paran, this volume)
1	1293	IBA	Jug	C	15:13
2	1295/1	IBA	Jar	C	16:5
3	1321	IBA	Jar	C	16:3
4	1333	IBA	Ledge handle	A?	16:8
5	1474	EB III	Bowl (KKW)	B	13:1
6	1371	IBA	Amphoriskos	A	15:5
7	1378	IBA	Jar	C	15:10
8	1373	EB III	Bowl (KKW)	B	13:4
9	1379	EB III	Bowl (KKW)	B	13:3
10	1380	IBA	Jar	C	15:11
11	1384	IBA	Jar	A	16:4
12	1389	IBA	Metallic Ware	C	16:9
13	1391/1	EB III	Bowl (KKW)	B	13:2
14	1394	IBA	Jar	C	16:1
15	1398/1	IBA	Bowl	C	15:3
16	1398/2	IBA	Bowl	C	15:2
17	1402	IBA	Amphoriskos	C	15:4
18	1409	EB III	Krater/stand (KKW)	B	Not illustrated
19	1426	IBA	Jar	C	16:2
20	1426/1	EB III	Black closed vessel	A	Not illustrated

IBA = Intermediate Bronze Age

Bartov and Rosensaft 1998). The area studied is characterized by soils that developed on rock formation, the main ones being *terra rosa, rendzina* and basaltic soils (Ravikovitch 1970). A tributary of Naḥal Tavor, which passes near the site, is characterized by an alluvial soil that reflects the diversified lithology described above. Formations comprising clay and marl are potentially suitable for pottery production, as are clay-rich soils and alluvial sediments, such as the Bira Formation and marl layers within the Cenomanian section.

Results

The pottery examined was allocated to petrographic groups (A–C) according to the characteristics of the raw materials.

Group A.— This group is characterized by calcareous clay with some foraminifera. The non-plastic components comprise diversified appearances of basalt, and tuff and minerals derived from basalt such as clinopyroxenes. Some basalt fragments appear with phenocrysts of olivine that are altered into iddingsite, and others show alterations to chlorite (Figs. 1, 2). Some limestone and dolomite fragments appear as well. The clay used for the vessels of this group is undetermined; however, local production is suggested based on the non-plastic components.

Group B.— This group is characterized by argillaceous ferruginous clay, showing birefringence, rich in silt-sized quartz grains

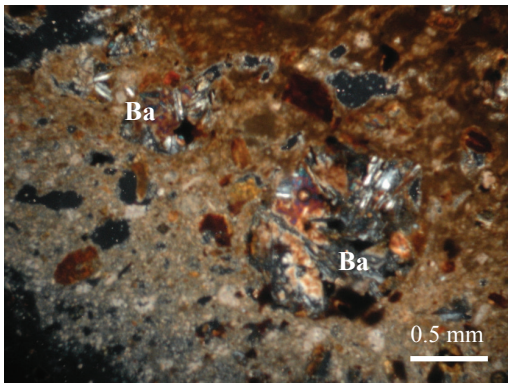

Fig. 1. Photomicrograph of IBA amphoriskos (Table 1:6). Basalt fragments embedded in calcareous clay. XPL. Ba = basalt.

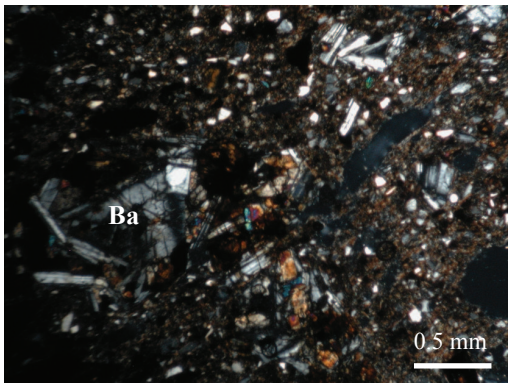

Fig. 2. Photomicrograph of KKW krater/stand (Table 1:18). Basalt fragments embedded in a silty basaltic brown mediterranean soil. XPL. Ba = basalt.

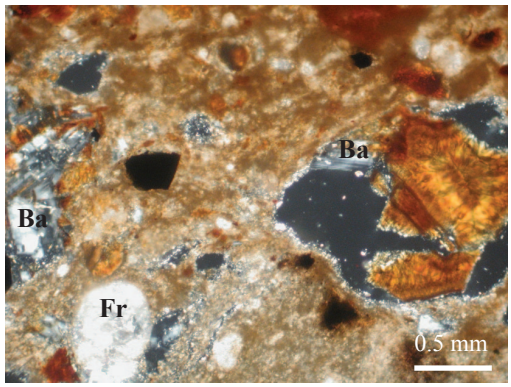

Fig. 3. Photomicrograph of IBA amphoriskos (Table 1:6). Basalt with alterations to chlorite embedded in calcareous clay comprising foraminifera. XPL. Ba = basalt, Fr = foraminifera.

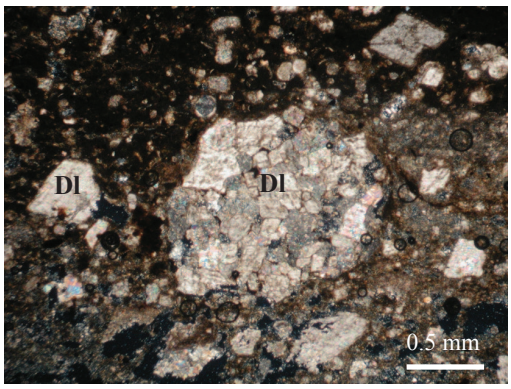

Fig. 4. Photomicrograph of IBA jar (Table 1:2). Dolomite fragments embedded in calcareous clay. XPL. Dl = dolomite.

and iron oxides. The main non-plastic components are basalt fragments (Fig. 3), with a few rare tuff and chert fragments. The clay is mixed with *terra rosa* soil, which appears as mud balls. The raw material used in this group is identified as basaltic brown Mediterranean soil (Ravikovitch 1970; Wieder and Adan-Bayewitz 2002:406–407). A large amount of silty quartz-grains occurs in soils developed on carbonate and basaltic rocks. As these rocks do not contain silt-size quartz grains, their source in the soil aeolian (Wieder and Adan-Bayewitz 2002:406–407, 411–412). Basaltic brown Mediterranean soils occur in Lower Galilee (Ravikovitch 1970); thus, this group could have been locally made.

Group C.— This group is characterized by foraminifera-rich clay. The non-plastic components consist of mainly dolomite rock fragments (Fig. 4). Chalk, travertine and, rarely, basalt rocks appear as well. The non-plastic assemblage of this group suggests a provenance with a significant component of dolomite rocks adjacent to a volcanic environment. The area of the site is well suited to such an environment. Hence, a local production for this group is suggested.

Summary

The vessels examined were divided into three petrographic groups, all of which attest to production in the vicinity of Ḥ. Zelef. All the EB III KKW vessels are related to the same petrographic group (B), while the Intermediate Bronze Age vessels were made of Petrographic Groups A and C. The cave could have been used by the inhabitants of an adjacent EB III site, such as Tel Qishyon. If the tomb was used by the same settlement for burial during EB III and the Intermediate Bronze Age, the results indicate that the potters used different raw material over time, possibly due to different traditions of pottery making. Alternatively, the EB III KKW and the Intermediate Bronze Age vessels might have been produced in different sites.

The raw material of the KKW from Bet She'an is dominated by travertine inclusions, which characterize the local lithology (Mazar, Ziv-Esudri and Cohen-Weinberger 2000). The raw material of the KKW sample from Bet Yeraḥ indicates an origin in the Jordan River.[1] The raw material used for the KKW in the burial cave near Ḥ. Zelef differs from that of the KKW from Bet She'an and Bet Yeraḥ. This result suggests the possibility that the KKW vessels from Ḥ. Zelef were made locally, most probably in one of the major EB III sites in the Jezreel Valley, such as Tel Qishyon.

Further study of the variety of EB III sites in the Jezreel Valley and its surroundings, and a close examination of KKW vessels in these sites, will enable a better understanding of the relation between these sites and the production and distribution patterns of this ware.

NOTE

[1] Analyzed by the author, as yet unpublished. A petrographic study of KKW vessels from Bet Yeraḥ is currently underway by Mark Iserlis and Raphael Greenberg.

The article is updated to 2006. For a more recent research on the production and distribution patterns of KKW in the southern Levant, see Zuckerman, Ziv-Esudri and Cohen-Weinberger 2009.

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