EXCAVATIONS AT TEL BETH-SHEAN 1989–1996

VOLUME IV

THE 4TH AND 3RD MILLENNIA BCE

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CONTENTS

ABBREVIATIONS

Bibliographic Citations

AASOR	Annual of the American Schools of Oriental Research
ADAJ	*Annual of the Department of Antiquities, Jordan*
AJA	*American Journal of Archaeology*
BAR Int. Ser.	British Archaeological Reports International Series
BASOR	*Bulletin of the American Schools of Oriental Research*
Beth Yeraḥ I	Greenberg, R., Eisenberg, E., Paz, S. and Paz, I. 2006. *Beth Yeraḥ, The Early Bronze Age Mound*, I: *Excavation Reports, 1933–1986* (IAA Reports 30). Jerusalem.
ESI	*Excavations and Surveys in Israel*
HA	*Ḥadashot Arkheologiyot*
IEJ	*Israel Exploration Journal*
JPOS	*Journal of the Palestine Oriental Society*
JNES	*Journal of Near Eastern Studies*
Megiddo II	Loud, G. 1948. *Megiddo* II: *Seasons of 1935–1939* (Oriental Institute Publications 62). Chicago.
Megiddo III	Finkelstein, I., Ussishkin, D. and Halpern, B. 2000. *Megiddo* III*: The 1992–1996 Seasons* (Institute of Archaeology Monograph Series 18). Tel Aviv.
Megiddo IV	Finkelstein, I., Ussishkin, D. and Halpern, B. 2006. *Megiddo* IV: *The 1998–2002 Seasons* (Institute of Archaeology Monograph Series 24). Tel Aviv.
NEAEHL	Stern, E. (ed.), 1993. *The New Encyclopedia of Archaeological Excavations in the Holy Land*. Jerusalem.
PEQ	*Palestine Exploration Quarterly*
Qashish	Ben-Tor, A., Bonfil, R. and Zuckerman, S. 2003. *Tel Qashish, A Village in the Jezreel Valley: Final Report of the Archaeological Excavations (1978–1987)* (Qedem Reports 5). Jerusalem.
Qiryat Ata	Golani, A. (ed.), 2003. *Salvage Excavations at the Early Bronze Age Site of Qiryat Ata* (IAA Reports 18). Jerusalem.
RB	*Revue Biblique*
TBS I	Mazar, A. 2006. *Excavations at Tel Beth-Shean 1989–1996.* I: *From the Late Bronze Age IIB to the Medieval Period*. Jerusalem.
TBS II	Mazar, A. and Mullins, R.A. (eds.), 2007. *Excavations at Tel Beth-Shean 1989–1996.* II: *The Middle and Late Bronze Age Strata in Area R*. Jerusalem.
TBS III	Panitz-Cohen N. and Mazar, A. (eds.), 2009. *Excavations at Tel Beth-Shean 1989–1996.* III*: The 13th–11th Century BCE Strata in Areas N and S.* Jerusalem.
Timnah II	Mazar, A. and Panitz-Cohen, N. (eds.), 2001. *Timnah (Tel Batash)* II: *The Finds from the First Millennium BCE* (Qedem 42). Jerusalem.
Timnah III	Panitz-Cohen, N. and Mazar, A. (eds.), 2006. *Timnah (Tel Batash)* III*: The Finds from the Second Millennium BCE* (Qedem 45). Jerusalem.
ZDPV	*Zeitschrift des Deutschen Palästina-Vereins*

Pottery Classes

AM	Amphoriskos
AN	Andiron
BL	Bowl
CB	Cooking bowl
CH	Chalice
CP	Cooking pot
CV	Closed vessel
FL	Flask
HJ	Holemouth jar
HL	Handle
JG	Jug
JR	Jar
JT	Juglet
KR	Krater
LD	Lid
LP	Lamp
OV	Open vessel
PL	Platter
PT	Pithos
SCV	Small closed vessel
SJ	Storage jar
ST	Stand
TP	Teapot

General

D	diameter
EB	Early Bronze Age
BP	Before Present
FG	Fabric Group
gr	gram
H	height
ha	hectare
HU	Hebrew University
HYB	hybrid: local-tradition form made in KKW technique
IAA	Israel Antiquities Authority
IBA	Intermediate Bronze Age
KKW	Khirbet Kerak Ware
L	length
LB	Late Bronze Age
LI	Lead Isotope
LT	Local Tradition
MB	Middle Bronze Age
MNI	Minimum Number of Individuals
MW	Metallic Ware
NE	Not excavated
OM	Optical Minerology
Th	thickness
UME	University Museum Expedition, University of Pennsylvania
Wt	weight
XPL	Cross-Polarized Light

CHAPTER 7

A TECHNOLOGICAL STUDY OF THE EARLY BRONZE AGE III POTTERY

Mark Iserlis, Raphael Greenberg and Yuval Goren

INTRODUCTION

This study[1] forms part of a larger project that seeks to establish the technological principles of Khirbet Kerak Ware (KKW) production by means of comparisons among KKW assemblages, between KKW and other Early Transcaucasian (Kura-Araxes) traditions, and between KKW and local non-KKW industries, i.e., common storage, preparation and presentation, and cooking wares (Iserlis et al. 2010; http://kura-arax.tau.ac.il/). Our approach is derived from *chaîne-opératoire* analysis (Lemmonier 1986; Pelegrin, Karlin and Bordu 1988; Dobres 2000), which offers a detailed reconstruction of artifact manufacture, use and discard, focusing on producers' behavior and decision-making. It therefore expands on and complements previous technological studies of KKW from Tel Beth-Shean (Chapter 6; see also Mazar, Ziv-Esudri and Cohen-Weinberger 2000; Cohen-Weinberger 2007; 2009; Zuckerman, Ziv-Esudri and Cohen-Weinberger 2009).

Tel Beth-Shean is a key site for the understanding of KKW, particularly in view of the dominance of this ware in the pottery assemblage through several stratigraphic phases in EB III. It provides a contrast to Tel Bet Yeraḥ (for which the preliminary results of our comparative project have been published, see Iserlis 2009), where KKW was introduced into an extant urban site and survived as the technological enclave of a minority, albeit a significant one, within a dominant local culture.

At Beth-Shean, KKW was found in considerable quantities in two excavation areas, Areas M and R (see Chapter 5). In Area M, only one phase of EB III survived (Stratum M-1, the later layers had been removed by the University Museum expedition, see Chapter 2), while in Area R, a long sequence of KKW-dominated phases was revealed, sandwiched between the uppermost EB stratum, R-7a, which appears to be post-KKW, and the lowermost stratum, R-12, which has been interpreted by the excavators as a pre-KKW phase of late EB II or early EB III (see Chapter 1). Upon visual inspection of the KKW from Stratum M-1, and the local, non-KKW pottery from Strata M-1 and R-12, we hypothesized that both phases, in fact, represent the same basal stratum of EB III when KKW was first introduced into an existing settlement that was established after an occupation gap in EB II. The subsequent levels would then represent the complete assimilation of the settlement into the KKW tradition (a similar pattern was observed at nearby Tel Yaqush, which shares many features with Beth-Shean, see Novacek 2007). The absence of KKW in Stratum R-12 in Area R would then be understood as a localized phenomenon, perhaps the result of spatial segregation between KKW users and local-ware users within the same settlement (for an exposition of this hypothesized relationship at other sites, see Greenberg 2007; Paz 2009). This reconstruction, which diverges from the sequence of events proposed by the excavators, is based on our own understanding of the admittedly slender evidence revealed in the limited excavation area. According to our hypothesis, and based on our observations at Beth Yeraḥ, we expected to see the following sequence of developments at Tel Beth-Shean:

1) Technologically segregated local and KKW pottery industries in the initial stage (Strata R-12/M-1), with KKW exhibiting the trademark features that communicate its difference (mainly, but not only, color and surface treatment).
2) Gradual change in the nature of the KKW, as its original values were attenuated over time.

3) An evolving relationship with non-KKW traditions, in view of the fact that neither cooking nor storage vessels were normally produced by KKW potters. This relationship would clearly diverge from what we observed at Beth Yeraḥ, since the latter site had a viable, prolific, on-site non-KKW industry throughout EB III, as evidenced by the production facilities discovered there (Iserlis 2009: 182), while, judging by appearances, Beth-Shean did not host a comparable industry after Stratum R-12/M-1. In light of this, a solution would have been required for the supply of local-tradition cooking and storage vessels, which form the bulk of the non-KKW ceramic artifacts in Strata R-11–R-7b.

METHODOLOGY

Eighty-three sherds originating in secure EB III contexts were sampled, 28 from Area M and 55 from Area R (see Appendix A: Inventory of Samples). Sampling was qualitative, attempting to secure a wide variety of types and fabrics. While the sherds are all derived from quantified loci, most do not appear in the pottery plates accompanying Chapter 5. We attempted to sample a representative number of KKW (n=53) and local-tradition vessels (n=30), including holemouth cooking pots, from each EB III phase.[2] Among the latter, we were able to identify 'gray pots', typical to EB II and EB III sites in the Jordan Valley (Iserlis 2009; Paz and Iserlis 2009); 'Beth-Shean Valley pots', a special subset of the latter peculiar to Beth-Shean and characterized by pale pink to yellowish-gray fabrics and surfaces (described in further detail below);[3] and undefined, intermediate types.

Formation techniques, surface treatment and raw-material composition were investigated by visual observation and with the aid of optical mineralogy analysis (OM, often dubbed petrography). Using the site-catchment (Vita-Finzi 1978; Arnold 1985) and drainage-system approaches to raw-material sampling (Goren, Finkelstein and Na'aman 2004: 6–9), we collected nine potential raw-material samples from the environs of Tel Beth-Shean in order to identify possible local clay sources (see Appendix B: List of Potential Raw-Material Samples). These samples were moistened, and each was formed into two small briquettes which could be tested to determine plasticity, shrinkage and firing behavior (Kingery and Francl 1954; Moore 1961; Rice 1987: 58–90). Plasticity was tested by compression and by measurement of water of plasticity (Rice 1987: 58–63). After drying at room temperature, one briquette of each sample was fired in an electric pottery kiln to bisque at 100° C, then at 650° C. The briquettes (both fired and unfired) were then sliced and used for the production of petrographic thin-sections (see *TBS III*: 523).

The OM analysis used in this study follows standard procedures (Bishop, Rands and Holley 1982; Porat 1989; Whitbread 1995; Goren, Finkelstein and Na'aman 2004). Slices taken from EB III sherds were impregnated with Buehler EpoThin epoxy resin in a vacuum and allowed to cure for nine hours. The samples were then polished on a Buehler Metaserv grinding machine and affixed to glass slides with Buehler EpoThin epoxy resin. Buehler PetroThin Thin Sectioning System was used to grind the samples to a standard thickness of 30 μm. The slides were covered with microscope-cover glass.

The samples were examined under a Zeiss Axiolab-POL polarizing microscope in the Laboratory for Comparative Microarchaeology of the Institute of Archaeology, Tel Aviv University. Color and orientation patterns of the matrix were identified and described according to Bullock et al. (1985). The minerals in the silt and the temper were identified and their frequency, sorting, shape and roundness were described with the aid of visual charts (FitzPatrick 1980; 1993; Bullock et al. 1985). We define temper as non-plastic, coarse (larger than 62 micron) particles added by a potter, or occurring naturally in the clay. The samples were divided into fabric groups on the basis of their petrographic affinities in both clay and temper.

Thin-sections of the fired potential-raw-material briquettes were analyzed and compared to the thin-sections of the sherds, and both were compared in turn with thin-sections from the collection in the Laboratory for Comparative Microarchaeology of the Institute of Archaeology, Tel Aviv University. The lithology of the thin-sections was compared to geological maps (Sneh, Bartov and Rosensaft 1998; Hatzor 2000).

An earlier OM analysis of 48 samples from the same strata at Beth-Shean was carried out by Anat Cohen-Weinberger (Chapter 6; see also Mazar, Ziv-Esudri and Cohen-Weinberger 2000: 270–276).

The thin-sections from this previous study were compared to those of the present study. Table 7.1 presents an attempted correlation between the fabric groups described in the two EB pottery studies and a petrographic analysis of LB pottery from Tel Beth-Shean conducted by Cohen-Weinberger (*TBS II*: 548–553).

RESULTS: THE FABRIC GROUPS

The main conclusions of the OM analysis are presented in Tables 7.2–7.5. Ten main fabric groups were defined, represented by uppercase letters, followed by numerals indicating two types of inclusions that were undoubtedly added by the potter: 2 = organic material (usually straw) and 3 = grog. A detailed description of all the sherd samples is presented in Appendix A, and a detailed description of the potential raw-material samples from the proximity of Beth-Shean is presented in Appendix B.

Group A

This group is characterized by calcareous clay. The silt (<1–5%) contains quartz and opaque minerals. The temper (>5–25%) contains dominant sand-sized, poorly sorted travertine, calcitic pisoliths and very rare grains of weathered basalt, opaque minerals and/or limestone grains. This group is highly variable in terms of quantity and proportions of the silt and temper components.

Sub-Group A2 contains a typical Group A mixture of clay and temper, but also vegetal material (1% up to >3%) or voids left by it. The shape and size range of the organic-material ghosts suggest that mostly chopped straw, and sometimes fresh grass or herbivore dung, was added to the body of the clay by the potters. Sub-Group A3 is characterized by typical Group A temper, accompanied by angular grog particles (1–5%). Sub-Group A3-2 is characterized by Group A clay and temper, accompanied by both grog (1–3%) and vegetal material (1–3%). About 50% of the grog particles are opaque; the non-opaque grog originated in vessels made from Groups A and D.

Fabric Group A is identified as originating in the local soil and suits both the geological environment of Tel Beth-Shean (Ravikovitch 1969; Sneh, Bartov and Rosencraft 1998; Hatzor 2000; Goren, Finkelstein and Na'aman 2004: 234–237) and potential raw-material Samples TBS066 and TBS069–074 (Appendix B). The quantity of silt

Table 7.1: Correlation of fabric groups in three OM studies of pottery from Tel Beth-Shean

Iserlis, Greenberg and Goren (present chapter)	Cohen-Weinberger EB III Pottery (Chapter 6)*	Cohen-Weinberger LB pottery (TBS II: 548–553)
A (Tel Beth-Shean)	A (local Beth-Shean region)	B
B, C (Jordan River cuts, Beth-Shean Valley)	B, C (Naḥal Ḥarod)	–
D (Naḥal Ḥarod)	D (local Beth-Shean region)	A
D+A (Mixed, local)	–	–
R (rendzina soils, Beth-Shean/Central Jordan Valleys)	–	–
I (unidentified source)	I (unknown provenance)	–
G/GG (Gesher and Bira Formations)	–	–
Z (presumably local marl)	–	–
–	E (unknown provenance)	–
–	F (Central Jordan Valley)	–
–	G (Taqiye Marl, northern Jordan)	–
–	H (Lower Cretaceous)	–

* see also Mazar, Ziv-Esudri and Cohen-Weinberger 2000

and the temper sorting suggest that the clay was sometimes levigated.

Sixteen KKW sherds as well as four local-tradition vessels (two 'Beth-Shean Valley holemouth cooking pots', one jar and one bowl)—are related to Group A (Tables 7.2–7.5). All of these are from Strata R-10 to R-7b, apart from three KKW sherds from Stratum M-1.

Table 7.2: Area M: Distribution of sampled vessel classes according to fabric groups: KKW

Fabric group/ Type	A3	A3-2	D	D3	D3-2	D+A	D+A3	D+A3-2	Total
Bowls	–	1	–	2	–	–	–	–	3
Kraters	1	1	–	3	2	1	1	1	10
Stand	–	–	–	–	1	–	–	–	1
Total vessels	**1**	**2**	**–**	**5**	**3**	**1**	**1**	**1**	**14**
Andiron	–	–	1	–	–	–	–	–	1
Total KKW	**1**	**2**	**1**	**5**	**3**	**1**	**1**	**1**	**15**

Table 7.3: Area R: Distribution of sampled vessel classes according to fabric groups: KKW

Fabric group/ Type	A	A2	A3	A3-2	D	D2	D3	D3-2	D+A	D+ A2	D+ A3	D+ A3-2	I	Z	Total
Bowls	5	1	1	–	3	1	4	5	1	–	2	1	–	–	24
Kraters	2	–	2	1	1	–	1	–	1	–	–	1	1	–	10
Stands	–	1	–	–	–	–	–	–	–	1	–	–	–	1	3
Total vessels	**7**	**2**	**3**	**1**	**4**	**1**	**5**	**5**	**2**	**1**	**2**	**2**	**1**	**1**	**37**
Andiron	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1
Total KKW	**7**	**2**	**3**	**1**	**4**	**1**	**5**	**6**	**2**	**1**	**2**	**2**	**1**	**1**	**38**

Table 7.4: Stratum M-1: Distribution of sampled vessel classes according to fabric groups: local tradition and holemouth pots

Fabric group/ Type	B	C	D	GG	R	Total
Bowls	2	1	–	–	–	3
Platters	2	–	–	–	–	2
Pithos	–	–	–	1	–	1
Gray Holemouths	1	–	–	–	4	5
Other Holemouths	–	–	1	–	1	2
Total	**5**	**1**	**1**	**1**	**5**	**13**

Table 7.5: Strata R-12–R-7a: Distribution of sampled vessel classes according to fabric groups: local tradition, holemouth pots, hybrid vessels

Fabric group/ Type	A	A2	A3	A3-2	D	D3-2	G	G3-2	GG	I	R	Z	Total
Local Tradition	–	1	1	–	–	–	2	–	1	–	–	–	5
Gray Holemouth	–	–	–	–	–	–	–	–	–	–	1	–	1
Other Holemouths	1	–	–	1	–	1	1	1	1	1	–	2	9
Hybrid	–	–	–	–	1	1	–	–	–	–	–	–	2
Total	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**1**	**2**	**1**	**1**	**2**	**17**

Group B

This group is defined by foraminiferous marl with rare silt (1%, sometimes up to 3%). The silt contains mainly quartz, accompanied by iron oxides, plagioclase, limestone, calcite and some chert fragments. The temper (3%–5%) contains medium-sorted sand (up to 600 μm) of rounded limestone (1–3%), sub-rounded to angular basalt (1–<3%) and angular to sub-rounded chert (up to 1%) grains. Very rarely were travertine (<1%) and rounded quartz grains identified.

The temper assemblage of this group is consistent with Jordan River sand (Goren, Finkelstein and Na'aman 2004: 234–237, with further references). Based on the potential raw-material samples and the geological maps, this group is identified as originating from Jordan River cuts (Sneh, Bartov and Rosensaft 1998). The appearance of travertine suggests that the group is local to the Beth-Shean Valley.

Two local-tradition bowls, two platters and one 'gray pot', all from Stratum M-1 in Area M, are attributed to this fabric group (Table 7.4).

Group C

This group is characterized by a non-foraminiferous marl. The silt (1–3%) includes quartz, iron oxides, plagioclase, limestone, calcite and occasional chert grains. The temper assemblage (3–5%, sometimes up to <10% of the matrix), like the silt, is identical with that of Group B and contains limestone, basalt and chert grains. Occasional travertine and quartz grains were also observed.

Only one example, a bowl in the local tradition from Stratum M-1, belongs to this fabric group (Table 7.4).

Group D

The matrix of this group is calcareous and silty (3–10%). The silt contains quartz (dominant), with limestone, iron oxides, plagioclase, mica, pyroxene and calcite. The temper (<10–15%) includes poorly sorted sand of limestone (dominant) accompanied by rare travertine and rounded basalt and (or) tuff grains (basalt grains were observed in 40% of the samples of this group). The temper assemblage of this group is consistent with Naḥal Ḥarod sand. Based on the geological map and the potential raw-material samples (Appendix B: Samples TBS067, TBS068), this group is identified as originating from the environs of Naḥal Ḥarod (Sneh, Bartov and Rosensaft 1998).

The temper assemblage of Sub-Group D2 contains typical Naḥal Ḥarod sand, and voids indicating vegetal material (1%–>3%). The shape and size range of the vegetal-material ghosts suggest that chopped straw was added to the body of the clay by the potters. Sub-Group D3 is characterized by the same temper (<10–15%) as in Group D, accompanied by angular grog particles (<1–5%). The grog is identified as originating in vessels made from Group D or A, or isotropic/opaque, over-fired particles. Samples of vessels made of Group D clay with grog and vegetal material were defined as Sub-Group D3-2. The temper assemblage (<10–15%) of this sub-group contains mainly limestone (>5% up to 10%) accompanied by grog (1–3%), organic material (1–3%), travertine (1–3%) and rare basalt and tuff grains. The non-opaque grog (50% of the samples) is identified as originating in vessels made from Group D or A.

Twenty-five KKW vessels, two hybrid vessels,

one undefined holemouth and one 'Beth-Shean Valley pot' are attributed to Group D. Ten of these originated in Stratum M-1 and 19 from Strata R-10 to R-7a (Tables 7.2–7.5).

Group D+A

The matrix of this group is calcareous and silty. The silt (>3–<10%) contains quartz (predominant), limestone, travertine, iron oxides, plagioclase, mica and pyroxene. The temper (>5–15%) includes mainly poorly sorted sand of limestone and travertine (predominant), accompanied by occasional rounded basalt and/or tuff grains.

The matrix, silt and inclusion assemblages of this group form a mixture of Groups A and D components. On the one hand, a mixture of quartz, iron oxides and volcanic minerals as silt with limestone as temper are typical of Group D and atypical for Group A, on the other hand, travertine temper (up to 30% of the groundmass) is typical of Group A and rare in Group D. From the functional standpoint, the addition of the Naḥal Ḥarod silty and non-plastic component to the Group A clay was clearly a technological choice to obtain a clay body with better plasticity (Kingery and Francl 1954; Moore 1961; Rice 1987: 54–79). The main observations from the experimental testing and firing of the potential-raw-material briquettes (Appendix B) was high shrinkage and cracking of Group A (tell soil) briquettes during drying and firing, in contrast to the Group D (Naḥal Ḥarod soil) briquettes, which exhibited good plasticity with a minimal quantity of water. Potters mixed Groups A and D clays to achieve better plasticity of the mass with minimum addition of water, in order to prevent shrinkage.

The sub-groups of Group D+A show additions of organic material (1%–<3%; D+A2), grog (D+A3), or both grog (<1%–<3%) and organic material (<1%–3%; D+A3-2).

Ten KKW vessels are attributed to Group D+A, three from Stratum M-1 and seven from Strata R-10, R-9 and R-7b (Tables 7.2, 7.3).

Group R

This group is characterized by a silty, foraminiferous, calcareous matrix. The silt (up to <10% of the matrix) contains chalk, limestone, calcite, quartz, iron oxides, plagioclase, olivine and chert. The temper (<10% up to >15%) contains poorly sorted sand of limestone and chalk (dominant or abundant), basalt (dominant or abundant), chert (frequent) and, rarely, travertine. The temper is often accompanied by rare fresh shell fragments, sub-angular to rounded quartz, plagioclase or clynopyroxene grains.

This fabric group is identified as valley rendzina soil, which occurs in the Beth-Shean Valley, the Central Jordan Valley and the Ḥula Valley. Based on published data, the matrix and inclusions indicate a depositional environment peculiar to the Central Jordan Valley (Ravikovitch 1969; 1981; Sneh, Bartov and Rosensaft 1998; Goren and Fischer 1999; Goren, Finkelstein and Na'aman 2004: 234–237; Iserlis 2009). The appearance of travertine identified this group as a site-specific variant of valley rendzina soil.

Five 'gray pots' and one additional undefined holemouth are attributed to this fabric group. One 'gray pot' originates in Stratum R-12, while the other five pots are from Stratum M-1 (Tables 7.4, 7.5).

Group G

This group is characterized by fine foraminiferous marl, rich in iron oxides. The silt (<1%) contains quartz. The temper (>3%) includes coarse limestone grains. Basalt particles were very rarely observed.

Samples of vessels made of Group G silty (>3%) clay with both grog and organic material were identified as Sub-Group G3-2. The silt includes mostly quartz and rare plagioclase. The temper assemblage (>5%) includes mostly limestone and chalk and is accompanied by weathered basalt (<1%) and tuff (<1%).

Based on potential raw-material samples from the Tel Beth Yeraḥ area (Iserlis 2007; Greenberg and Iserlis, forthcoming), and the geological map, this group is identified as originating from marl of the Pliocene Bira Formation (Sneh, Bartov and Rosensaft 1998; Goren, Finkelstein and Na'aman 2004: 240–243). The Bira Formation is exposed north and southwest of Beth-Shean, at a distance of 5–9 km from the tell.

One jug, one jar and two 'Beth-Shean Valley pots' belong to Group G, all from Strata R-10, R-9 and R-7b (Table 7.5).

Group GG

This matrix is a fine foraminiferous marl with iron oxides (>3%). The silt (<1%) includes quartz. The

temper assemblage (>5% up to <10%) contains fragments of oolitic, micritic and sparitic limestone (very frequent), weathered calcite (frequent) and sub-angular to angular chert (frequent or very frequent). In one case, the temper (<10%) also includes angular basalt fragments (<3%).

This group is a variation of the Group G clay. The appearance of chert and the quantity of silt and temper components suggest that the clay was collected from exposures of Bira Formation marl not far from other geological formations that include fresh chert and basalt. Exposures of the Bira Formation no less than 7 km southwest of Tel Beth-Shean are located in proximity to the Lower-Middle Eocene Timrat Formation and also to the Pliocene-Pleistocene Cover basalt (Sneh, Bartov and Rosensaft 1998; Goren, Finkelstein and Na'aman 2004: 240–243), making them the likely source for this clay.

One pithos from Stratum M-1, a 'Beth-Shean Valley pot' from Stratum R-10 and a bowl from Stratum R-8 are attributed to Group GG (Tables 7.4, 7.5).

Group I

The matrix of this group is foraminiferous marl containing up to 3% silt of calcite, limestone and quartz. The temper assemblage (<10%–15%) contains mainly crushed calcite (>5%–10%) accompanied by limestone grains (<1% up to <3%). We are unable to determine the provenance of this group.

One KKW krater and one 'Beth-Shean Valley pot' from Strata R-10 and R-9 belong to this group (Tables 7.3, 7.5).

Group Z

This group is characterized by foraminiferous marl and rare silt (>1%) that contains mainly quartz, accompanied by iron oxides. The temper (>5% up to <10%) includes poorly sorted, angular chert (<1% up to <5%), limestone (>1% up to >3%), travertine (>1% up to >3%) and foraminiferous chalk (>1%). Based on the presence of the travertine, this group is identified as originating from an unknown but presumably local marl source (Sneh, Bartov and Rosensaft 1998).

One KKW stand and two 'Beth-Shean Valley pots' from Stratum R-10 belong to Group Z (Tables 7.3, 7.5).

DISCUSSION

Fabric Groups in Area M

The OM analyses indicate a clear segregation in raw-material selection between local-tradition pottery and KKW in Area M:

1. KKW producers used only clays of Groups A and D. They added straw, textile fragments (see below), other organic materials and grog to the clay.
2. Local potters used clays of Groups B and C.
3. Local-tradition, round-based, 'gray holemouth cooking pots' were made from valley rendzina soil (Group R), with the exception of one pot made of Group B marl.
4. The single pithos of Group GG clay was probably made off-site.

Two atypical holemouths, brown and dark gray in color and lacking the usual internal striations of the 'gray holemouth pots', were also analyzed by OM: one was made of valley rendzina soil, the other of Group D clay, otherwise used only for KKW (Mazar, Ziv-Esudri and Cohen-Weinberger 2000: 271 and Chapter 6 in this volume). The latter vessel was apparently created by a potter with a non-traditional approach to raw materials, in a different technique.

Fabric Groups in Area R

In accordance with our hypothesis, local-tradition pottery of the basal stratum in Area R, R-12, was made of the same raw materials as in Stratum M-1. This observation is based on seven samples from Stratum R-12 identified by Cohen-Weinberger (Mazar, Ziv-Esudri and Cohen-Weinberger 2000: 258 and Chapter 6 in this volume) and on a single new sample of a typical round-based, 'gray holemouth cooking pot' made of Group R soil. In later phases (R-10–7-a), the 'gray holemouth cooking pots' were replaced by the 'Beth-Shean Valley holemouth cooking pots' made of Group A, D, G, GG, I and Z clays (see below).

In the KKW samples from the later strata, a clear increase in the variability of raw materials is evident (see also Mazar, Ziv-Esudri and Cohen-Weinberger 2000 and Chapter 6 in this volume), and two new raw-material groups are introduced, Groups I and Z. The increased variety of matrix and

temper combinations in Groups A and D is probably due to the increased sample size; this underlines a characteristic observed throughout the Kura-Araxes and KKW traditions — a notable lack of standardization in clay composition (Batiuk 2005; Iserlis 2009; Iserlis et al. 2010). The introduction of new groups testifies to continuous experimentation and a gradual drift away from the original technological procedures introduced on arrival at the site. This drift is also evident in the amount of effort expended on red/black coloration and intensive surface treatment, both of which decline over time (we have observed a similar trend in the Tel Yaqush material). Yellowish-gray, creamy, creamy-white and light-pink KKW vessels increase from about 3–5% in Strata M-1 (as observed visually during the sampling procedure), to 25–30% in Strata R-10–R-7b, which, according to our hypothesis, are later than Stratum M-1 (for a similar observation regarding color frequencies in Strata R-11–R-7a, see Mazar, Ziv-Esudri and Cohen-Weinberger 2000: Fig, 14.9).

Also as we predicted (see above), beginning in Stratum R-10, differences could be observed in the local pottery tradition:

1. The amount of vessels created from Groups B, C and R decreases in Strata R-10–R-7b in comparison to Strata R-12 and M-1.
2. Three cooking pots and three non-cooking vessels (a bowl, a jug and a jar) from Strata R-10–R-7b were made of Groups G and GG clay, and two vessels of Group A clay with organic material or grog (possibly evidence of KKW influence). We suggest that the Groups G and GG vessels were not produced on-site, but at some distance from it; the nearest outcrops of the Bira Formation are located 5–9 km north or southwest of the mound. As these formations are not of outstanding quality, and were not used in Strata R-12 and M-1, there seems to have been no compelling reason for them to be taken up by potters residing at such a distance as that of Tel Beth-Shean (especially as clays of comparable quality, Groups B and C, were still readily available to the latter). It appears more likely that other potters, accustomed to using the Bira-Gesher clays, tapped this source to complement the needs of various KKW consumers in the region who had no indigenous cooking-pot tradition and few local-tradition potters in their own community (for distance issues, see Arnold 1985: 32–60).
3. Ten holemouth pots from Strata R-10 to R-7b are technologically different from the standard 'gray holemouth pots' of Strata M-1 and R-12. Fired to a white, pale pink or yellowish-gray color, the pots were sometimes slipped and lightly burnished (or 'smoothed' as defined in Chapter 5) and sometimes had a lightly scraped interior. These 'Beth-Shean Valley pots' were an innovation based on the concept of the local, round-based 'gray pots' and a new, highly variable suite of raw materials. Some of the pots were created, perhaps on-site, from typical KKW materials (Groups A, A3-2) or 'new' KKW materials (Groups I, Z), some from non-KKW materials (Groups G, GG), and one from a non-KKW clay with added grog and straw (G3-2). These developments illustrate the need of the KKW-producers/consumers to compensate for the apparent demise of the Stratum M-1/R-12 local production within the settlement itself (Table 7.6).

Two clear cases of hybridization in local non-cooking vessels were identified in the OM analysis: a morphologically local-tradition bowl and a jug handle, both with typical KKW burnished slip (for hybrid forms, see discussion in Chapter 5). The first was formed of Group D clay with organic material and grog (=D3-2), the second of Group D clay.

Table 7.6. Local-tradition versus KKW groups according to strata

Strata	KKW Fabrics	KKW Attributes	Local-Tradition Fabrics	Local-Tradition Attributes
M-1/R-12	A, D + organic, grog (M-1 only)	Intense color and finish	B, C, R	'Gray holemouth cooking pots'
R-10–R-7	A, D, I, Z + organic, grog	25% yellow/cream finish	A, G, GG, I, Z, R + straw, grog	'Beth-Shean Valley holemouth pots'

Another important observation was noted in the thin-sections of a KKW stand (Reg. No. 182255/10, Stratum M-1) and a KKW andiron (Reg. No. 183264/1, Stratum R-10; Pl. 43:13): ghosts of single fibers and yarns (width 20–30 μm) and twisted or braided ropes and textile (width 400–800 μm and length up to 5000 μm). Both of the vessels were made of Group D clay, and the potters had added chopped straw (length 600–2000 μm), grog originating in Group D vessels, opaque, overfired grog, and textile and/or rope fragments.

One holemouth pot from post-KKW Stratum R-7a was analyzed (Reg. No. 103156, Pl. 48:7); it was created from typical KKW materials (Group D+D3-2), suggesting that in the post-KKW EB III phase at the site, some aspects of the KKW tradition were maintained, perhaps by descendants of KKW potters.

Chaînes Opératoires

The local-tradition potters in Strata M-1 and R-12 extracted naturally tempered, marly clay (Groups B and C) from nearby Jordan River cuts. Their efforts were invested in obtaining the most suitable clay from a fixed source, as was the case with the 'southern potter' at Tel Beth Yeraḥ (Iserlis 2009). The matrix of local-tradition vessels includes a minimum of 'air-bubble ghosts'; the potter added water to the clay and kneaded it well. The potters used coils and, for bowls and platters (rare at Beth-Shean, but common in comparable industries at nearby sites), molding techniques to build the body. The rim was added and centered on a slow wheel, and mold-formed vessels were removed from the mold when leather-hard. The vessels were slipped, burnished and dried before firing. The local potters produced a limited repertoire of vessels from fixed clay sources and invested limited effort in slipping and burnishing.

The KKW potters collected calcareous soil at the site (Group A) or calcareous sediment from the Naḥal Ḥarod streambed (Group D). The quantity of silt and the temper sorting suggest that Group A clay was levigated. The potters mixed the naturally well-tempered Group D clay and the levigated Group A clay with grog and straw. Sometimes they mixed Groups A and D clays and then added grog and straw. They kneaded some clays more than others: the matrix of KKW bowls is uniform and dense, while that of the larger vessels includes a relatively large quantity of air bubbles.

Macroscopic observations suggest that the KKW potters used pinching and a pressing/beating technique (Iserlis 2007) to form bowls and a mixed coil/slab-molding technique to build larger vessels. After forming and thinning, KKW vessels were decorated by incision or the addition of raised bands and then slipped, burnished and dried (sometimes twice). After drying, KKW pots were fired in an oxidizing and reducing atmosphere and burnished again.

The producers of the 'gray holemouth cooking pots' collected naturally tempered rendzina soil from the Jordan Valley near the site (Group R). They used a mold to form the rounded bases. The walls of the 'gray pots' were built with the coiling technique, using paddle and anvil to thin the walls and achieve a uniform thickness. The rim was created with an additional coil and then the interior walls were scraped roughly to bind the coils. The vessels were fired in an oxidizing atmosphere.

The producers of the 'Beth-Shean Valley holemouth pots' used a variety of clays: Group A (typical of KKW), G and GG (used by off-site industries) and I and Z, which were newly introduced clays. Sometimes they added grog and vegetal material, particularly straw. The vessels were coil-built, thinned using paddle and anvil and lightly scraped on their interior. Sometimes these pots were slipped and lightly burnished. After drying, they were fired to a pale color in an oxidizing atmosphere.

CONCLUSIONS

Our analysis reveals the technological imprint of significant social processes at EB III Tel Beth-Shean. The local-tradition/KKW assemblage of the initial EB III phase in Stratum M-1 (which may be contemporaneous with R-12), represents a situation observed also at Tel Beth Yeraḥ, Tel Yaqush II, Ḥazor XX and Tel Qishyon: a heterogeneous society consisting of two main groups, each characterized by different-looking pottery vessels that were made with different materials, forming techniques, surface treatment, decoration and firing techniques. As at Tel Beth Yeraḥ, the bearers of the KKW tradition brought to Tel Beth-Shean their own distinctive pottery technology.

In Strata R-10 to R-7b at Tel Beth Shean, we observe a very different scenario to that encountered at Tel Beth Yeraḥ in the dynamics of KKW production, in the evolution of the local-pottery tradition and in the technological relations between the two. Whereas at Beth Yeraḥ there is ample evidence for the survival of local-tradition production on an industrial scale, our interpretation of the petrographic evidence from Beth-Shean suggests that the local producers and consumers were eventually pushed out by the KKW pottery bearers, as attested by the virtual disappearance of vessels made with Groups B and C clays and of a coherent non-KKW on-site industry. In their new role as sole proprietors of the site, KKW producers and consumers had to fill the void caused by the lack of local products that fulfilled functions not covered by KKW (especially cooking and storage). This explains the *ad-hoc* production of some vessels at the site and the importation of such products from outside, albeit not too distant, workshops that used Groups G and GG clay.

APPENDIX A: INVENTORY OF OM SAMPLES

	Reg. No	Locus	Stratum	Stratigraphic Context	Type	Notes	OM Description	Fabric Group
1	182098	18229	M-1	Floor	KKW andiron (miniature, burnished)	Creamy-grayish burnished slip	Calcareous, silty. Temper: limestone, basalt.	D
2	100055/22	10030	M-1	Living surface	Gray holemouth cooking pot	Striated interior	Foraminiferous marl. Temper: limestone, basalt, chert, travertine, quartz.	B
3	100055/6	10030	M-1	Living surface	Bowl	Red slip interior and exterior	Non-foraminiferous marl. Temper: limestone, basalt, chert.	C
4	100055/12	10030	M-1	Living surface	Holemouth	Brown clay, red slip exterior	Calcareous, silty. Temper: basalt and limestone.	D
5	100241/2	10030	M-1	Living surface	Gray holemouth cooking pot	Striated interior	Calcareous, foraminiferous, silty. Temper: limestone, chalk, basalt, chert, quartz, plagioclase.	R
6	100224/3	10038	M-1	Plastered installation	Bowl	Red slip interior	Foraminiferous marl. Temper: limestone, basalt, chert, travertine, quartz.	B
7	100187/14	10038	M-1	Plastered installation	KKW bowl	Red exterior and interior	Calcareous, silty. Temper: limestone, basalt, grog, travertine.	D3
8	100224/18	10038	M-1	Plastered installation	KKW krater	Red exterior and interior	Calcareous, silty. Temper: limestone, nari, basalt, grog, travertine.	D3
9	100187/9 (100161)	10038	M-1	Plastered installation	Gray holemouth cooking pot	Striated interior, gray-brown clay	Calcareous, foraminiferous, silty. Temper: limestone, chalk, basalt, chert, quartz, clynopyroxene, plagioclase, travertine.	R
10	10038	10038	M-1	Plastered installation	Gray holemouth cooking pot	Striated interior, gray clay	Calcareous, foraminiferous, silty. Temper: limestone, chalk, basalt, chert, quartz, plagioclase.	R

	Reg. No	Locus	Stratum	Stratigraphic Context	Type	Notes	OM Description	Fabric Group
11	181117/2	10044	M-1	Floor	Bowl	Red slip interior	Foraminiferous marl. Temper: limestone, basalt, chert, travertine, quartz.	B
12	181117/7	10044	M-1	Floor	Gray holemouth cooking pot	Striated interior	Calcareous, foraminiferous, silty. Temper: limestone, chalk, basalt, chert, quartz, plagioclase, travertine.	R
13	182387/10	18110	M-1	Accumulation, debris	Holemouth	Red slip exterior	Calcareous, foraminiferous, silty. Temper: limestone, chalk, basalt, chert, quartz, travertine.	R
14	182166/x	18213	M-1	Accumulation, above floor	KKW krater	Red exterior and interior, plastic decoration	Calcareous, silty. Temper: travertine, limestone, basalt, tuff	D+A
15	182166/y	18213	M-1	Accumulation above floor	KKW bowl	Red exterior and interior	Calcareous, silty. Temper: limestone, basalt, tuff, grog, travertine.	D3
16	182161/9	18226	M-1	Floor	KKW jar (Pl. 32:17)	Yellowish-white exterior and interior	Calcareous. Temper: travertine, grog, weathered basalt.	A3
17	182173/1	18226	M-1	Floor	KKW bowl	Red exterior and interior, plastic decoration	Calcareous. Temper: travertine, grog, straw, weathered basalt.	A3-2
18	182325	18226	M-1	Floor	KKW jar (Pl. 32:16)	Creamy-yellow exterior and interior, substandard burnish	Calcareous, silty. Temper: travertine, limestone, grog, straw, basalt, tuff.	D+ A3-2
19	182255/10	18226	M-1	Floor	KKW stand (Pl. 33:7)	Red-brown exterior and interior, black patches	Calcareous, silty. Temper: limestone, basalt, nari, grog, straw, textile (rope).	D3-2
20	182093/5	18229	M-1	Floor	KKW krater	Black exterior, creamy exterior rim, red interior	Calcareous. Temper: travertine, grog, straw, basalt.	A3-2
21	182297/6	18229	M-1	Floor	Platter		Foraminiferous marl. Temper: limestone, basalt, chert, travertine, quartz.	B
22	182093/8	18229	M-1	Floor	Pithos	Red slip exterior	Foraminiferous fine marl. Temper: limestone, weathered calcite, chert, basalt.	GG

	Reg. No	Locus	Stratum	Stratigraphic Context	Type	Notes	OM Description	Fabric Group
23	182260/2	18250	M-1	Floor make-up	KKW krater	Black exterior, red interior	Calcareous, silty. Temper: limestone, basalt, grog, travertine.	D3
24	182457/1	18258	M-1	Floor	Platter	Red slip interior, burnished rim	Foraminiferous marl. Temper: limestone, basalt, chert, travertine, quartz.	B
25	182457	18258	M-1	Floor	KKW bowl (Pl. 31:20)	Black exterior, red interior	Calcareous, silty. Temper: travertine, basalt, limestone, grog, tuff.	D+A3
26	18258/99	18258	M-1	Floor	KKW krater	Black exterior, red on rim exterior, red interior	Calcareous, silty. Temper: limestone, basalt, grog, travertine.	D3
27	100201/17	10038	M-1	Plastered installation	KKW krater	Black and creamy-white exterior, creamy interior	Calcareous, silty. Temper: basalt, limestone, grog, straw, other organic material.	D3-2
28	100201/47	10038	M-1	Plastered installation	KKW krater		Calcareous, silty. Temper: limestone, basalt, tuff, straw, grog, travertine, chert.	D3-2
29	183217/1	18326	R-10	Plaster floor	KKW krater	Red exterior, creamy-white rim, creamy-white interior	Calcareous. Temper: travertine, limestone.	A
30	283239/30	28330	R12	Destruction debris with collapsed bricks	Gray holemouth cooking pot (Pl. 38:8)	Striated interior, gray-brown clay	Calcareous, foraminiferous, silty. Temper: limestone, chalk, basalt, chert, quartz, plagioclase, clynopyroxene, travertine.	R
31	183300/4	18326	R-10	Plaster floor	Beth-Shean Valley holemouth pot	Creamy-white exterior and interior, soot marks	Foraminiferous fine marl. Temper: limestone, weathered calcite, chert.	GG
32	183254/3 (+8)	18327	R-10	Occupation debris	KKW bowl	Red exterior and interior	Calcareous. Temper: travertine, limestone, weathered basalt.	A
33	183278/16	18327	R-10	Occupation debris	KKW bowl	Red exterior, yellowish-white interior	Calcareous. Temper: travertine.	A
34	183288/2	18327	R-10	Occupation debris	KKW krater	Creamy-white exterior and interior	Calcareous. Temper: travertine.	A

	Reg. No	Locus	Stratum	Stratigraphic Context	Type	Notes	OM Description	Fabric Group
35	183254/5	18327	R-10	Occupation debris	KKW stand	Red exterior and interior	Calcareous, silty. Temper: limestone, travertine, straw, organic material (?), basalt, tuff.	D+A2
36	183278/15	18327	R-10	Occupation debris	KKW krater	Red exterior and interior	Calcareous, silty. Temper: limestone, travertine, grog, organic material, basalt, tuff.	D+ A3-2
37	183264/1	18327	R-10	Occupation debris	KKW andiron (Plate 43:13)	Red slip, red-dish-brown clay	Calcareous, silty. Temper: limestone, textile (rope), yarn, hair (?), basalt, grog.	D3-2
38	183273/1	18327	R-10	Occupation debris	Beth-Shean Valley holemouth pot	Red slip on rim	Foraminiferous fine marl. Temper: lime-stone, chalk, straw, grog, weathered basalt and tuff.	G3-2
39	183273/18	18327	R-10	Occupation debris	Beth-Shean Valley holemouth pot	Folded rim	Foraminiferous marl. Temper: mainly crushed calcite, rare limestone.	I
40	183278/15	18327	R-10	Occupation debris	Beth-Shean Valley holemouth pot	Folded rim, grayish-white	Foraminiferous marl. Temper: chert, lime-stone, travertine, chalk.	Z
41	183278/18	18327	R-10	Occupation debris	Beth-Shean Valley holemouth pot	Red slip exterior	Foraminiferous marl. Temper: chert, lime-stone, travertine, chalk.	Z
42	183295/20	18329	R-10	Floor	KKW stand	Red exterior and interior	Calcareous. Temper: travertine, straw, weathered basalt.	A2
43	183280/11	18329	R-10	Floor	KKW krater	Red and black exterior, red inte-rior	Calcareous. Temper: travertine, grog, lime-stone, weathered basalt.	A3
44	183280/2	18329	R-10	Floor	KKW krater base	Red exterior and interior	Calcareous. Temper: travertine, grog, weathered basalt.	A3
45	183286/4	18329	R-10	Floor	KKW stand	Red exterior and interior	Foraminiferous marl. Temper: chert, lime-stone, travertine, chalk.	Z
46	283156/14	28317	R-10	Decayed brick debris	Beth-Shean Valley holemouth pot	Yellowish-white exterior and inte-rior	Calcareous. Temper: travertine, limestone, weathered basalt.	A

	Reg. No	Locus	Stratum	Stratigraphic Context	Type	Notes	OM Description	Fabric Group
47	283156/5	28317	R-10	Decayed brick debris	KKW bowl	Red exterior and interior	Calcareous. Temper: travertine, limestone, weathered basalt.	A
48	283156/6	28317	R-10	Decayed brick debris	KKW bowl	Red exterior and interior	Calcareous. Temper: travertine, limestone, weathered basalt.	A
49	283156/7	28317	R-10	Decayed brick debris	KKW bowl	Red exterior and interior	Calcareous. Temper: travertine.	A
50	283156/3	28317	R-10	Decayed brick debris	KKW bowl	Red exterior and interior	Calcareous. Temper: travertine, grog, weathered basalt.	A3
51	283156/1	28317	R-10	Decayed brick debris	KKW bowl	White-yellow exterior, creamy interior	Calcareous, silty. Temper: limestone (predominant), rare travertine, basalt and tuff.	D
52	283156/4	28317	R-10	Decayed brick debris	KKW bowl	Red exterior and interior	Calcareous, silty. Temper: limestone (predominant), rare travertine, basalt and tuff.	D
53	283156/32	28317	R-10	Decayed brick debris	KKW krater	Black exterior, creamy ext. rim, red interior	Calcareous, silty. Temper: limestone, travertine, basalt, tuff.	D+A
54	283156/2	28317	R-10	Decayed brick debris	KKW bowl	Reddish-brown exterior and interior	Calcareous, silty. Temper: limestone (predominant), grog, rare travertine, basalt.	D3
55	283132/1	28317	R-10	Decayed brick debris	Beth-Shean Valley holemouth pot	Creamy-white, soot marks	Foraminiferous fine marl. Temper: limestone.	G
56	183230/4	18309	R-9	Occupation debris	KKW bowl	Yellowish and brown exterior, reddish-cream interior	Calcareous. Temper: travertine, limestone, organic material, weathered basalt.	A2
57	183252/2	18309	R-9	Occupation debris	Jar	Red slip exterior	Calcareous. Temper: travertine, grog, limestone, weathered basalt.	A3
58	183230/1	18309	R-9	Occupation debris	Jug handle, hybrid	Red-burnished slip exterior similar to KKW, local morphology	Calcareous, silty. Temper: limestone, basalt and tuff.	D
59	183230/n-36	18309	R-9	Occupation debris	KKW bowl	Black and brown exterior, red interior	Calcareous, silty. Temper: limestone, tuff, rare travertine, basalt.	D

	Reg. No	Locus	Stratum	Stratigraphic Context	Type	Notes	OM Description	Fabric Group
60	183230/n-34	18309	R-9	Occupation debris	KKW bowl	Red interior and exterior	Calcareous, silty. Temper: limestone, tuff, nari, travertine, basalt.	D+A
61	183230/n-35	18309	R-9	Occupation debris	KKW bowl	Red interior and exterior	Calcareous, silty. Temper: limestone, grog, travertine, basalt, tuff.	D+A3
62	183230/n-37	18309	R-9	Occupation debris	KKW bowl	Black exterior, red interior	Calcareous, silty. Temper: basalt, tuff, limestone, nari, grog.	D3
63	183230/99	18309	R-9	Occupation debris	KKW bowl	Yellowish-white exterior, pinkish interior, plastic decoration	Calcareous, silty. Temper: limestone, organic material, grog, basalt, tuff, travertine.	D3-2
64	183230/n-33	18309	R-9	Occupation debris	KKW krater	Creamy-white exterior, creamy interior	Foraminiferous marl. Temper: mainly crushed calcite, rare limestone.	I
65	983154/40	98309	R-8	Accumulation on street	KKW krater	Black exterior, white rim exterior, red interior	Calcareous. Temper: travertine, straw, grog, weathered basalt.	A3-2
66	983154/c	98309	R-8	Accumulation on street	Beth-Shean Valley holemouth pot	Striated and cracked interior, polished exterior	Calcareous. Temper: travertine, grog, straw, limestone, weathered basalt.	A3-2
67	983187 (y)	98309	R-8	Accumulation on street	KKW bowl	Black exterior, red interior	Calcareous, silty. Temper: limestone, tuff, basalt.	D
68	983192/15	98309	R-8	Accumulation on street	KKW bowl	Red exterior and interior	Calcareous, silty. Temper: limestone, travertine, grog, straw, organic material, basalt, tuff.	D+A3
69	983197(2)/15	98309	R-8	Accumulation on street	KKW bowl	Black exterior, red interior	Calcareous, silty. Temper: limestone, basalt, straw.	D2
70	983154/25	98309	R-8	Accumulation on street	KKW krater	Black exterior, red rim exterior, brown interior, plastic decoration	Calcareous, silty. Temper: limestone, basalt, nari, tuff, travertine and grog.	D3
71	983155/(25)	98309	R-8	Accumulation on street	KKW bowl	White-creamy exterior, yellowish-white interior	Calcareous, silty. Temper: limestone, basalt, grog and tuff.	D3
72	983155/a	98309	R-8	Accumulation on street	KKW bowl		Calcareous, silty. Temper: limestone, basalt, tuff, grog.	D3

	Reg. No	Locus	Stratum	Stratigraphic Context	Type	Notes	OM Description	Fabric Group
73	983192/8	98309	R-8	Accumulation on street	KKW bowl	Red exterior and interior	Calcareous, silty. Temper: limestone (predominant), straw, grog, basalt and tuff.	D3-2
74	983192/1	98309	R-8	Accumulation on street	KKW bowl	Black and gray exterior, red interior	Calcareous, silty. Temper: limestone, basalt, tuff, grog, straw, travertine.	D3-2
75	983192/99	98309	R-8	Accumulation on street	KKW bowl	Reddish-creamy exterior and interior	Calcareous, silty. Temper: limestone (predominant), grog, straw, basalt, tuff, travertine.	D3-2
76	983155/9	98309	R-8	Accumulation on street	Jar	Traces of red slip exterior	Foraminiferous fine marl. Temper: limestone.	G
77	983155/2	98309	R-8	Accumulation on street	Bowl	Red slip interior	Foraminiferous fine marl. Temper: limestone, weathered calcite, chert, basalt.	GG
78	103206/5 (103375)	10325	R-7b	Occupation debris	Bowl	Red slip interior	Calcareous. Temper: travertine, straw, weathered basalt.	A2
79	103185/3 (103375)	10325	R-7b	Occupation debris	KKW bowl	Red exterior and interior	Calcareous, silty. Temper: limestone, travertine, grog, straw, organic material, basalt, tuff.	D+ A3-2
80	103174/7 (103375)	10325	R-7b	Occupation debris	Bowl, hybrid	Red-polished slip interior and exterior similar to KKW, typical local morphology	Calcareous, silty. Temper: limestone, organic material, basalt, tuff, grog, travertine.	D3-2
81	103206/8 (103375)	10325	R-7b	Occupation debris	KKW bowl	Brown exterior and interior	Calcareous, silty. Temper: limestone (predominant), grog, straw, basalt and tuff, travertine.	D3-2
82	103205/1	10325	R-7b	Occupation debris	Jug	Red slip exterior	Foraminiferous fine marl. Temper: limestone, chalk, weathered basalt and tuff.	G
83	103156	10317	R-7a	Ash layer on floor	Beth-Shean Valley holemouth pot (Pl. 48:7)	Reddish-brown slip exterior, pinkish interior, striated interior	Calcareous, silty. Temper: limestone, travertine, basalt, tuff, grog (opaque, Groups A and D), straw.	D3-2

APPENDIX B: LIST OF POTENTIAL RAW-MATERIAL SAMPLES

Samples TBS066 and TBS069–TBS074 correspond well with Fabric Group A, typical of KKW. The plasticity of these samples is poor to medium: the clay absorbed a large quantity of water, it was characterized by a very small 'working range' (Rice 1987: 60–63) and was cracked as a result of drying and firing. These samples show high variability in proportions of matrix versus temper and in the relative frequencies of the various coarse elements.

Samples TBS067 and TBS068 correspond with Fabric Group D, although TBS067 contained a relatively large quantity of travertine and was characterized by medium plasticity and drying cracks. Sample TBS068, collected from the Naḥal Ḥarod streambed itself, includes relatively well-sorted river sand, a higher clay content and much less travertine than the Group A samples; these three factors influence plasticity, shrinkage and firing behavior, and may be the reason that this clay was preferred by the KKW potters.

Sample No.	Position (ICS, Old Israel Grid)	Setting	Sediment Type	OM description	Plasticity, shrinkage and firing behavior	Fabric Group
TBS066	0196825/ 1212803	Bet-Shean Valley, topsoil	Soil (rendzina?)	Silty (3%). Temper: travertine (10%), limestone (1%), basalt and opaque minerals (1%)	Medium plasticity. Firing cracks.	A
TBS067	0196780/ 1212584	Bank of Naḥal Ḥarod, at bridge, Beth-Shean	Soil (rendzina?)	Very silty (<10%). Temper: travertine (<10%), limestone (<10%), basalt (3%)	Medium plasticity. Drying cracks.	D
TBS068	0196796/ 1212581	Naḥal Ḥarod streambed, Beth-Shean	Soil (alluvium?) and sand	Silty (>5%). Temper: well-sorted temper travertine (<3-5%), limestone (5%), basalt (5%), quartz (<3)	Very good plasticity.	D
TBS069	0197551/ 1212247	Tel Beth-Shean, summit	Soil (rendzina?)	Silty (>5%). Temper: travertine (>15%), quartz, opaque minerals (>1%)	Poor plasticity. Drying cracks.	A
TBS070	0197550/ 1212244	Tel Beth-Shean, summit	Soil (rendzina?)	Silty (<5%). Temper: travertine (>10%), soil balls (>1%), quartz, opaque minerals (>1%)	Poor plasticity.	A
TBS071	0197550/ 1212236	Tel Beth-Shean, summit	Soil (rendzina?)	Silty (<5%). Temper: travertine (<10%), limestone (<1%), quartz, opaque minerals (>1%), tuff grains (1%)	Medium-poor plasticity.	A
TBS072	0197549/ 1212227	Tel Beth-Shean, summit, EB 1 bricks	Soil (rendzina?)	Silty (>3%). Temper: travertine (<10%), limestone and fossiliferous shells (<3%), rounded basalt (>1%), quartz, opaque minerals (>1%)	Medium plasticity.	A
TBS073	0197549/ 1212227	Tel Beth-Shean	Soil (rendzina?)	Rare silt (>1%). Temper: travertine (5%), limestone (>1%)	Poor plasticity. Firing cracks.	A
TBS074	0197304/ 1211980	Beth-Shean, Roman-Byzantine strata	Soil	Rare silt (>1%). Temper: travertine (<3%), limestone (>1%), weathered calcite (<1%)	Medium plasticity.	A

NOTES

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2 With the exception of the limited assemblage of Stratum R-11, which we did not sample.

3 These two types are included by the excavators in the category of Holemouth Jars Types 45–46, according to the criteria detailed in Chapter 5.

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