'Atiqot 108, 2022

Late Chalcolithic and Early Bronze Age IA Settlement Remains at Kafr Kanna, Lower Galilee

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Introduction

Kafr Kanna is a large village located about 4 km northeast of Nazareth on the northern lower slopes of the Nazareth hills, just south of the Tur'an Valley in Lower Galilee (Fig. 1). Since the 1990s, many small-scale salvage excavations have been conducted on behalf of

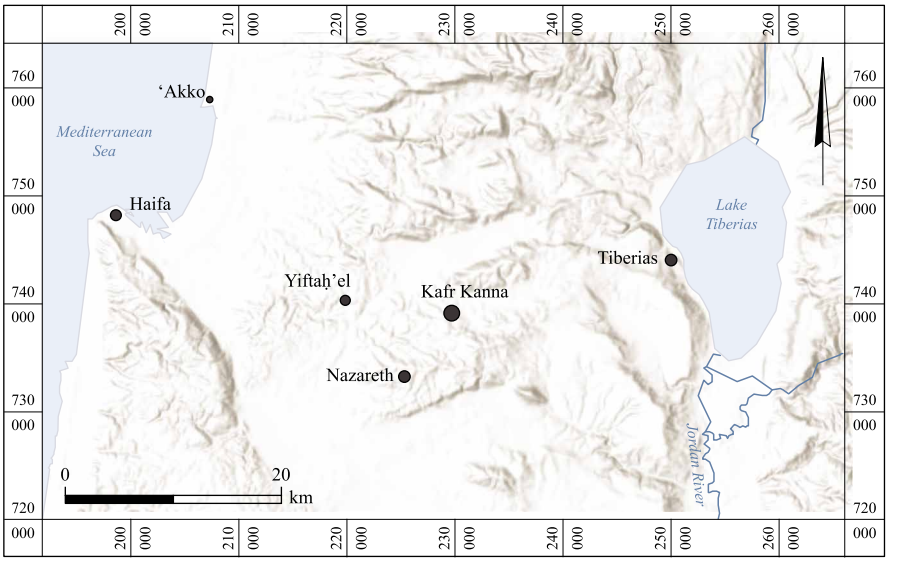


Fig. 1. Location map of Kafr Kanna in Lower Galilee.

[1] The stratified building remains exposed in the excavation, the associated pottery assemblages and the general discussion, are presented by the excavator, Edwin C.M. van den Brink. Technical aspects of the pottery production are presented by Valentine Roux, followed by a petrographic analysis of some of the pottery wares by Anastasia Shapiro, and an analysis of the flint assemblage by Maayan Shemer.

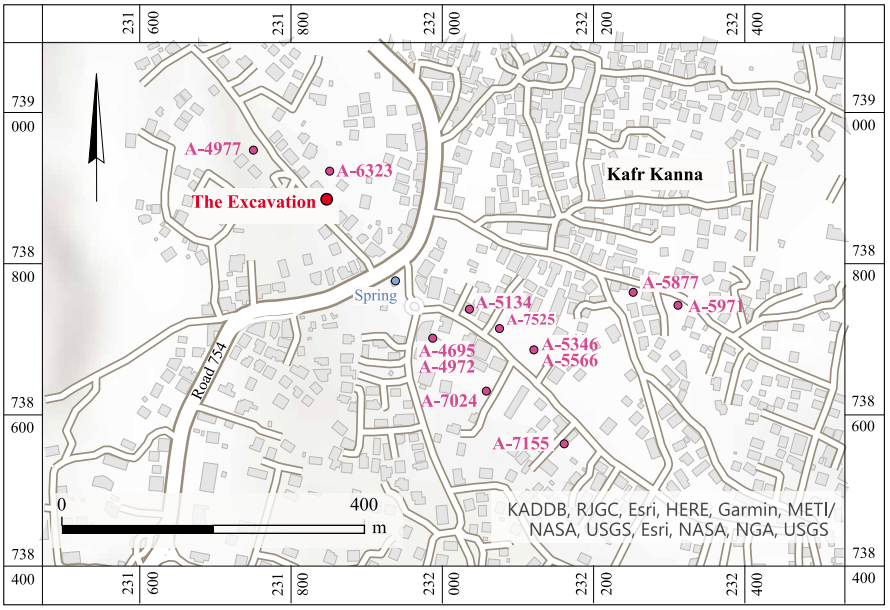
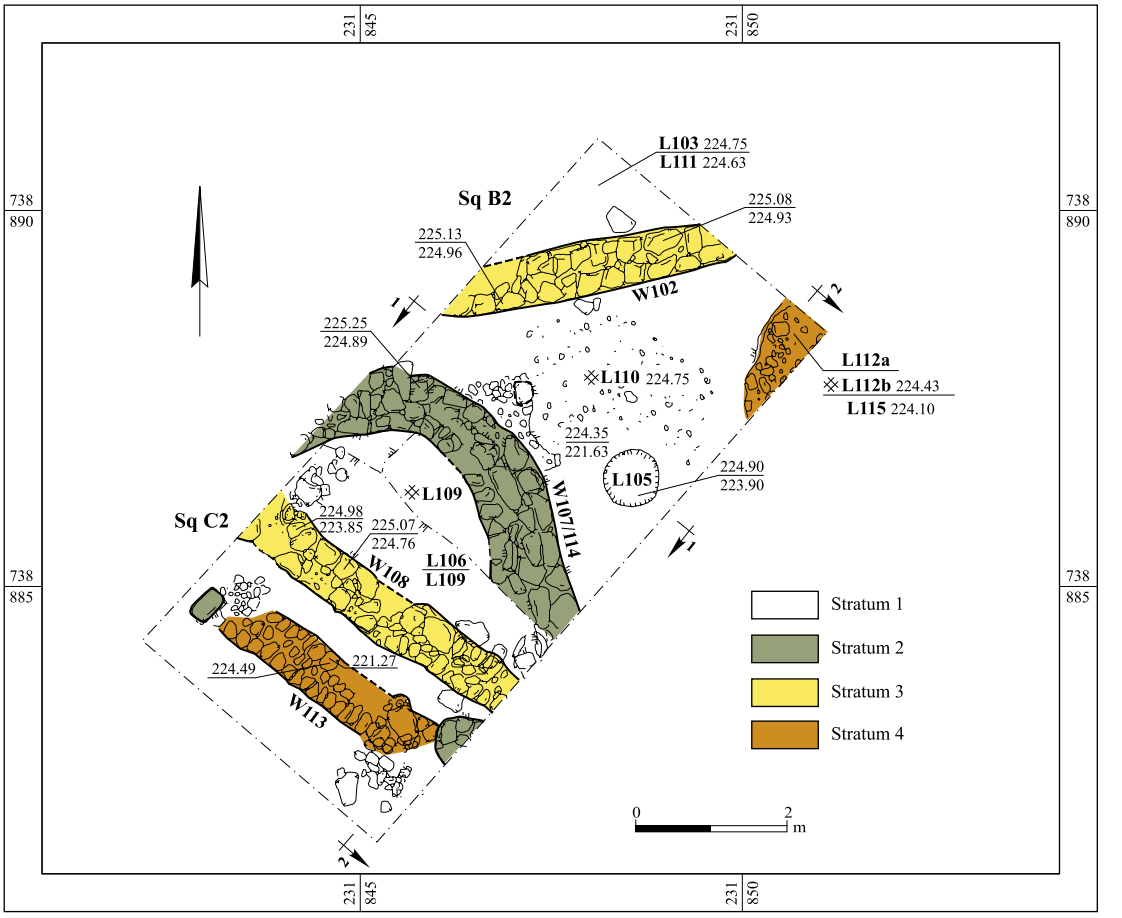


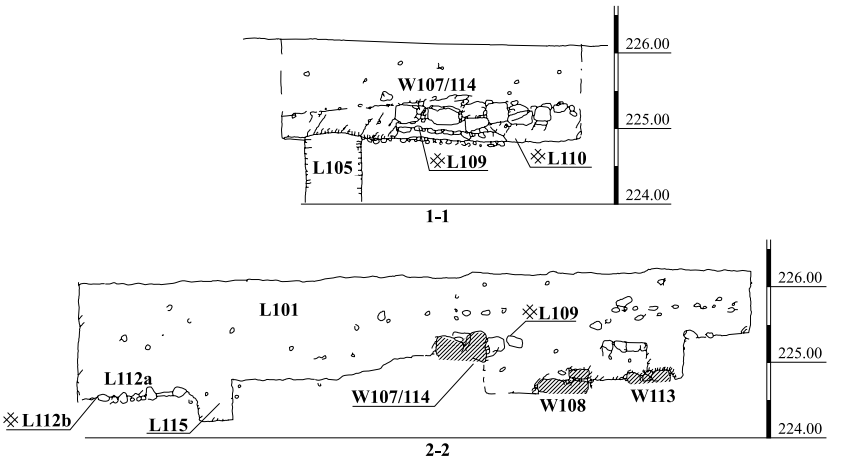
Fig. 2. Location of the excavation and previous Chalcolithic and Early Bronze Age findspots around the Kafr Kanna spring.

the Israel Antiquities Authority in private building plots, prior to construction, uncovering remains dating from the Neolithic to the Mamluk periods.

Several previous excavations within a radius of c. 200 m from the perennial Kanna spring (232 m asl) have exposed Late Chalcolithic and Early Bronze Age IA settlement remains (Fig. 2). The present small excavation was carried out in 2016, in a plot (224 m asl; map ref. 231814-848/738816-890) located c. 100 m northwest of the spring, and c. 100 m west of Road 754 (Fig. 2).[2]

[2] The seven-day salvage excavation (Permit No. A-7827; Plot 17390, Parcel 42/5) was directed on behalf of the Israel Antiquities Authority by Edwin C.M. van den Brink, with the assistance of Yossi Ya'aqobi (logistics), Rivka Mishayev (field plan), Elena Delerzon (Fig. 1), Anastasia Shapiro (Fig. 2), Bracha Zilber (plan), Hagit Tahan-Rosen (pottery drawings and figures) and Michael Smilanski (flint drawing). The preliminary mechanical trenching was supervised by Michael Peleg.





Plan 1. The excavation, plan and sections.

Stratigraphy and Architecture

Two adjoining 4 × 4 m squares were excavated in the middle of the building plot (Sqs B2, C2; Plan 1). The topsoil layer (L101; c. 0.8 m thick; Stratum 1; Plan 1: Section 2–2) was removed mechanically down to a loose gray, tell-like soil layer containing small concentrations of stones. Below this level, manual excavation exposed segments of stone wall foundations and surfaces probably belonging to three partially superimposed building phases (Strata 4–2); bedrock or virgin soil was not reached. All the excavated sediments were sieved.

Stratum 4

At the lowest level, a stone surface (L112b; 0.6 × 1.5 m) was exposed in the northeastern corner of Sq B2 (Plan 1: Section 2–2; Fig. 3); the small area exposed precluded clarifying the nature of this feature. The pottery retrieved from below the stone surface (L115) dated to the Late Chalcolithic period (see below). The soil accumulation layer (L112a; thickness c. 0.35 m) overlying the stone surface contained a mixture of Early Bronze Age I and Ghassulian or Late Chalcolithic potsherds. The presence of the Late Chalcolithic sherds in the lower part of this accumulation layer (L112a), and the almost total absence of Late Chalcolithic sherds elsewhere in the excavation, support dating the stone surface (L112b) to the Late Chalcolithic period.

Stratum 3

A segment of a straight wall, built of two rows of fieldstones (W102; exposed length 4 m; width 0.7 m; one to two extant courses; Figs. 3–5), was uncovered in the northwestern corner of Sq B2, overlying accumulation layer L112a. Wall 102 was associated with a small stone floor foundation layer (L110). Another similarly built, straight wall was exposed in Sq C2 (W108; exposed length 4 m; width 0.65 m; two extant courses; Plan 1: Section 2–2; Figs. 4–6). Walls 102 and 108 were dated by associated pottery to a phase within EB IA (Stratum 3). The different orientation of the two walls indicates that they belonged to two separate buildings, both extending beyond the excavation limits.

Another wall (W113; exposed length 3 m; width 0.65 m), running parallel to W108, was built of smaller limestones, its construction technique distinctly different from that of Walls 102 and 108 (Plan 1: Section 2–2; Figs. 4–7). The wall's base was not reached, and the wall did not have an associated floor. The EB IA pottery retrieved from the overlying fill (L109) permitted attributing the wall to either Stratum 3 (EB IA) or Stratum 4 (Late Chalcolithic); as its construction is different from that of the two Stratum 3 walls, it may be attributed to Stratum 4.

Stratum 2

A fourth wall (W107/114) was exposed in the balk removed between the two squares (Figs. 4, 5, 7). Wall 107/114 was a large curvilinear wall, built of three rows of medium-sized,

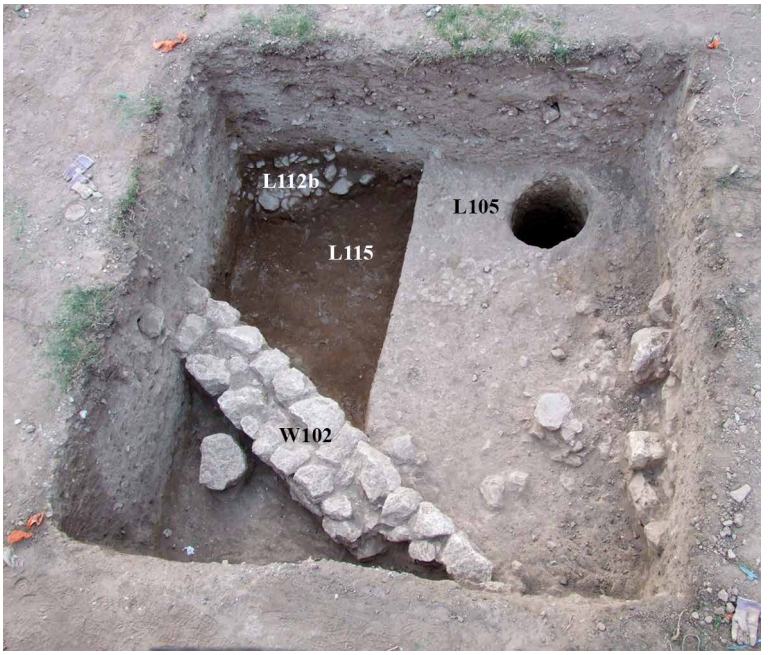


Fig. 3. Stratum 4 Late Chalcolithic stone layer (L112b) and Stratum 1 well shaft (L105), looking east.

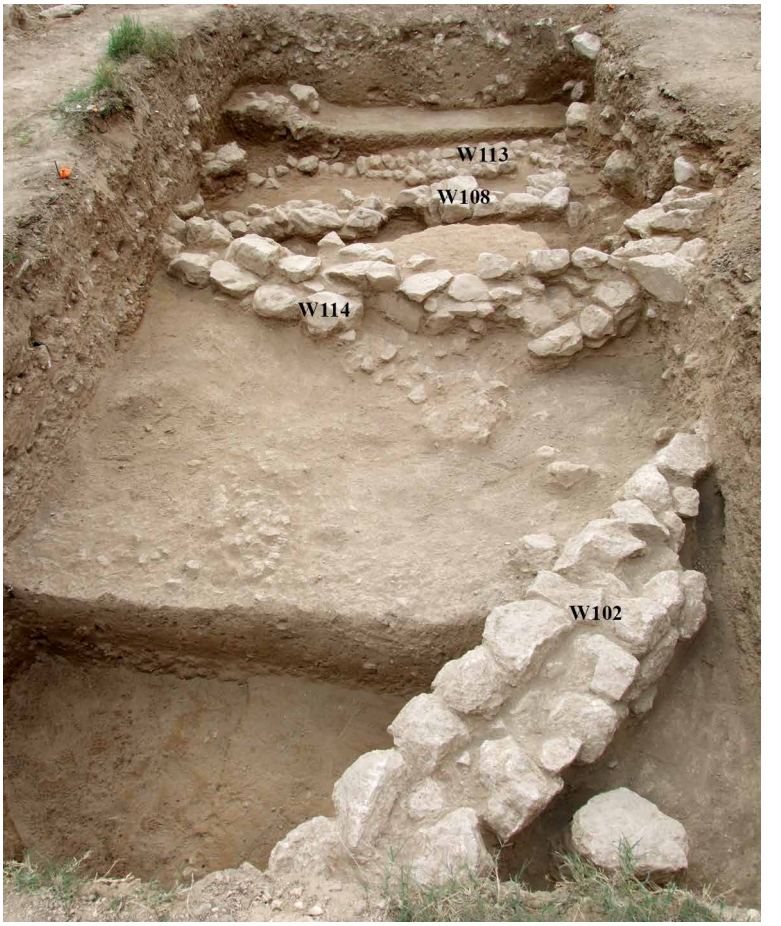


Fig. 4. General view of excavation, looking west.

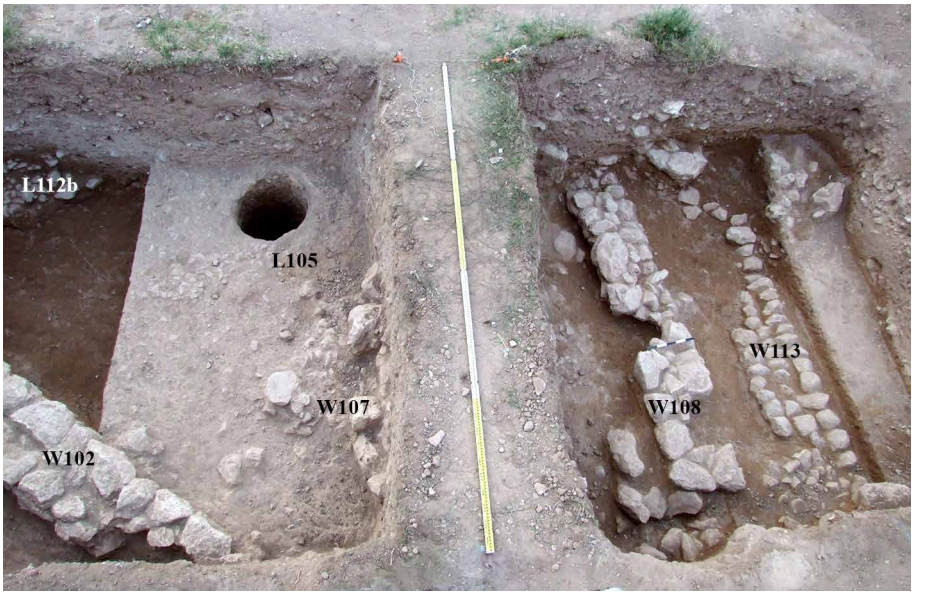


Fig. 5. Walls 102, 108 and 113, looking southeast; W107/114 is visible beneath the balk.

unworked limestones (width 0.9 m; diam. of enclosed space 4 m; three extant courses), constituting the northeastern end of a characteristic EB IA double-apsed building (for this term, see Nicolle and Braemer 2012; Braun 2021:9). The curving wall overlays Stratum 3 stone floor L110 associated with W102 (Plan 1: Section 1–1), indicating that it was part of a later building. This curving wall is similar to the walls of contemporary double-apsed structures uncovered nearby in Kafr Kanna (Ron Be'eri, pers. comm.), as well as at other contemporary sites, for example at the nearby site of Yiftaḥ'el Stratum II (Braun 1997:23–42). The date of this building within the EB IA horizon is corroborated by the associated pottery finds (see Figs. 10–12, below). Based on the proportions of the wall segment exposed, the building may have been 10–12 m long. The long walls and the southwestern curvilinear end of this northeast–southwest oriented structure extend well-beyond the limits of the present excavation. Three stone slabs adjoining the top course of the interior face of W107/W114 indicated the existence of a stone pavement in at least part of the structure (Plan 1: Section 2–2); two large, flat stones overlying W113, probably functioned as pillar bases to support the roof of the Stratum II building (Fig. 6). Wall 107/114 was overlain by topsoil (L101).

Stratum 1

A deep vertical shaft dug in Sq B2, subsequently backfilled with yellow sand and limestones, was probably a pre-modern well shaft (L105; Plan 1: Section 1–1; Fig. 3). The upper 1.6

Fig. 6. Wall 108 with pillar bases, and W113, looking southwest.

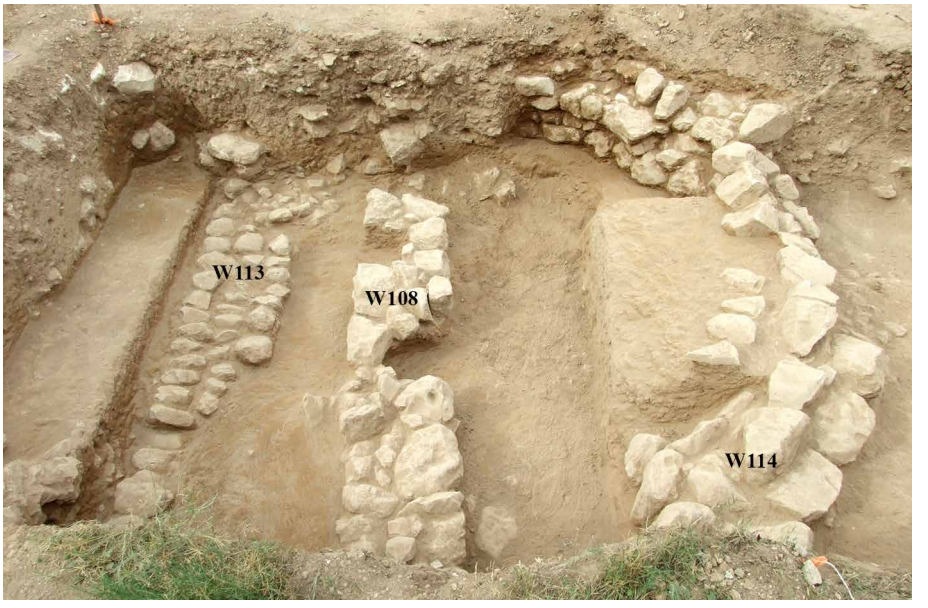


Fig. 7. Walls 113, 108 and 107/114, looking northwest.

m deep layer of the fill was removed manually, without reaching the bottom of the shaft. Small stone concentrations and occasional potsherds protruding from the exposed shaft's interior wall indicate that anthropogenic deposits continue below the deepest level reached in the excavation (L115), and that the natural bedrock or virgin soil lie at still deeper levels at the site.

The Pottery

Two distinct pottery assemblages, dating to the Late Chalcolithic period and EB IA, were retrieved.

Late Chalcolithic Period (Figs. 8, 9)
The Late Chalcolithic pottery, mostly retrieved from two loci (L112, L115), comprises 520 sherds, 433 of which are body sherds and 87 are diagnostic; the majority (n = 69) belong to open vessels.

Open Vessels (Fig. 8).— The open vessels comprise small, medium and large-sized V-shaped bowls fenestrated pedestal bowls, and a basin (Table 1). The wheel-finished, small V-shaped bowls (Fig. 8:1–12) include one bowl with a complete profile (Fig. 8:5); none exhibit the characteristic red-painted 'lipstick' rim of the Late Chalcolithic period. Although some of the rims are similar to those of cornets, the absence of diagnostic medial and base sherds of cornets suggests that they were not cornets. Medium- and large-sized V-shaped bowl rims are also present (Fig. 8:13–18). A single crude, thick-walled small bowl was found (Fig. 8:19). Fenestrated pedestal bowls are represented by a ring-stand, a pedestal and two fenestrated leg sherds (Fig. 8:20–23). Some of the medium- and large- sized V-shaped bowl rims may also have been fenestrated pedestal bowls. A single large basin with an indented rim had a break on the exterior where a handle had broken off (Fig. 8:24).

Closed Vessels (Fig. 9).— A few holemouth jar rims (Fig. 9:1–3), one red-slipped, and one red-slipped necked jar rim (Fig. 9:4) were retrieved (Table 1); pithoi and churns are notably absent from this admittedly small assemblage. There are several medium- and large-sized red-slipped[3] loop handles, triangular in section (Fig. 9:6–9), and only one small lug handle (Fig. 9:10). Two body sherds exhibit incised decoration on the exterior (Fig. 9:11, 12); the latter sherd, incised with a herringbone design, is part of a small strainer vessel (for similar Chalcolithic strainer vessels, see Brink, Chasan and Rosenberg 2021).

[3] The term red-slipped is used in the pottery descriptions, although on some vessels the red coating may have been applied by painting.

Table 1. Late Chalcolithic Diagnostic Sherds

Small V-Shaped Bowls	Medium to Large V-Shaped Bowls	Fenestrated Pedestal Bowls	Basin	Holemouth Jars	Necked Jar	Handles	Bases	Varia
14 rims 29 bases 1 complete profile	20 rims	2 leg sherds 2 medial sherds	1	3	1	7	2	2 stoppers 1 strainer 1 rope-decorated sherd

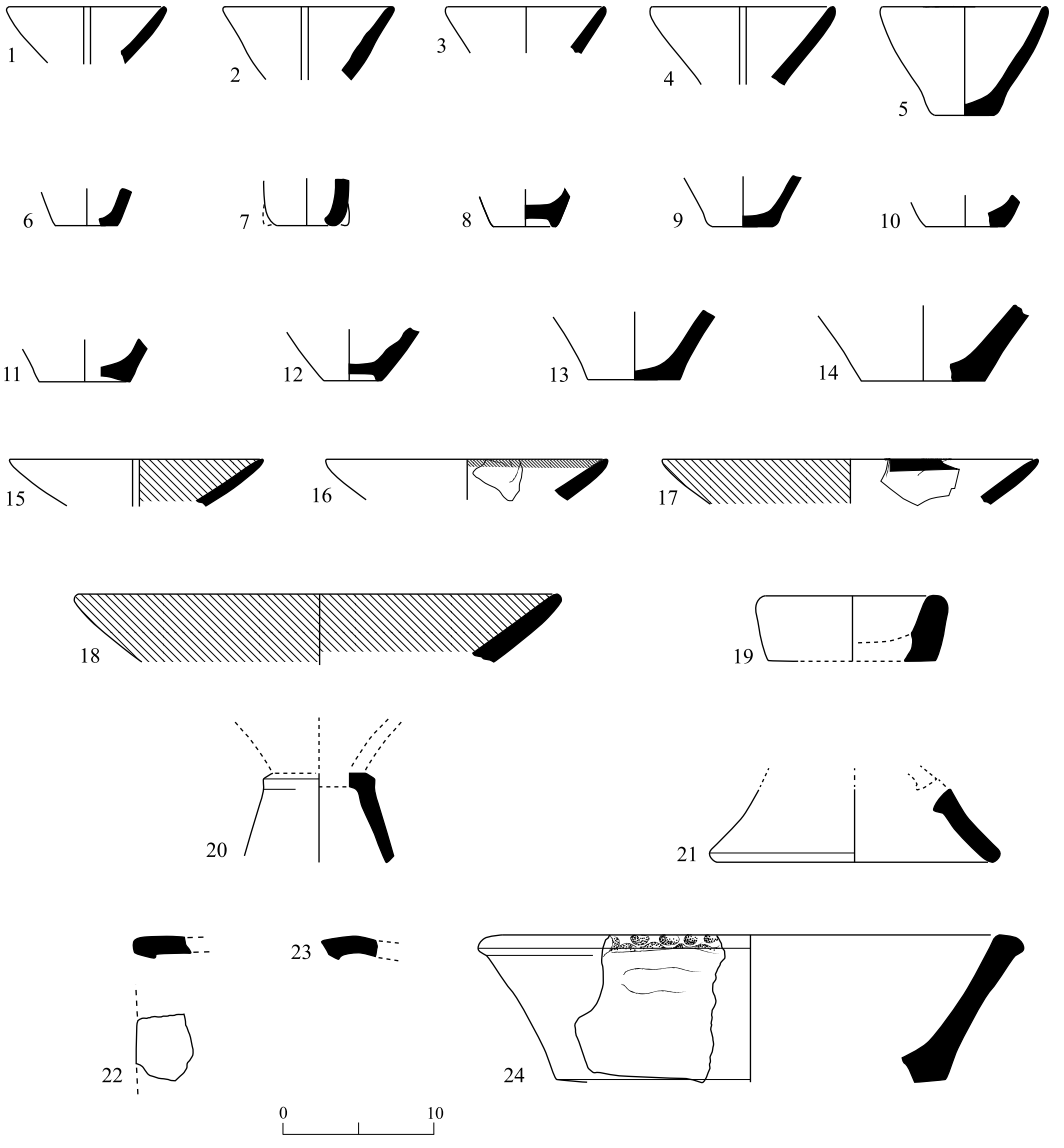


Fig. 8. Late Chalcolithic V-shaped bowls, fenestrated pedestal bowls and basin.

◂ Fig. 8

No.	Type	Locus	Basket	Description
1	Small V-shaped bowl	112	1031/6	Patinated surface
2	Small V-shaped bowl	112	1031/5	Plain, light brown surface
3	Small V-shaped bowl	112		Plain
4	Small V-shaped bowl	112	1038/4	Plain, orange surface
5	Small V-shaped bowl	112	1038/13	Plain, light orange surface
6	Small V-shaped bowl	104	1004/19	Plain, light orange surface
7	Small V-shaped bowl	111	1023/5	Plain, light orange surface
8	Small V-shaped bowl	112	1038/3	Plain, orange surface
9	Small V-shaped bowl	115	1043/1	Plain, light orange surface
10	Small V-shaped bowl	101	1001/2	Plain, light orange surface
11	Small V-shaped bowl	110	1016/3	Plain, light orange surface
12	Small V-shaped bowl	112	1031/8	Plain, light orange surface
13	Medium-sized V-shaped bowl	112	1038/12	Plain, light orange surface
14	Large V-shaped bowl	115	1043/2	Soot stains on int. and ext.
15	Medium-sized V-shaped bowl	104	1004/5	Red slip traces on int.
16	Medium-sized V-shaped bowl	112	1031/7	Red slip on rim int.
17	Large V-shaped bowl	104	1004/24	Red-slipped ext. and rim
18	Large V-shaped bowl	112	1038/6	Red-slipped int. and ext.
19	Small thick-walled bowl	112	1031/9	Patinated surface
20	Fenestrated bowl	112	1038/7	Plain, light orange surface
21	Fenestrated bowl	112	1024/10	Plain, light orange surface int. and ext.
22	Fenestrated bowl	106	1005/4	Red-slipped ext.
23	Fenestrated bowl	104	1004/23	Red-slipped ext.
24	Basin	112	1038/8	Plain, light orange surface; handle broken

Fig. 9 ▸

No.	Type	Locus	Basket	Description
1	Holemouth jar	110	1016/1	Plain surface
2	Holemouth jar	112	1038/14	Patinated surface
3	Holemouth jar	112	1038/9	Red-slipped ext. and rim
4	Necked Jar	110	1016/2	Red-slipped int. and ext.
5	Jar base	111	1023/6	Soot stains on int.
6	Loop handle	104	1004/21	Triangular section; red-slipped
7	Loop handle	100	1000/16	Triangular section; red-slipped
8	Loop handle	112	1038/10	Triangular section; red-slipped
9	Loop handle	115	1043/3	Triangular section
10	Lug handle	112	1031/10	Red-slipped
11	Incised sherd	112	1038/11	Plain, light orange surface
12	Incised strainer sherd	103	1009/10	Herringbone design; red-slipped ext. and int.

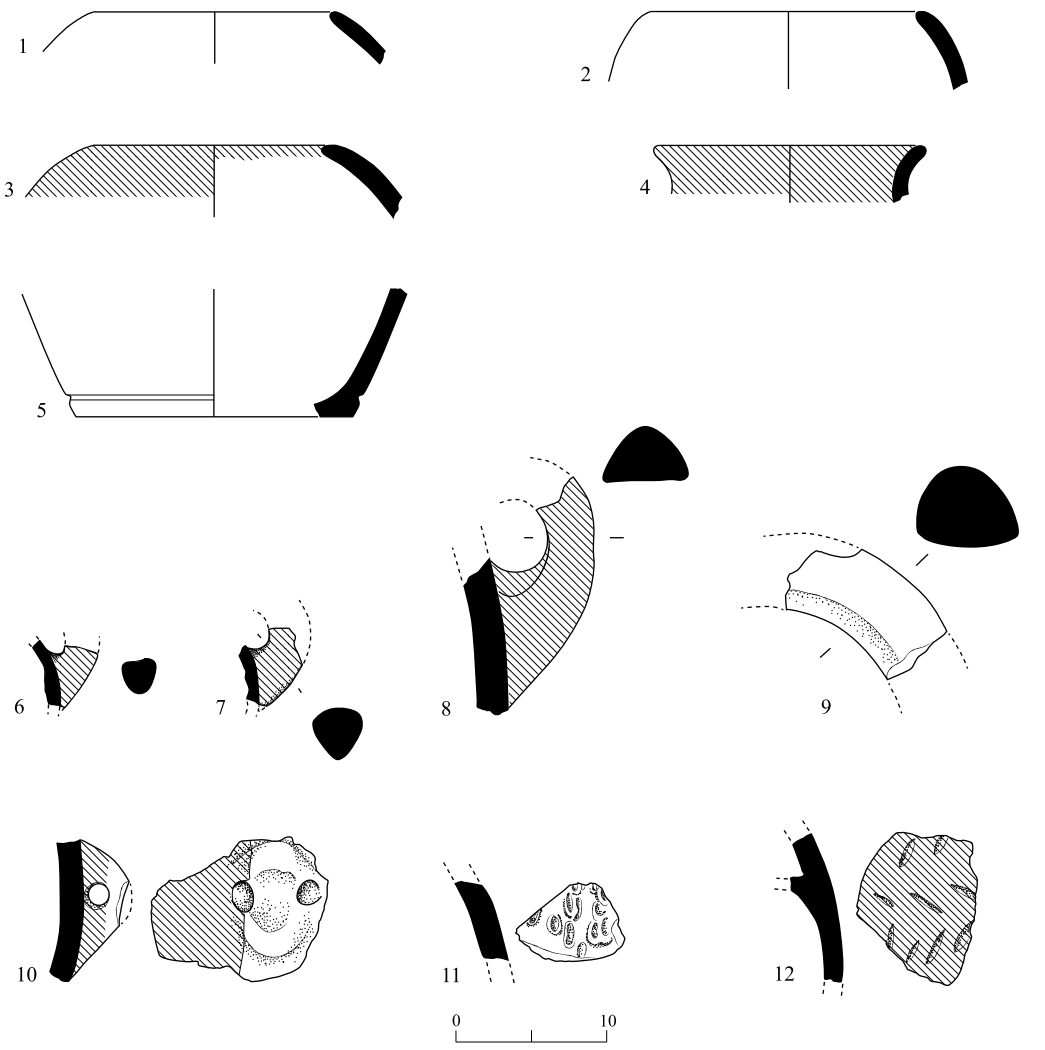


Fig. 9. Late Chalcolithic jars, handles, incised sherd and strainer.

Early Bronze Age IA

The EB IA pottery assemblage comprises 1883 sherds, of which 1519 are body sherds and 364 are diagnostic.

Open Vessels (Figs. 10–12).— The repertoire includes many small hemispherical bowls with slightly inverted rims (Fig. 10:1–15) and a few medium- and large-sized bowls (Fig. 10:16, 17; Table 2). Two of the small bowls exhibit soot stains (Fig. 10:6, 9), indicating their use as lamps. Some bowls are plain (Fig. 10:1, 9, 14); others are red-slipped on their exterior (Fig. 10:2, 6, 12, 15) or interior (Fig. 10:11), or both (Fig. 10:3, 4, 13, 16, 17). Only one of the bowls has an applied indented or rope-decorated clay band below the rim (Fig. 10:16),

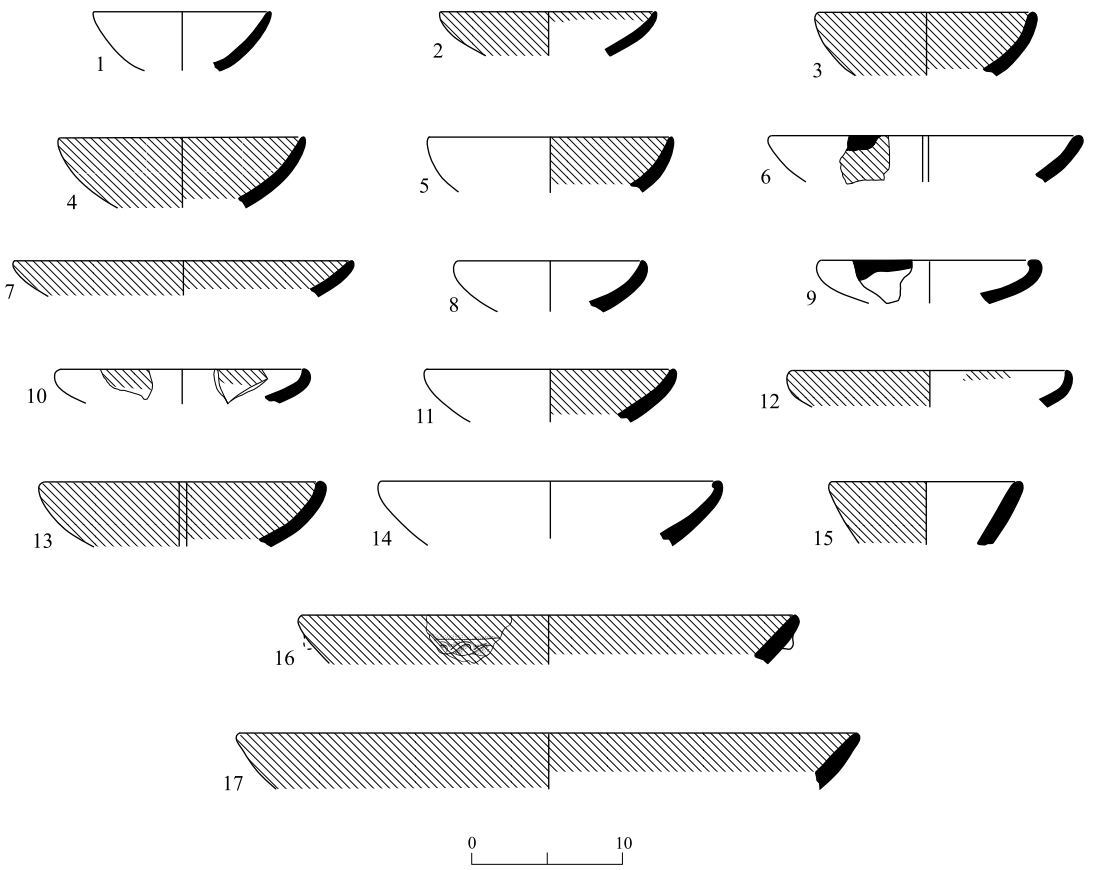


Fig. 10. Early Bronze Age IA hemispherical bowls.

No.	Type	Locus	Basket	Description
1	Small bowl	103	1009/1	Plain
2	Small bowl	100	1000/1	Red-slipped ext. and rim
3	Small bowl	106	1010/2	Red-slipped int. and ext.; soot stains on rim
4	Small bowl	109	1013/1	Red-slipped int. and ext.
5	Small bowl	112	1038/1	Red-slipped int. and ext.; patinated ext.
6	Small bowl	104	1003/1	Red-slipped ext. and rim; soot stains on rim
7	Bowl	101	1001/1	Red-slipped int. and rim
8	Small bowl	112	1024/1	Light orange oxidation patches; gray core; red-slipped int.
9	Small bowl	104	1004/3	Plain; soot stains on int. and ext.
10	Small bowl	103	1009/2	Red-slipped int. and ext.; soot stains?
11	Small bowl	106	1010/1	Red-slipped traces on int.
12	Small bowl	104	1004/2	Red-slipped ext. and rim
13	Small bowl	109	1013/2	Red-slipped int. and ext.
14	Small bowl	111	1023/1	Plain, buff surface
15	Small bowl	111	1023/2	Red-slipped ext.
16	Medium-sized bowl	104	1004/9	Red-slipped int. and ext.; applied indented clay band
17	Large bowl	104	1004/1	Red-slipped int. and ext.

although this is a common feature on EB IA bowls throughout the country, for example, at Azor (Golani and Brink 1999). There are several basins (or large deep bowls) with indented rims (Fig. 11). Some basins are plain (Fig. 11:1–3), others are red-slipped on the exterior and rim (Fig. 11:6), or entirely red-slipped (Fig. 11:4, 5).

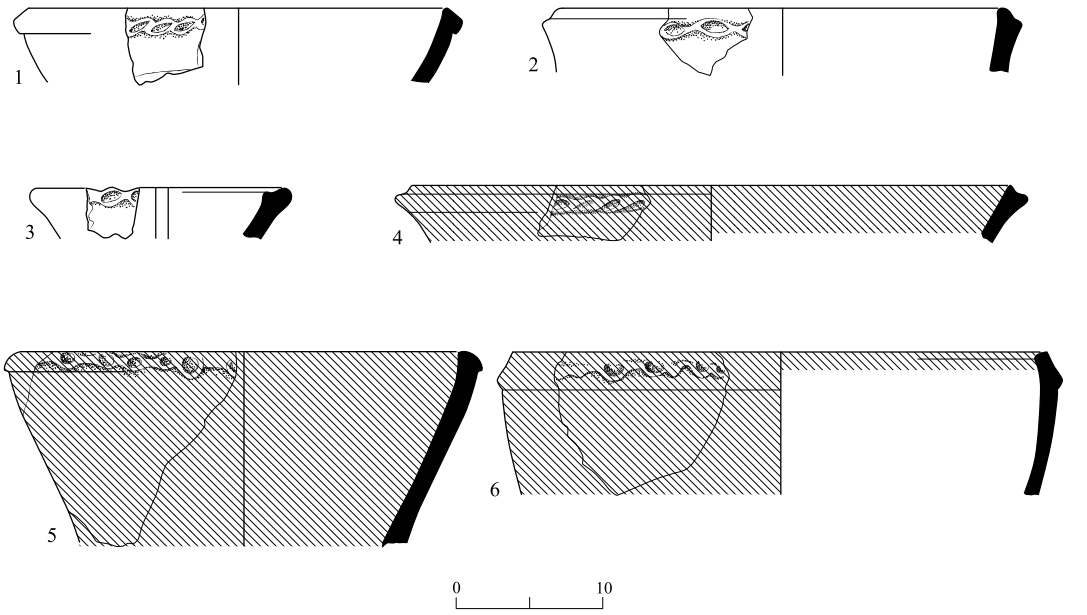


Fig. 11. Early Bronze Age IA basins (large deep bowls).

No.	Type	Locus	Basket	Description
1	Basin	110	1014	Indented rim; plain, light orange surface
2	Basin	104	1003/3	Indented rim; plain, light orange surface
3	Deep bowl	103	1009/4	Indented rim; plain, light orange surface
4	Large basin	106	1010/6	Indented rim; plain, light orange surface; soot stains on ext.
5	Large basin	112	1024/7	Indented rim; red-slipped int. and ext.
6	Large basin	112	1024/6	Rope decoration below rim; red-slipped ext. and rim

The Gray Burnished bowls are the predominant bowl group (Fig. 12; Table 2). These bowls are characterized by flaring rims and carinated walls with multiple knobs on the carination; the only base sherd certainly identified was flat (Fig. 12:20). The bowls exhibit some variety in color and surface treatment. Most are gray-slipped and burnished inside and out (Fig. 12:2, 3, 11–13, 15–18); a few are only burnished on the exterior (Fig. 12:5, 20), and a single specimen is gray-slipped inside and out, but apparently not burnished (Fig. 12:14).

Table 2. Early Bronze Age IA Diagnostic Sherds

Small, Medium and Large Bowls	GBW Bowls (inc. Red-Slipped and Brown-Slipped)	Holemouth Jars	Necked Jars	Pithos	Handles	Bases	Stoppers	Varia
46 rims	61 rims, bases, knobs, carinated wall sherds	35 rims	52 rims and necks	7 rims	27	79	9	48 applied rope-decorated body sherds; baked clay roof piece

Fig. 12 ▸

No.	Locus	Basket	Description
1	103	1009/3	Brown-slipped int. and ext., burnished
2	111	1023/3	Gray-slipped int. and ext., burnished
3	104	1003/2	Brownish gray slip on int. and ext., burnished
4	104	1004/4	Red-slipped int. and ext., burnished
5	104	1004/6	Gray-slipped ext., burnished
6	112	1024/5	Red-slipped ext., burnished
7	104	1003/4	Red-slipped ext.
8	106	1010/4	Gray-slipped ext., burnished; patinated int.; black core
9	100	1000/2	Red-slipped int. and ext.
10	100	1000/3	Light brown slip on int. and ext., burnished; soot stains on ext.
11	106	1010/3	Gray-slipped int. and ext., burnished
12	112	1024/4	Gray-slipped int. and ext., burnished
13	112	1024/2	Gray-slipped int. and ext., burnished
14	112	1031/1	Gray-slipped int. and ext., not burnished (?)
15	112	1024/3	Gray-slipped int. and ext., burnished
16	106	1005/1	Gray-slipped int. and ext., burnished
17	106	1010/5	Gray-slipped int. and ext., burnished
18	104	1004/7	Gray-slipped on int. and ext., burnished
19	100	1000/4	Light brown slip on int. and ext., burnished, soot stains on ext.
20	104	1004/8	Gray-slipped base, burnished

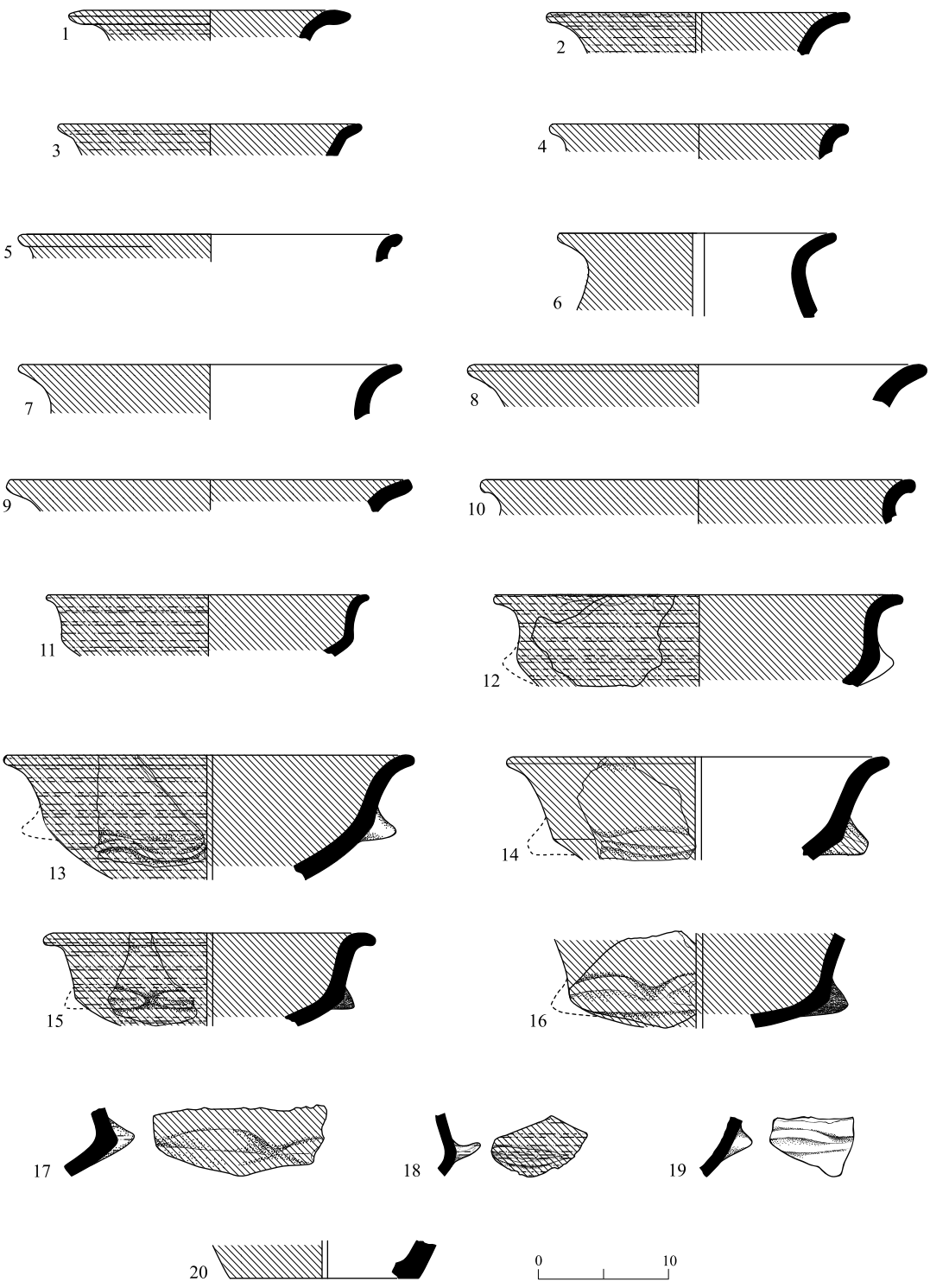


Fig. 12. Early Bronze Age IA Gray Burnished Ware bowls.

Some bowls are red-slipped on the interior and/or exterior, some burnished (Fig. 12:4, 6, 7, 9); other bowls are brown-slipped and burnished (Fig. 12:1, 10). The GBW fenestrated pedestal bowls seem to be absent, although some of the bowl rims may have been part of the pedestal ring stands, as, for example, observed at Yiftaḥ'el (Braun 1997:60; Fig. 9.4:1, 2). Six of these bowls were thin-sectioned for petrographic analysis (see Table 3, below).

Closed Vessels (Figs. 13–15).— The EB IA assemblage includes many holemouth jars (Fig. 13). The jar rims have rounded, tapered or flattened/ridged rims that are either simple (Fig. 13:1–3), or more commonly indented (Fig. 13:4–16, 18). One jar has an applied, indented clay band below the rim (Fig. 13:17). The jars are either plain or red-slipped.

Small, medium and large-sized necked jars are also common, mostly red-slipped on the exterior and over the rim (Fig. 14:1–11, 16). The pithoi all have a finger-indented or pinched clay coil on the join between the neck and the shoulder, and they are also red-slipped (Fig. 14:12–16). One jar sherd (Fig. 14:14) has two converging indented applied coils on the neck and shoulder. Similar pithoi were found at other sites, for example at Yiftaḥ'el Stratum II (Braun 1997:61–62, Fig. 9.18). The jar bases are invariably flat (Fig. 15:1, 2). A flat-based fragment of a large jar with a combed wall (Fig. 15:3) is exceptional in this assemblage,

Fig. 13 ▸

No.	Locus	Basket	Description
1	104	1004/13	Red-slipped ext. and rim
2	112	1024/8	Red-slipped ext.
3	103	1009/5	Red-slipped ext. and rim
4	103	1009/6	Ridged indented rim; plain, light orange surface
5	111	1023/4	Ridged indented rim; red-slipped ext. and rim
6	109	1013/4	Indented rim; red-slipped ext.; soot stains on ext.
7	100	1000/10	Indented rim; red-slipped ext.
8	106	1005/2	Ridged indented rim; smeared wash on ext.
9	106	1005/3	Indented rim; red-slipped ext. and traces on rim; soot stains on int. and ext.
10	103	1009/7	Indented rim; red-slipped ext. and rim
11	101	1001/3	Indented rim; red-slipped ext. and rim
12	109	1013/3	Indented rim; red-slipped ext.; soot stains on ext.
13	100	1000/7	Indented rim; red-slipped ext.
14	100	1000.9	Indented rim; red-slipped ext.
15	104	1004/12	Indented rim; plain, light orange surface
16	100	1000/8	Indented rim; red-slipped ext.
17	100	1000/6	Applied rope-decorated band below rim; red-slipped ext. and int.
18	104	1004/11	Indented, slightly overhanging rim; patinated surface
19	104	1004/10	Flattened profiled rim; red-slipped rim

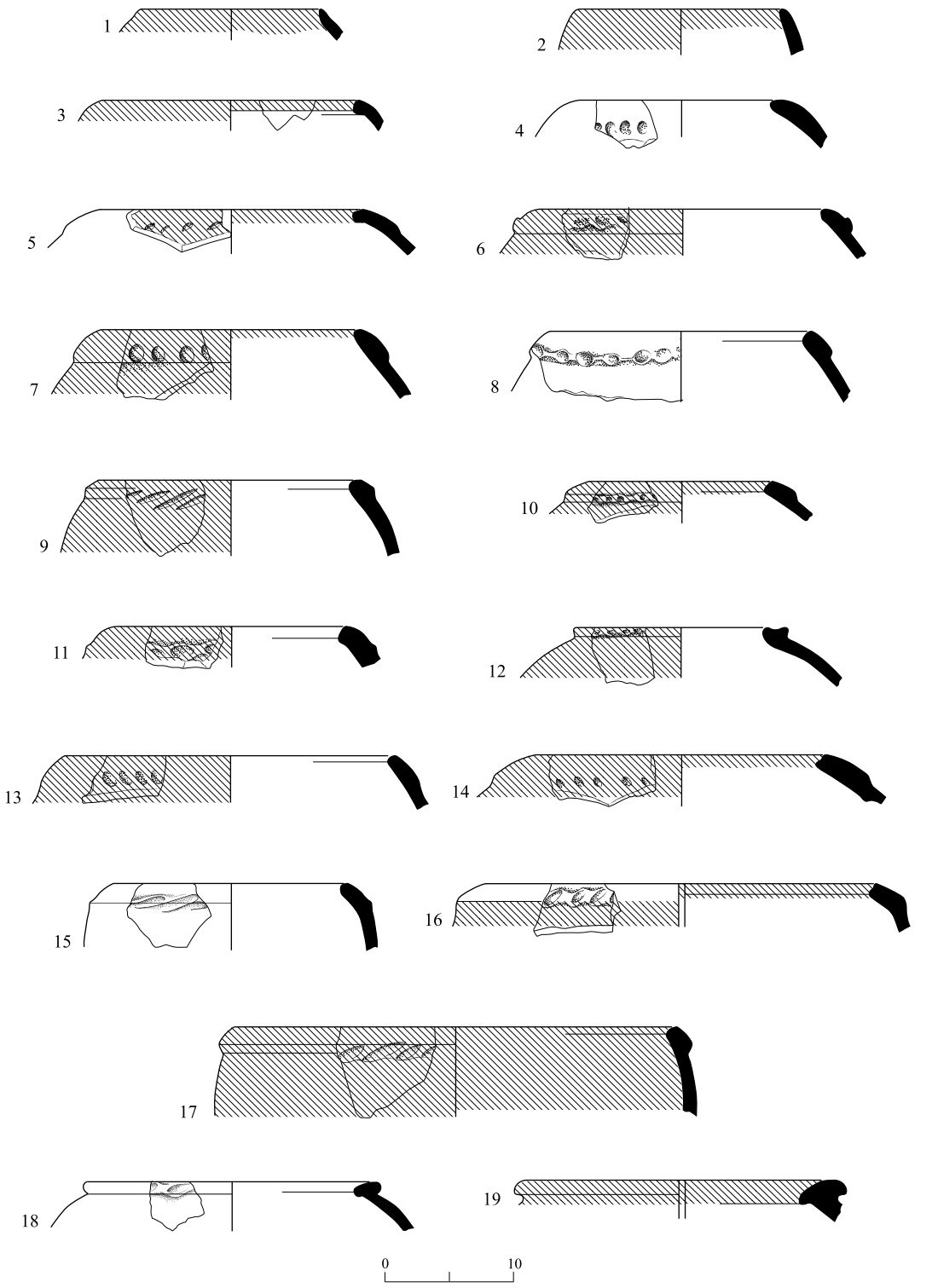


Fig. 13. Early Bronze Age IA holemouth jars.

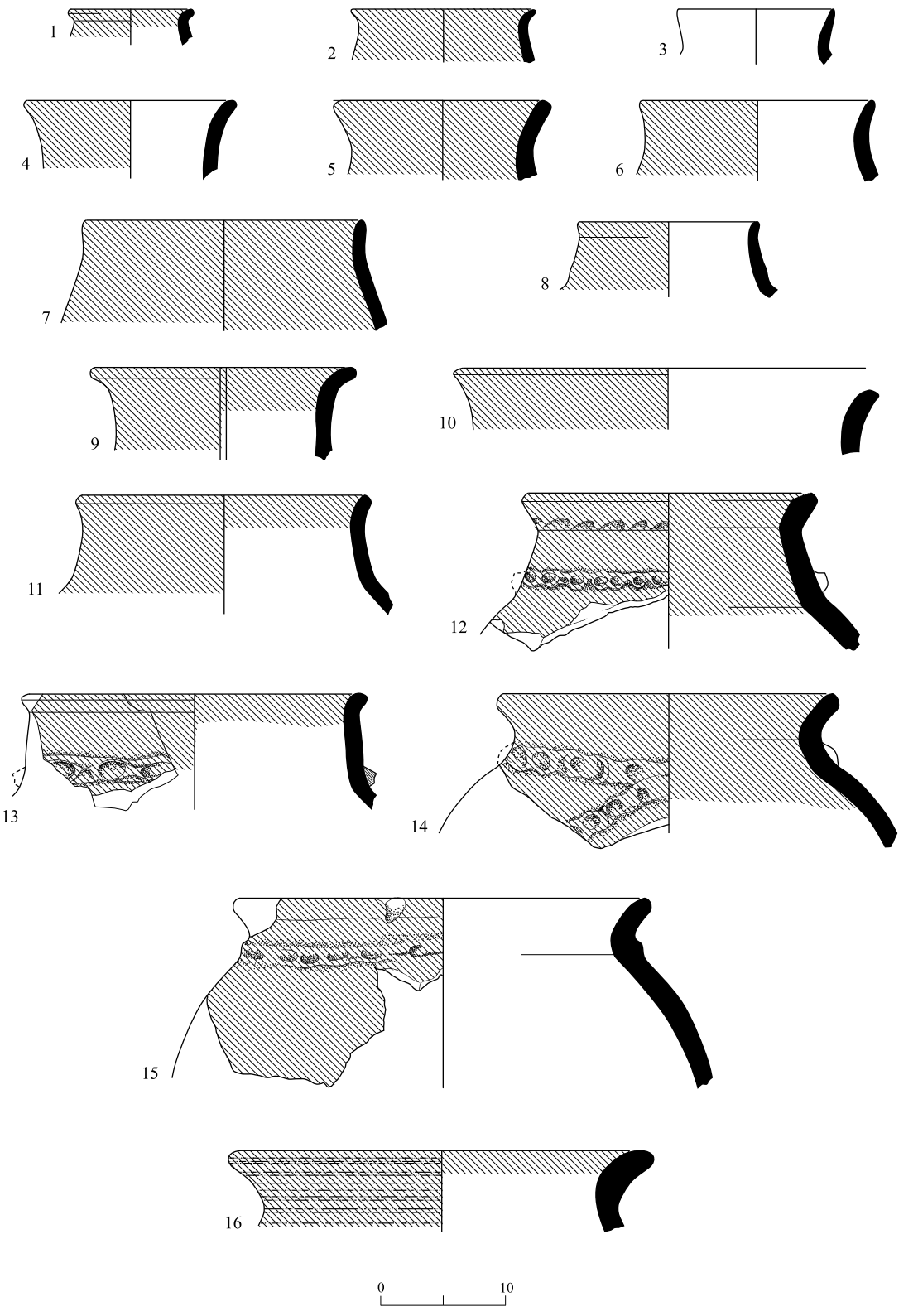


Fig. 14. Early Bronze Age IA jars and pithoi.

◂ **Fig. 14**

No.	Type	Locus	Basket	Description
1	Small jar	106	1010/7	Red-slipped ext.
2	Medium-sized jar	104	1004/15	Red-slipped int. and ext.
3	Medium-sized jar	112	1024/9	Plain, light orange surface
4	Medium-sized jar	104	1004/16	Red-slipped traces on ext.
5	Medium-sized jar	103	1009/9	Red-slipped int. and ext.
6	Medium-sized jar	100	1000/5	Red-slipped ext.
7	Medium-sized jar	112	1031/2	Red-slipped int. and ext.
8	Medium-sized jar	112	1031/3	Red-slipped ext.
9	Medium-sized jar	101	1001/4	Red-slipped ext. and rim
10	Large jar	104	1004/17	Red-slipped ext.
11	Pithos	W114	1042	Red-slipped traces on ext. and rim
12	Pithos	109	1035	Indented neck; applied rope-decorated band on join of neck and shoulder; red slip traces on ext. and int. down to shoulder
13	Pithos	100	1000/12	Rope-decorated band on join of neck and shoulder; red-slipped ext. and rim
14	Pithos	109	1032/2	Two converging applied indented bands; red-slipped ext. and rim
15	Pithos	109	1032/1	Rope-decorated band on join of neck and shoulder; red-slipped ext.
16	Pithos	100	1000/11	Red-slipped ext. and rim

probably dating to EB II, in which case it is the only indication in the excavation of a presence in this period. The jars have loop handles (not illustrated), or plain or red-slipped ledge handles, either simple (Fig. 15:4) or indented (Fig. 15:5–7). Three juglet sherds, one red-slipped and burnished, and two with small loop handles are included in the count, but not illustrated.

Stoppers/Reworked Body Sherds.— Several body sherds were retouched and shaped into roundish discs, probably used as stoppers. Some are plain (Fig. 16:1–4), others red-slipped (Fig. 16:5–8); one reworked sherd has a drilled but non-perforated, depression (Fig. 16:9).

Varia.— A single piece of baked clay, possibly roof plaster, was recorded (Fig. 16:10).

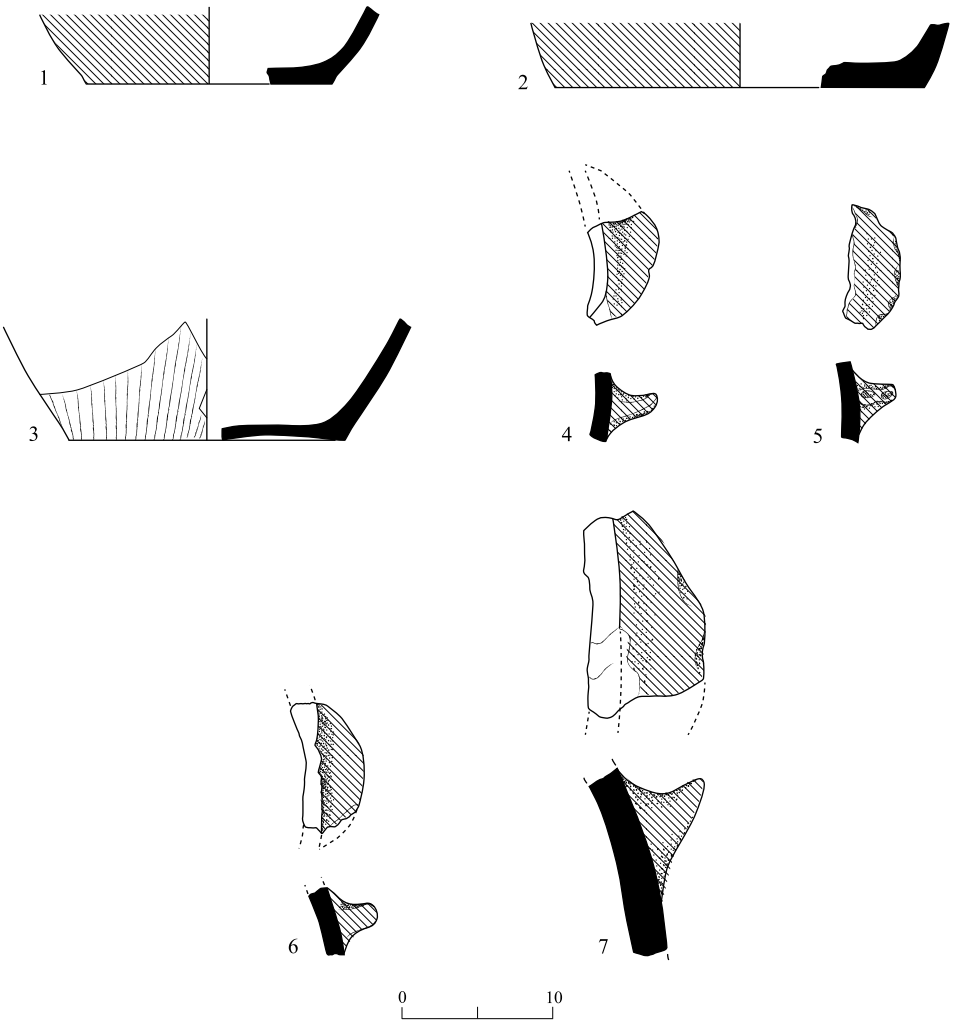


Fig. 15. Early Bronze Age IA bases, handles.

No.	Type	Locus	Basket	Remarks
1	Flat jar base	104	1004/18	Red-slipped ext.
2	Flat base of large jar	112	1024/11	Red-slipped ext. and base
3	Flat base of metallic(?) jar	100	1000/14	Vertical combing on ext.; plain, light orange surface
4	Indented ledge handle	112	1031/4	Red-slipped
5	Indented ledge handle	106	1010/8	Red-slipped traces
6	Plain ledge handle	104	1004/20	Red-slipped
7	Indented ledge handle	112	1038/2	Red-slipped

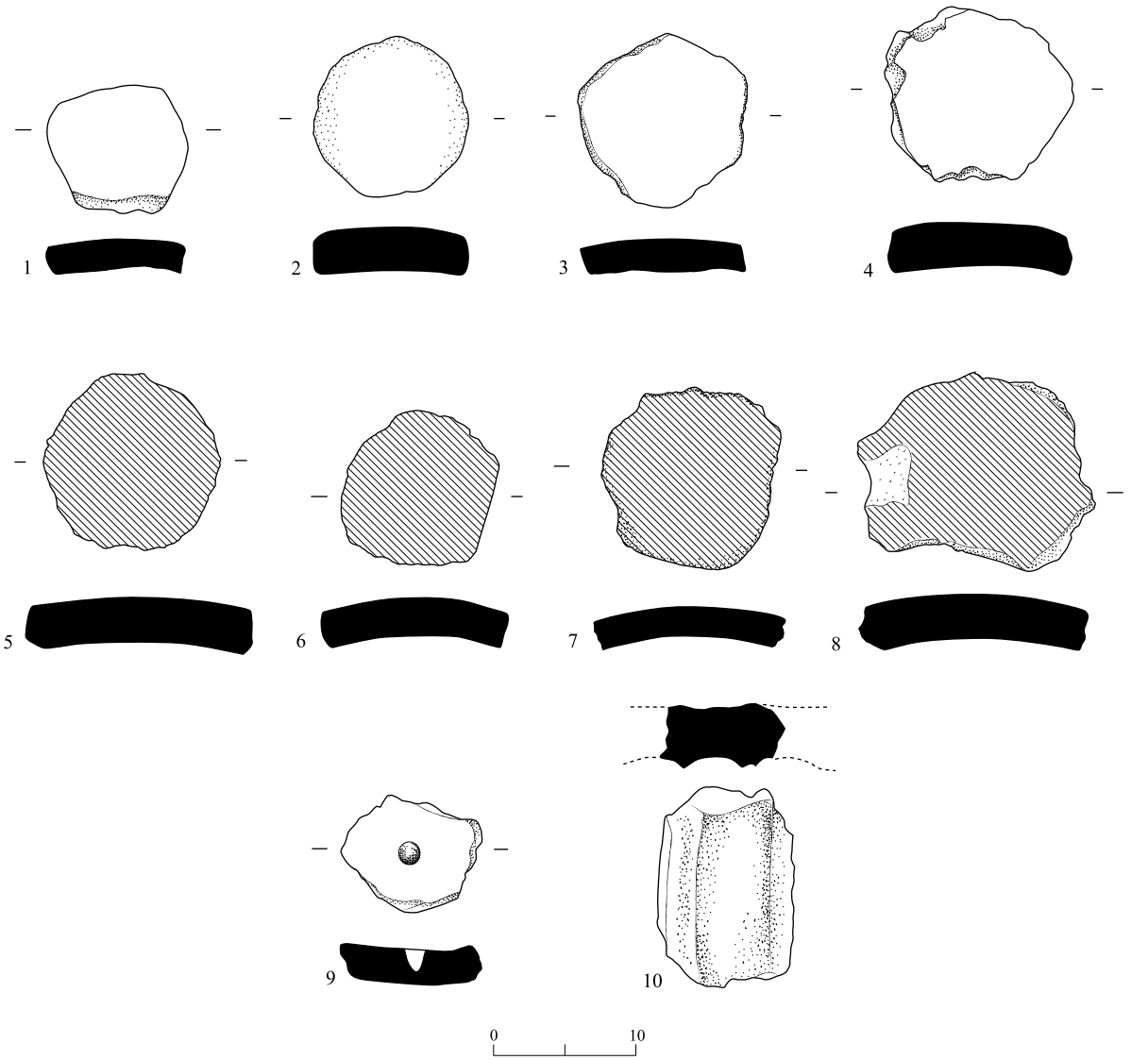


Fig. 16. Early Bronze Age IA stoppers (reworked body sherds) and roof plaster fragment.

No.	Type	Locus	Basket	Remarks
1	Stopper	111	1023/7	Plain surface
2	Stopper	112	1024/12	Patinated surface
3	Stopper	112	1024/13	Plain surface
4	Stopper	100	1000/15	Red-slipped ext.
5	Stopper	106	1010/10	Red-slipped ext.
6	Stopper	106	1010/9	Red-slipped int.
7	Stopper	103	1009/11	Red-slipped ext.
8	Stopper	106	1005/5	Red-slipped ext.
9	Stopper	104	1003/5	Drilled hole on sherd int.
10	Fragment of roof plaster	104	1004/22	

Technological Aspects of the Pottery Assemblages

A technological approach was applied to the pottery assemblages to characterize the *chaînes opératoires*,[4] and to assess whether the Late Chalcolithic vessels were manufactured according to the same *chaîne opératoire* as the EB IA vessels. The analysis, carried out on 86 Late Chalcolithic and 222 EB IA wall and base sherds of vessels (none drawn) comprised the naked-eye and the microscopic observation of their surface features and of fresh radial sections thereof.

Late Chalcolithic Pottery

The Late Chalcolithic assemblage included vessels manufactured without rotary kinetic energy, and others manufactured with rotary kinetic energy (RKE).

Vessels Manufactured without Rotary Kinetic Energy (RKE)
Both open and closed vessels were manufactured without RKE. The vessels were made according to the so-called 'Ghassulian *chaîne opératoire*' (for description, see Roux 2019).

The clay paste was generally tempered with coarse mineral inclusions whose size depends on the thickness of the walls. The bases were modeled from a lump of clay into a disc shape whose edges were raised 1–2 cm in order to start the body. An inner peripheral coil was then placed on the raised edges of the clay disc and attached by exerting discontinuous pressure. The diagnostic features are: at high magnification, the bases are characterized by sub-parallel elongated voids and alignment of the inclusions; the raised edges are visible in the continuity of the porosity system and the alignment of the coarse inclusions at the junction between the base and the body; the adding of an internal peripheral coil was visible in the void and inclusion pattern of the body section. It is characterized by a vertical pattern related to the raising of the edges, contrasting with the elongated oblique voids of the inner peripheral coil placed against the raised edges (Fig. 17:a, b).

The successive coils were fixed internally against the inner face with oblique joins. The coils were fairly small (1–2 cm), their height about one-and-a-half times the thickness of the vessels. The diagnostic features are: at high magnification, in section, fissures indicate oblique joins of coils whose direction is inward, from the outer to the inner face; the strong sub-parallel oblique porosity running from one side of the wall to the other suggests a strong compression of the coil, and therefore coiling by spreading (Fig. 17c).

Once the body was formed, the rim was shaped with a wet soft tool, possibly fingers or a piece of cloth. The diagnostic features are: at high magnification, fluid micro-topography and ribbed sub-parallel striations indicate the use of water.

[4] A *chaîne opératoire* is defined as "the series of actions that transform raw material into finished product, either consumption or tool" (Creswell 1976:13; see also Roux 2019:24–25)

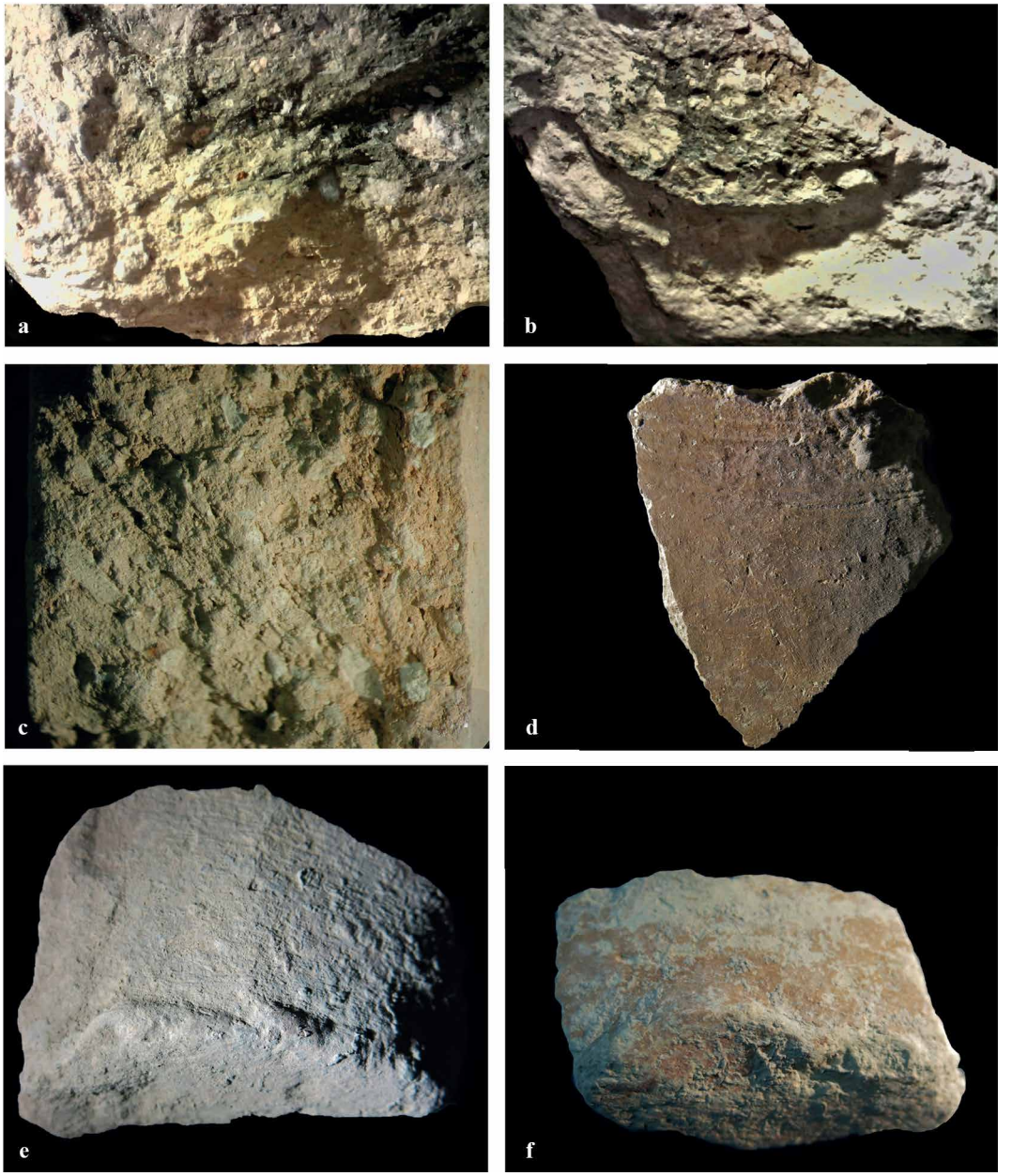


Fig. 17. Diagnostic features of the *chaîne opératoire* used for making Late Chalcolithic vessels without RKE: (a) and (b) radial sections of bases with contrasted pattern of porosity and alignment of inclusions showing both the continuity between the base and the start of the body, and the adding of an inner peripheral coil; (c) porosity with an oblique pattern indicating coiling by internal apposition; (d) red lumpy surface testifying to a layer of clay coating covered by a red slip layer; (e) and (f) overthickness and folding of the outer peripheral coil on the lower body.

After the shaping of the rim, the wet inner face of vessels was smoothed with soft tools, again fingers or a piece of cloth. The diagnostic features are: at high magnification, irregular micro-topography, threaded striations, and inner body striations overlapping inner rim striations on the inner face of closed vessels, indicate a smoothing operation after shaping the rim.

The vessel was then left to dry until it was leather hard. Elements, such as decorative bands and handles, were now applied, as well as an extra peripheral coil around the external base of all the vessels, probably to reinforce the junction between the base and the body. This junction was consolidated in three ways: by the raised edges of the base, by the inner peripheral coil, and by the addition of the outer peripheral coil. The diagnostic features are: to the naked eye, overthickness on the lower outer face and around the external base (Fig. 17:e). The overthickness of the outer peripheral coil is folded either against the body or against the surface of the outer base (Fig. 17:e, f). However, the thickening on the lower outer face is hardly visible when the outer coil is smeared strongly against the wall and covered by a thick coating.

Next, the clay coating was applied on the outer/inner face of the vessels using vertical/oblique gestures, or in some cases, with a rotary motion, from below the rim, or from the rim itself, down to the base, probably with fingers. The coating was also applied on the bases. The diagnostic features are: to the naked eye, lumpy and irregular topography (Fig. 17:d); at high magnification, floating grains; on the body, coating overlapping the smoothing striations of the rim; coating covering the applied elements.

The decoration of the bands with finger impressions, and the perforation of the handles was done after the coating. Slip, applied at this stage, was observed on the outer surface of 23 closed vessels (Fig. 17:d), on the inner surface of 5 open vessels, and on both the inner and outer surface of 3 open vessels; it was also observed on external bases on 6 vessels (Fig. 17:f). The slip was not visible systematically due to the calcite deposit that covered many vessels. The diagnostic features are: to the naked eye, an over-thickness around the perforations/impressions testifies to these operations on the wet clay coating; the red slip is visible under the multidirectional ribbed striations.

Once dried, the vessels were fired in an oxidized atmosphere. They were possibly left to cool down in the firing structure. The diagnostic features are: the surfaces of the pottery are pale; in radial section, the two outer margins are oxidized, and the core may be oxidized or reduced, showing a variability in the oxidation process (Fig. 17:a, b). The often-oxidized cores and the well-fired vessels may suggest a long exposure within the firing structures.

Vessels Manufactured with Rotary Kinetic Energy (RKE)

Thirty wheel-coiled bowls, 16 of which were bases, were made with RKE. These were mostly small bowls, as indicated by the wall thickness (c. 5.2 mm) and by the base diameter (c. 4.3 cm). Their inner profile varied, depending on whether the inner base was horizontal, or V-shaped (9 bases).

The bases were modeled from a lump of clay into a disc shape whose edges were raised c. 1 cm to form the body. An inner peripheral coil was then placed against the raised edges of the disc and joined to the base by discontinuous pressures. The diagnostic features are: at high magnification, radial sections of the bases present the same previously described features—sub-parallel elongated voids and alignment of the inclusions; vertical pattern related to the raising of the edges contrasting with the elongated oblique voids of the inner peripheral coil placed against the raised edges (Fig. 18:a). To the naked eye, fissures at the junction between the inner base and the body indicate the placing of an inner peripheral coil on the base (Fig. 18:b).

The next successive coils are fixed internally against the inner face; the joints are oblique. The coils are small (1 cm). Once the roughout was made and the coils joined together, the bowl was placed on the tournette and the walls were shaped with RKE. The diagnostic features are: at high magnification, in section, fissures indicate oblique joints of coils whose direction is inward, from the outer to the inner face; the sub-parallel voids visible in the radial sections suggest that the walls have been compressed with RKE; the paralleled concentric ribbed striations and the fluid micro-topography indicate that shaping was done with the help of RKE (Fig. 18:b, c).

The bowls were placed on the tournette either directly, or on a clay disc placed on the tournette. In the former case, the bowls were detached with a string and a string-cut mark is visible on the outer base of the bowl. This is true of only one base. In the latter case, the bowls were forcely detached from the disc, on which sand had been sprinkled. The results are outer bases with irregular microtopography, and coarse inclusions inserted in the superficial layer (Fig. 18:d).

The vessel was then left to dry until leather-hard. An outer peripheral coil was added. The diagnostic features are: to the naked eye, over-thickness on the lower outer face and around the external base (Fig. 18:d, e).

Wheel-coiled bowls were never coated; only one wheel-coiled bowl had a red-painted rim. The vessels were fired in an oxidized atmosphere, as is evident from the light color of the surfaces and sections.

Early Bronze Age IA Pottery

The EB IA pottery examined included oxidized coated pottery, Gray Burnished Ware (GBW), Black Burnished Ware (BBW) and Red Burnished Ware (RBW).

Oxidized Coated Pottery

Analyzed in this category are 120 vessels, 40 of which were bases. These vessels include a wide range of open and closed vessels. Surprisingly, all these EB IA vessels were made according to the same *chaine opératoire* as that of the Late Chalolithic Ghassulian vessels. We emphasize here the shared technical features of the Late Chalcolithic and EB IA assemblages.

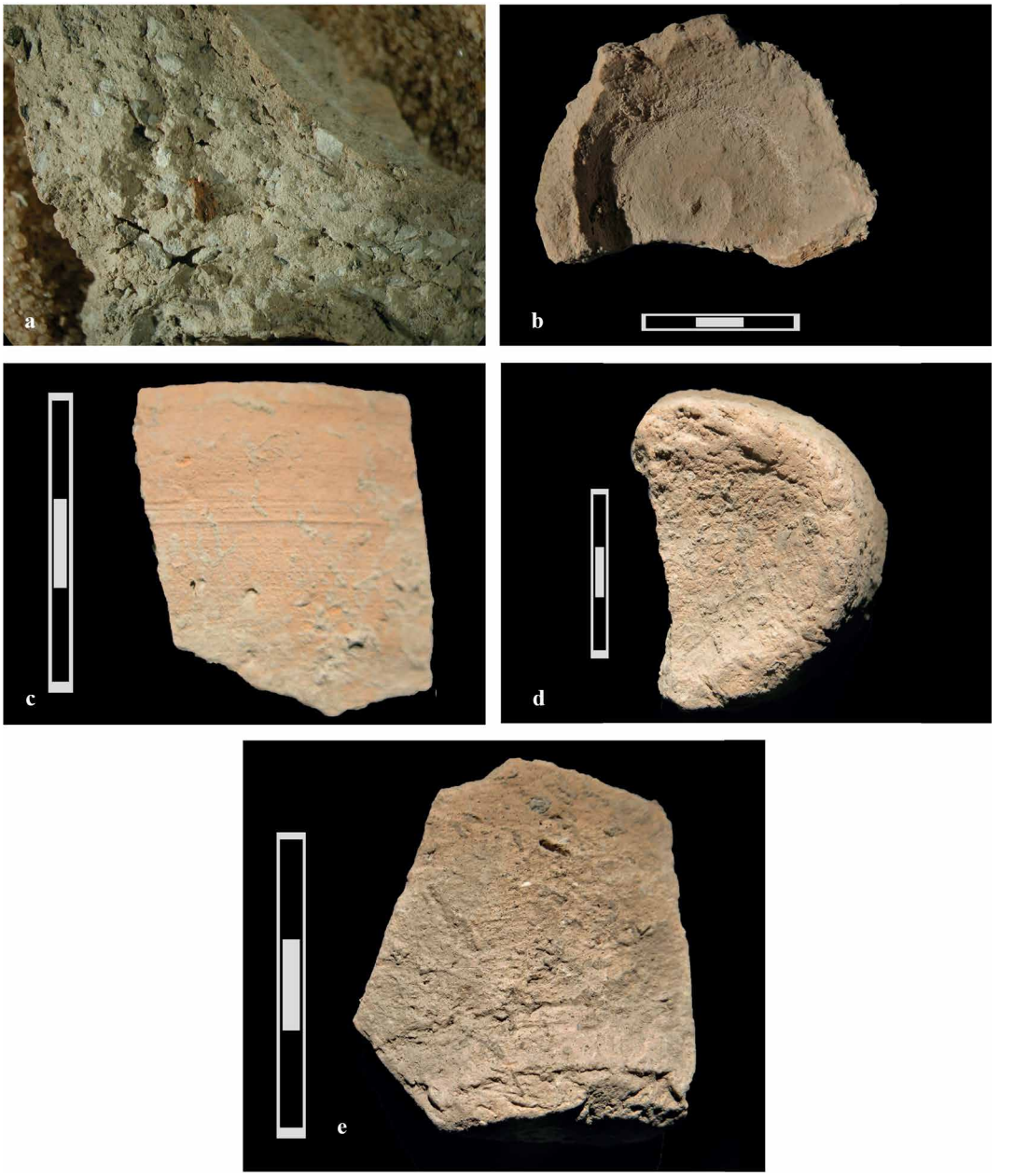


Fig. 18. Diagnostic features of the *chaîne opératoire* of the RKE wheel-coiled bowls: (a) radial section of a base with contrasted pattern of porosity and alignment of inclusions showing both the continuity between the base and the start of the body, and the adding of an inner peripheral coil; (b) fissure on the inner base at the junction between the inner peripheral coil and the base; (c) concentric parallel ribbed striations indicating the use of RKE to shape the bowls; (d) overthickness folded on the base; irregular topography of the base testifying to the placing of the base on a clay disc; (e) overthickness on the lower outer face due to the adding of an extra outer peripheral coil.

The clay pastes were tempered with coarse inclusions, mostly heterogeneous in nature. The bases were made of a clay disc with raised edges. An inner peripheral coil was placed against the edges (Figs. 19:a, b). The coils were placed inward with oblique joints of coils.

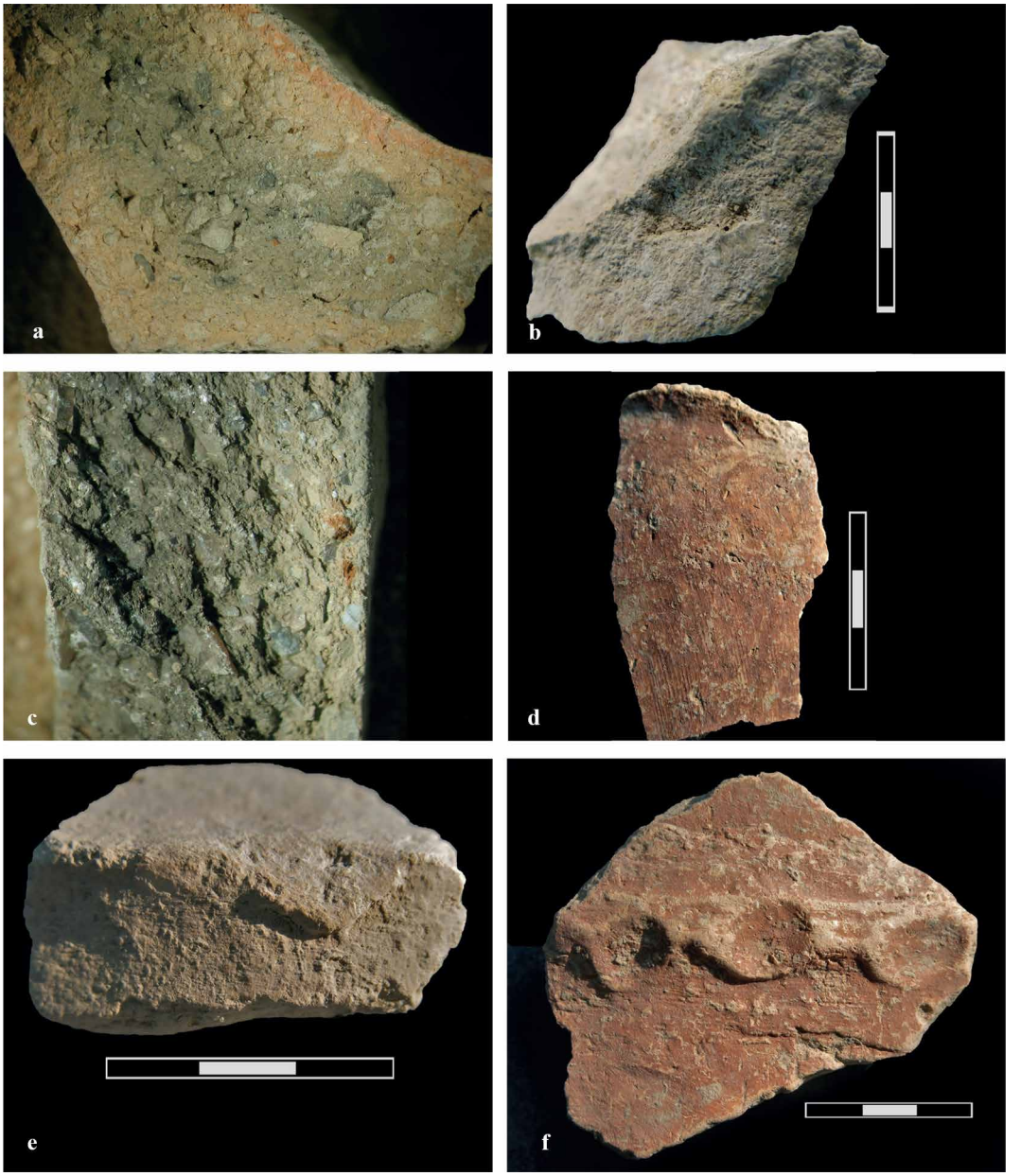


Fig. 19. Diagnostic features of the *chaîne opératoire* used for making EB IA vessels: (a) and (b) radial sections of bases with contrasted pattern of porosity and alignment of inclusions showing both the continuity between the base and the start of the body, and the adding of an inner peripheral coil; (c) porosity with an oblique pattern indicating coiling by internal apposition; (d) and (f) red lumpy surface testifying to a layer of clay coating covered by a red slip layer; (e) overthickness and folding of the outer peripheral coil on the lower body.

The coils were 1–2 cm thick, depending on the size of the walls. The coiling was done by spreading (Fig. 19:c). An outer coil was placed around the outer base. The same method of folding the overthickness of the outer peripheral coil against the lower body was observed (Fig. 19:e).

All the vessels were clay-coated and red-slipped (Fig. 19:d, f); 104 vessels, including 33 bases, have a red-slipped exterior, and 32 open vessels are entirely red-slipped. The vessels were fired in an oxidized atmosphere, as is evident from the pale surface of the walls. The colors of the radial sections can be described for the margins (outer and inner) and the core. They vary from outer and inner margins of the same pale color as the core, to strong color variation between the core and the margins, either pale margins with dark core, or pale outer margin with dark core and inner margin. The colors in the radial sections of the EB IA vessels seem to vary more than in those of the Late Chalcolithic period. However, this may not reflect a difference in firing techniques, but rather a different lenght of exposure during the firing.

Gray Burnished Ware

In total, 34 GBW sherds were examined, mostly body sherds; no bases were examined. The radial sections show that the coils are quite small (1.0–1.5 cm). The inner and outer surfaces were slipped with finely sieved clay. The diagnostic features are: ribbed striations, fluid microtopography (Fig. 20:b) and drying cracks (Fig. 20:d).

After applying the slip, the surfaces were shined, i.e., rubbed with a soft tool against the leather-hard or dry clay paste (Fig. 20:c). The shine appears in the form of narrow bands, suggesting that the shining movements were not sufficiently repetitive to cover the entire surface. The diagnostic features are: absence of facets, that is, rubbing the leather-hard clay pastes with a hard tool, a feature usually encountered when burnishing; multidirectional striations (Fig. 20:d); and still visible ribbed striations (Fig. 20:c). It should be noted that many of the GBW sherds had lost their shine, indicating that the shining was superficial.

Among the 34 sherds, two were beige. The radial sections are mostly gray, testifying to a reduced atmosphere. The presence of beige sherds may indicate a different control of the reduced atmosphere on a batch of vessels.

Black Burnished Ware

Eight sherds have a very shiny, deep black outer surface, rather than a gray one (Fig. 20:e). Six of these have a gray inner surface, and two have a beige inner surface. These sherds all exhibit numerous drying cracks from the application of a thick slip on their outer surface. The radial sections of seven sherds are gray, indicating that they were fired in a reduced atmosphere; one has a radial section with a pale-colored inner margin and inner wall, indicating that the inner surface was exposed to an oxidized atmosphere.

The slipped walls were highly shined, but not burnished, given the absence of facets and the still clearly visible ribbed striations from the application of the slip.

Red Burnished Ware

Five sherds were examined. The red slip, indicated by numerous drying cracks, was shined (as no facet indicates burnishing; Fig. 20:f). The inner walls were smoothed while the clay was wet, as indicated by the threaded striations and irregular microtopography. All the vessels were fired in an oxidized atmosphere.

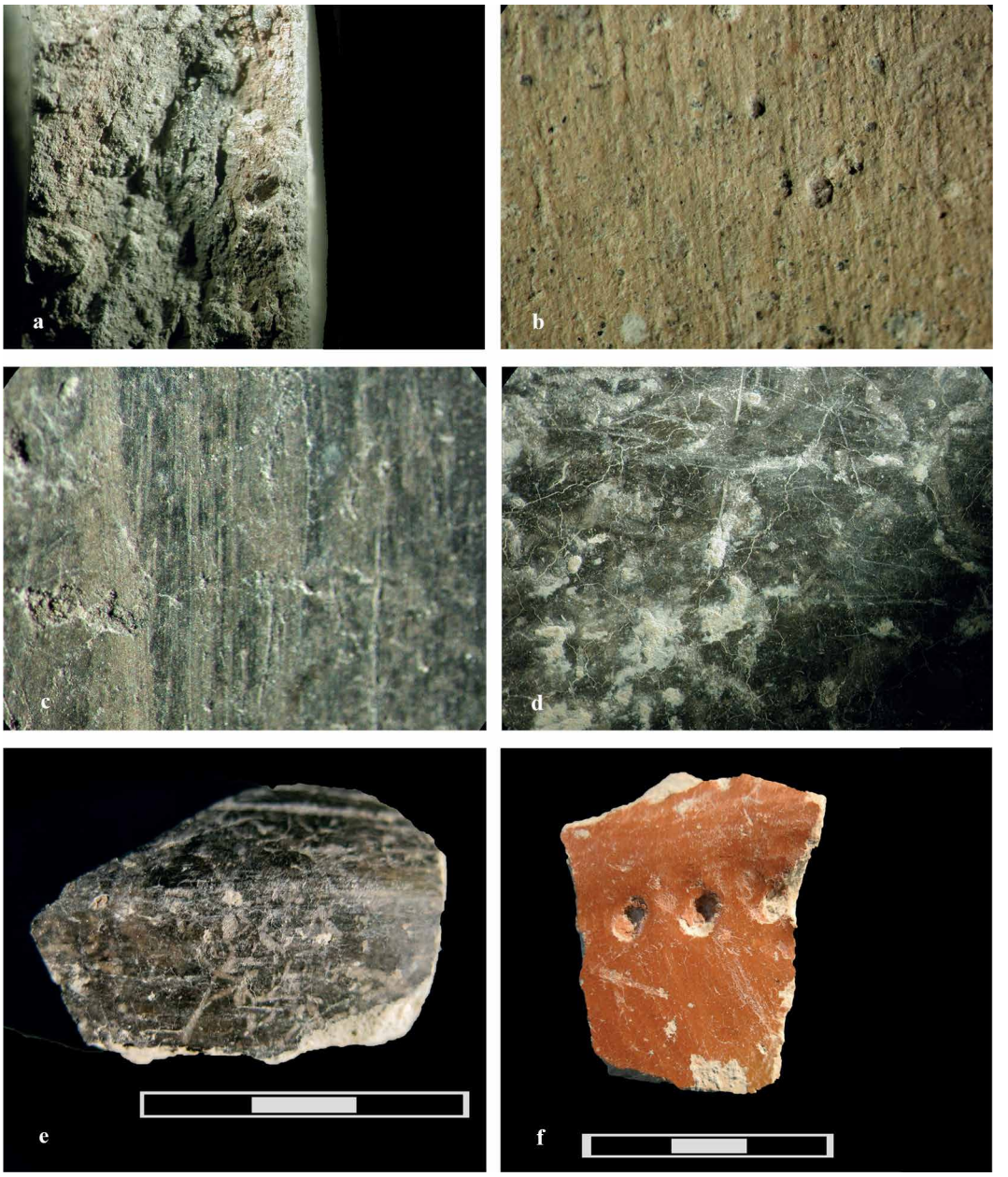


Fig. 20. Manufacturing features of GBW, BBW and RBW bowls: (a) radial section of GBW vessel showing porosity with an oblique pattern testifying to coiling by internal apposition; (b) ribbed striations, fluid microtopography and floating grains testifying to a clay slip applied on the GBW ceramics; (c) shiny bands of GBW vessel; (d) shiny surface of GBW vessel and drying cracks of the clay slip; (e) BBW and drying cracks; (f) RBW.

Petrographic Examination of the Gray Burnished Ware

Six EB IA Gray Burnished Ware (GBW) vessels were selected for petrographic study with the aim of identifying their provenance (Fig. 12:6, 12–14, 16, 17; Table 3). Thin sections were prepared and examined under a Nikon petrographic microscope at magnifications between × 20 and × 200, following standard procedure (Whitbread 1986). The mineralogical composition of the non-plastic inclusions in the fabric was determined, and the data were compared with the geological and pedological setting of the site and its vicinity, and with petrographic thin sections of pottery from other contemporary archaeological sites in northern Israel.

Geology and Pedology in the Vicinity

Kafr Kanna is located on the northern foothills of the Nazareth hill range, just south of the Tur'an Valley (see Plan 1). The Nazareth hills, particularly Har Yona, were formed by the tectonics and erosion of sedimentary rocks of Cenomanian to Eocene epoch, and comprise dolostone, limestone, chert, marl and chalk (Sneh, Bartov and Rosensaft 1998). The pedology of the excavation's immediate surroundings and northward downslope, comprise a complex of *terra rossa* soil (dominant), Mediterranean brown forest soil (secondary) and rendzina soil deriving from the mountains (less than 20%). Further upslope to the south and east, mountainous rendzina soil predominates, about 2 km to the south and west there are *terra rossa* soils, and 1.5 km north of the excavation, lies the alluvium of the Tur'an Valley (Ravikovitch 1969).

Results and Discussion

The petrographic examination indicates that all six samples belong to the same petrographic group with some minor variations in the sand-size, non-plastic inclusions and firing conditions. The samples are characterized by a calcareous and slightly ferruginous clay matrix containing c. 17% of foraminifers and rare, very dark brown to black opaque specks of iron oxide (Fig. 21). The identifiable foraminifers are *Globigerina*, *Rugogloblgerina* sp. (Fig. 21) and Heterohelix (Fig. 22), all dated to Senonian-Eocene ages. Apart from

Table 3. Inventory of Gray Burnished Ware Petrographic Thin Sections

Sample/Basket No.	Locus	Thin Section Fig.	Pottery Vessel Fig.
1005/1	106	21	12:16
1010/5	106	23	12:17
1024/2	112	24	12:13
1024/4	112		12:12
1024/5	112		12:6
1031/1	112	22, 25	12:14

the foraminifers, there are rare *echinoid* (sea urchin) spines (Fig. 23) and brachiopod shell debris.

The sand-sized non-plastic materials include predominantly rounded and sub-rounded grog fragments of the same composition as the examined sherds (Fig. 24). In smaller quantities, there are angular grains of crystalline calcite, mainly split along the cleavage planes and exhibiting typical optical activity (Fig. 25), and rounded grains of biogenic chalk, and voids resulting from burned-out organic material (Figs. 22, 23). There are also occasional sub-rounded grains of chert and nodules of silty ferruginous clay (Sample 1010/5). These non-plastic materials range between 0.5–2.0 mm (grog and voids), and 0.1–0.5 mm (all others), comprising between 7% (Sample 1031/1) and 15% (Sample 1005/1) of the sherd's volume.

The estimated maximum firing temperature is low, 700ºC, as the clay minerals in the matrix are optically active, and the crystalline structure of calcite is preserved (Fig. 25). Five of the six samples are of different shades of gray, due to varying reduction atmosphere

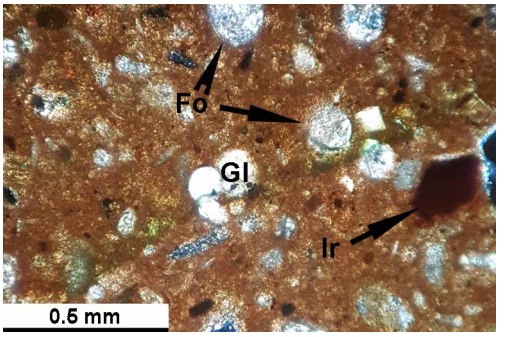


Fig. 21. Sample 1005/1. Microphotograph of thin section, cross-polarized light (CPL). Gl = Globigerina; Fo = foraminifera; Ir = speck of iron oxide.

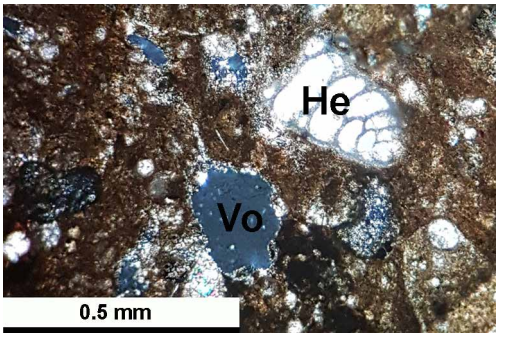


Fig. 22. Sample 1031/1. Microphotograph of thin section (CPL). He = Heterohelix; Vo = void.

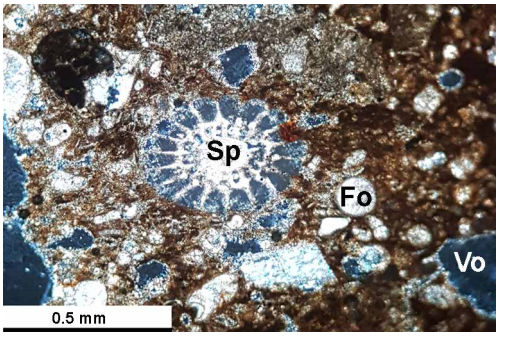


Fig. 23. Sample 1010/5. Microphotograph of thin section (CPL). Sp = echinoid spine; Fo = foraminifera; Vo = void.

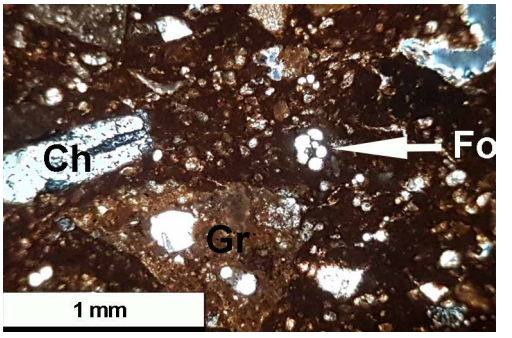


Fig. 24. Sample 1024/2. Microphotograph of thin section (CPL). Gr = grog; Ch = chert; Fo = foraminifera.

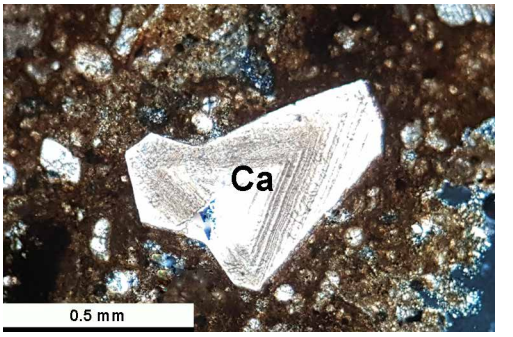


Fig. 25. Sample 1031/1. Microphotograph of thin section (CPL). Ca = calcite.

during firing. The exception is Sample 1024/5, which was fired to light brown. Samples 1024/4 and 1031/1 have slightly brownish layers (c. 1.5 mm thick) just below the exterior surface, perhaps resulting from opening the kiln at the end of the firing process.

The raw materials used to prepare the ceramic paste for the examined vessels would have derived from an area of exposed foraminiferous marl, biogenic chalk of Eocene–Paleocene age and *terra rossa* soil. Paleocene Taqiye Formation provides the best match for the marl, since, after firing, the sherds usually receive light colors of yellowish brown (beige, buff, etc.) or turn grayish brown to very dark gray in unoxidised atmosphere.

The Taqiye formations are known from many previously studied ceramic assemblages as good raw material used by ancient potters (Goren 1990; 1992; Goren and Zuckermann 2000; Shapiro, in prep.). This marl, however, cannot be used for provenance distinction, as its units frequently crop out throughout the Eastern Mediterranean, from Turkey through the Levant to Egypt and as far as Morocco, appearing in Israel, Jordan and Lebanon (Bentor 1966; Walley 1997; Sneh, Bartov and Rosensaft 1998; Alsharhan and Nairn 2003:379). Although the lithological properties of the examined vessels cannot be used for provenance, an attempt can be made to pinpoint the most likely place of their manufacture. The outcrops of Ghareb and Taqiye formations that would fit the GBW petrographic profile of the Kafr Kanna samples are located c. 700 m southeast of the excavation, on the northern slope of Har Yona (Sneh, Bartov and Rosensaft 1998).

The mineralogical composition of the examined GBW samples best matches that of the ‘marly group’ with grog as its major non-plastic material, described by Goren and Zuckermann (2000:169), who defined vessels of this fabric as originating from the Galilee. The only difference between the samples described by Goren and Zuckermann and the Kafr Kanna samples is the absence here of any basalt-derived minerals. Consequently, the composition of our samples is not identical to their ‘marly group’, and a different manufacturing site should be suggested.

A few technological issues are noteworthy. First, the firing process was mostly carried out in an unoxidized atmosphere to create the gray color of the vessels; whether accidently or not, in some cases oxygen seems to have entered the kiln at the end of the firing process, resulting in the slightly brownish layer on the exterior surface. Secondly, the voids mentioned above represent imprints of burned-out organic material, such as chaff, originally added to the paste as a temper and disappearing during the firing process. The low firing temperature (<800ºC), caused the incomplete burning of the charred organic and the dispersion of the carbon within the sherd, lending it additional shades of gray. Thirdly, the grog fragments and the crystalline calcite should be considered as 'temper', i.e., material deliberately crushed to the desired size and added to the clay paste. As noted above, the composition of the grog pieces is identical to that of the parent sherds, possibly indicating that pottery production waste may have been recycled already around 3600 BCE.

Comparative Petrography of the Late Chalcolithic and Early Bronze Age IA Vessels

Two randomly selected potsherds, one from a Late Chalcolithic and the other from an EB IA context, were thin sectioned and scrutinized under the microscope for comparison of their composition.

Late Chalcolithic Sample (Fig. 26)
The matrix of the sherd (L112, B1031/2) is calcareous foraminiferous marl. The non-plastic inclusions are c. 20% of the sherd volume, predominantly comprising sub-rounded 0.1–2.0 mm fragments of biogenic chalk, some containing micro-layers of iron oxides. The chalk is accompanied by occasional 0.5 mm pellets of ferruginous and silty clay (apparently *terra rossa* soil), and 0.1–0.3 mm grains of crystalline calcite. The quantity and quality of the chalk allow defining it as a temper, material deliberately crushed by the potter and added as dry powder to the clay, absorbing its water content. As a result, numerous cracks and hollows originated, most probably when the vessel was drying prior to firing. The cracks do not have a specific orientation, a feature characteristic of handmade vessels.

Firing temperature is estimated as 700–750°C for a relatively short time, since the calcite and clay minerals in the matrix are partly decomposed (for discussion on mineral changes in the firing process, see Shapiro 2012:103–104)

Early Bronze Age IA Sample (Figs. 27–29)
The matrix of the sherd (L106, B1010/11) is calcareous foraminiferous marl with minute specks of iron oxides. The non-plastic inclusions compose 2–3% of the sherd's volume, and comprise crystalline calcite, chalk, grog, fossil shells, specks of iron oxides, an alkali-olivine basalt grain, and pellets of the same matrix marl. All mentioned above range between 0.2 and 1.0 mm. There are occasional irregular elongated hollows, some of which are surrounded with grayish aureoles, indicating that they are negatives of some organic matter

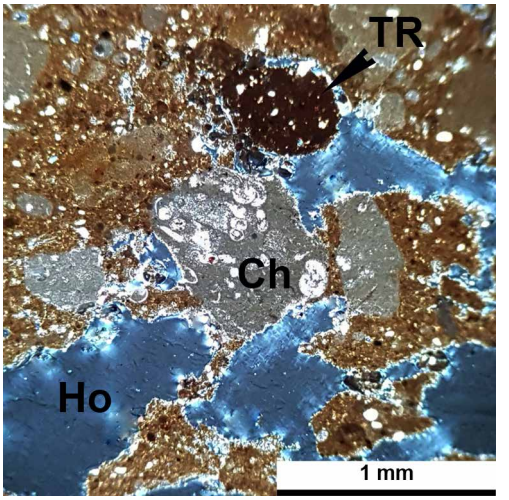


Fig. 26. Late Chalcolithic sample. Microphotograph of the thin-section (CPL). Ch = biogenic chalk; TR = nodule of *terra rossa*; Ho = hollow.

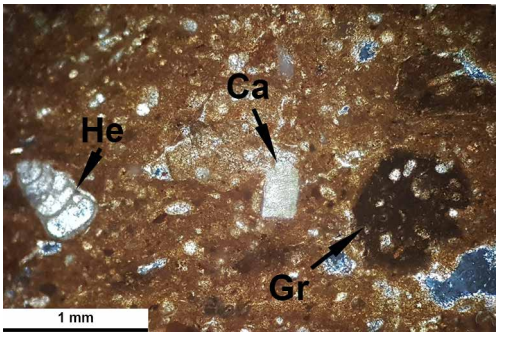


Fig. 27. Early Bronze Age IA sample. Microphotograph of the thin-section (CPL). Ca = calcite; Gr = grog; He = Heterohelix foraminifera.

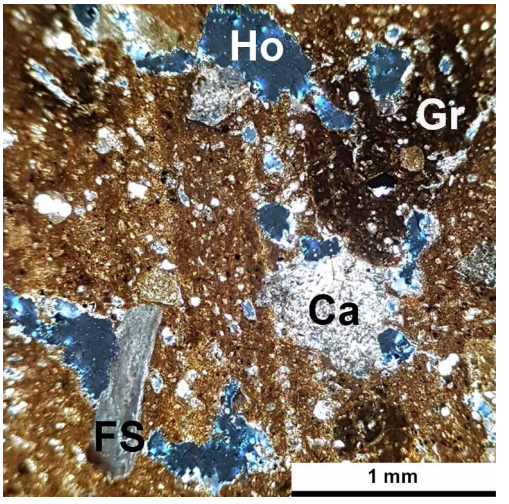


Fig. 28. Early Bronze Age IA sample. Microphotograph of the thin-section (CPL). Ca = calcite; FS = fossil shell; Gr = grog; Ho = hollow.

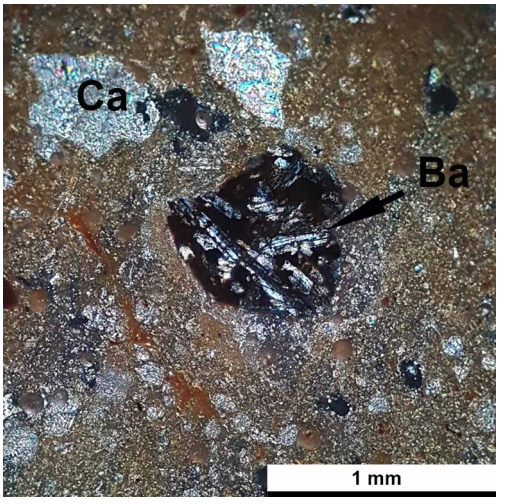


Fig. 29. Early Bronze Age IA sample. Microphotograph of the thin-section (CPL). Ba = basalt; Ca = calcite.

that disappeared during the firing process. The non-plastic inclusions are not indigenous to the parent raw material, and their small quantities suggest that they were added to the clay during its preparation. Firing temperature is estimated below 700°C, since the calcite and clay minerals in the matrix retained their optical properties.

Conclusions

The Paleocene Taqiye Formation, consisting of biogenic chalks and chalky marls, best matches the parent material for both samples. The single basalt grain observed in the EB IA sample may be an incidental inclusion from the potter's workplace environs.

The Flint Assemblage

The flint assemblage contains a total of 590 items, 193 of which came from Late Chalcolithic contexts, and 397 were associated with the EB IA occupation phase (Table 4). The artifacts show minimal signs of abrasion; most items present sharp edges and only a few are patinated, indicating minimal exposure to post-depositional processes. The raw material is quite homogeneous, almost all items were made of the opaque yellowish gray flint with pink or yellow veins, commonly found in the Eocene outcrops in the surrounding area (Sneh, Bartov and Rosensaft 1998; Ekshtain et al. 2014).

Table 4. General Breakdown of Flint Assemblage

Type	Late Chalcolithic		EB IA		Total	
	N	%	N	%	N	%
Primary flakes	15	11.1	32	14.9	47	14.0
Primary blades	2	1.5	2	0.9	4	1.2
Naturally backed flakes	9	6.7	7	3.3	16	4.8
Naturally backed blades	6	4.4	5	2.3	11	3.3
Flakes	68	50.4	119	55.4	187	55.5
Blades	17	12.6	25	11.6	42	12.5
Canaanean Blades	1	0.7	1	0.5	2	0.6
Bladelets	1	0.7			1	0.3
CTEs	14	10.4	23	10.7	24	7.1
Biface re-sharpening spalls	2	1.5	1	0.5	3	0.9
Total debitage	*135*	*100*	*215*	*100*	*337*	*100*
Fragments	5	15.6	25	21.2	30	20.0
Chips	3	9.4	35	29.7	38	25.3
Chunks	24	75.0	58	49.2	82	54.7
Total debris	*32*	*100*	*118*	*100*	*150*	*100*
Debitage	135	69.2	215	54.2	350	59.3
Debris	32	16.4	118	29.7	150	25.4
Cores	10	5.1	13	3.3	21	3.6
Tools	18	9.2	50	12.6	69	11.7
Hammerstones			1	0.3	1	0.2
Total	*195*	*100*	*397*	*100*	*590*	*100*

Late Chalcolithic Assemblage

The small assemblage (n = 193) comes from two loci (L112, L115) associated with the Late Chalcolithic occupation phase. The assemblage presents typical characteristics of Chalcolithic industries, with diagnostic elements, including two polished axes and one backed and truncated sickle blade (see, for example, Gilead, Hershman and Marder 1995; Rowan 2006; Milevski 2013; Brink et al. 2016). A Canaanean blade fragment found in the assemblage indicates some degree of mixture with the overlying EB IA occupation layer.

Cores and Core Trimming Elements

Cores constitute 5.1% of the assemblage, represented by 10 items (Table 5). Blade/bladelet cores are most common, comprising 60% of the cores in the assemblage. Of these, single platform cores are most frequent, utilizing a narrow front (n = 2), or displaying a pyramidal (n = 1) or semi-pyramidal (n = 1) shape. Other blade/bladelet cores indicate the use of two striking platforms, utilizing opposed, opposite or perpendicular sides of the core.

Core trimming elements are represented by 14 items, which constitute 10.4% of the total assemblage (Table 4). Typologically, they are equally divided between products of striking platform rejuvenations (core tablets) and products of removal surface rectifications. Core tablets were mostly produced through a blow to one of the core's lateral edges, which removed a segment of the striking platform. Surface rectification items are mostly ridge blades (n = 6), produced through a blow to the bottom of the core (n = 3) or through a hard blow to the striking platform (n = 3), often removing the whole length of the removal surface as well as a part of the striking platform. Of these, one retained more than 50% cortex on its dorsal surface, implying preliminary stages of core utilization. One additional item reflects the removal of a local interference from the removal surface.

Table 5. Late Chalcolithic Core Typology

Core Type		N	%
Blade/bladelet	Single platform	4	40
	Two opposed platforms	1	10
	Two perpendicular platforms	1	10
Flake	Single platform	1	10
	Two opposed platforms	1	10
	Two opposite platforms	1	10
	Multiple platforms	1	10
Total		*10*	*100*

Tools

Tools are represented by 18 items, constituting 9.2% of the assemblage (Table 6). Diagnostic elements include two bifacial tools and a sickle blade, together constituting almost 17% of the tools in the assemblage. Of the two bifacial tools, one is an unfinished axe, made on a small nodule (7.0 × 3.5 × 1.5 cm; Fig. 30:1) and the other is a polished and re-sharpened axe. The sickle blade is backed and both its proximal and distal edges are truncated. Other tool types in the assemblage include high frequencies of 'informal tools', such as the retouched or truncated items categories, indicating a dominance of the ad hoc component. Some preference toward the selection of flakes as blanks is indicated among the truncated items.

Early Bronze IA Assemblage

The EB IA assemblage consists of 397 artifacts, representing the main occupation period identified in the excavation (Table 4). Diagnostic artifacts include three Canaanean sickle blades, typical artifacts of Early Bronze Age industries. However, the presence of backed and truncated sickle blades and of three bifacial tools indicate some mixture of the flint items with the underlying Late Chalcolithic layer.

Cores and Core Trimming Elements

Cores constitute 3.3% of the EB IA assemblage. In contrast to the Late Chalcolithic assemblage, here cores designated for flake production are most common, among which, amorphous cores demonstrating the use of multiple striking platforms, are most frequent (Table 7). All blade and bladelet cores display the use of a single striking platform, utilizing a narrow front or displaying a pyramidal or semi-pyramidal shape. One core, demonstrating the use of multiple striking platforms shows evidence for a mixed production of bladelets and small flakes.

Table 6. Late Chalcolithic Tool Typology and Blank Selection

Tool Type		Naturally Backed Item	Flake	Blade	Core Trimming Element	Other	Not Identified	Total	
								N	%
Bifacial tools						2		2	11.1
Endscrapers				1				1	5.5
Sickle blades				1				1	5.5
Retouched items		2	1		1	1		5	27.8
Truncated items		1	4					5	27.8
Retouched and truncated items							1	1	5.5
Notch			1					1	5.5
Broken tools		1					1	2	11.1
Total	*N*	*4*	*6*	*2*	*1*	*3*	*2*	*18*	*100*
	%	*22.2*	*33.3*	*11.1*	*5.5*	*16.7*	*11.1*		*100*

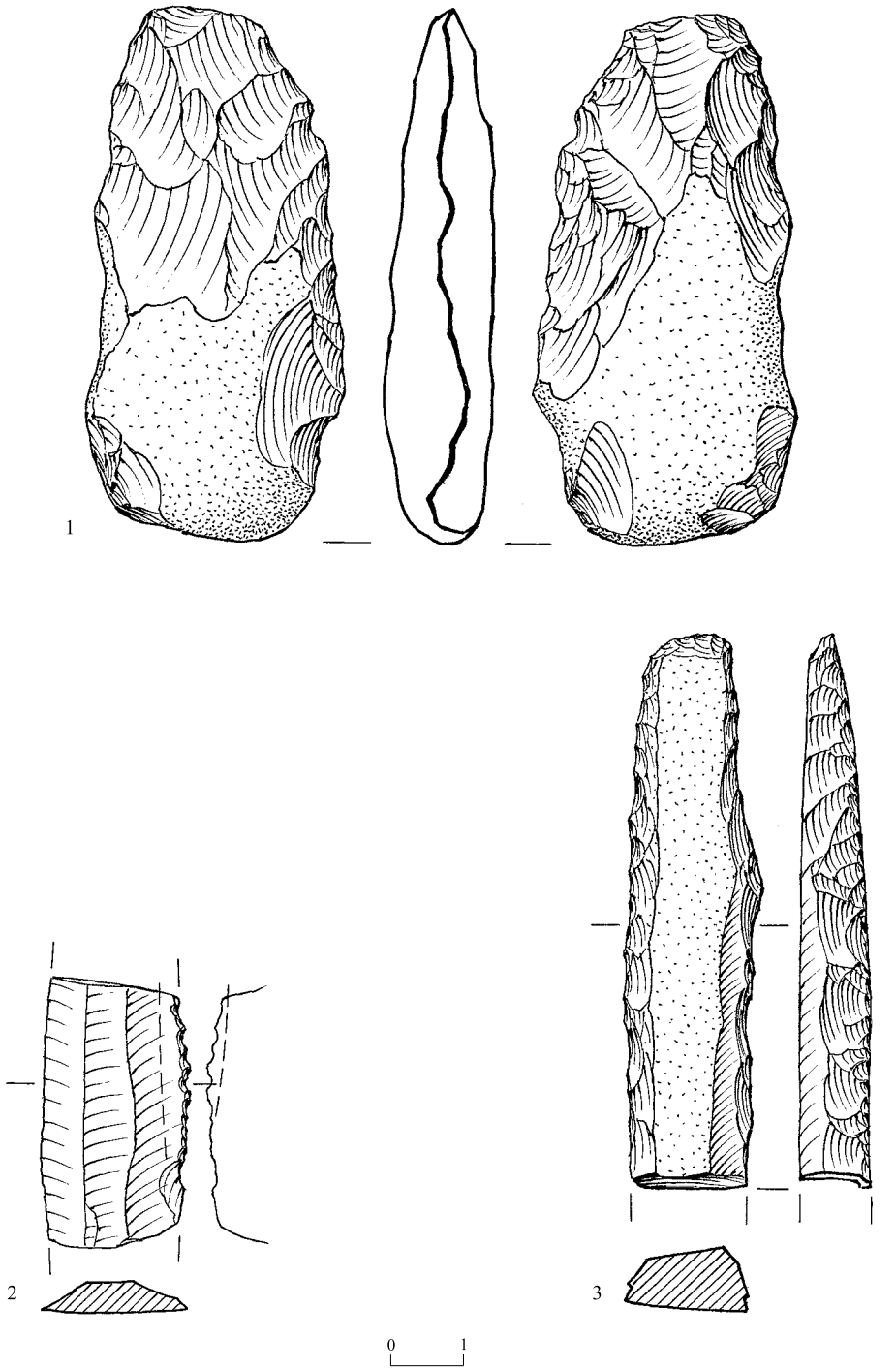


Fig. 30. Flint items: (1) partially complete axe, made of a small nodule;
(2) Canaanean sickle blade; (3) elongated tabular scraper with proximal edge broken.

Table 7. Early Bronze Age IA Core Typology

Core Type		N	%
Blade/bladelet	Single platform	4	30.8
Flake	Single platform	1	7.7
	Two, opposed platforms	1	7.7
	Multiple platforms	4	30.8
Mixed	Multiple platforms	1	7.7
Tested nodule	Multiple platforms	1	7.7
Core fragment		1	7.7
Total		*13*	*100*

Core trimming elements are represented by 23 items, constituting 10.7% of the debitage in the assemblage. These demonstrated various stages of core utilization, indicating on-site knapping oriented toward both flake and bladelet production. Surface rectification by-products are most frequent (n = 16; 70%), mostly demonstrating the removal of a ridge blade from the center of the removal surface or from one of its lateral edges. Four items are the result of a local interference removal. Core tablets, striking platform rejuvenation by-products, constitute 30% of the core trimming elements identified in this assemblage (n = 7). Three items (a core tablet and two ridge blades) are primary elements, representing the initial phases of core shaping.

Notably, there was no indication for the production of either Canaanean blades or tabular scrapers among the cores and core trimming elements. These items are often referred to as traded commodities, as they were mostly produced in designated workshops by specialized knappers (e.g., Rosen 1983; Shimelmitz, Barkai and Gophna 2000; Milevski 2013; Manclossi et al. 2016). The lack of evidence for the production of these items on site further supports the accepted model.

Tools

Tools constitute 12.6% of the EB IA assemblage (Table 8). Diagnostic artifacts include three bifacial tools, seven sickle blades and an elongated tabular scraper. The presence of bifacial tools implies some degree of mixture with underlying sediments, as they are considered to disappear at the end of the Chalcolithic period (e.g., Rosen 1997:93–98; Barkai 2011).

Bifacial Tools.— Bifacial tools, represented here by two axes and a chisel, are not typically found in Early Bronze Age industries, and are probably remnants of the underlying Chalcolithic industries.

Sickle Blades.— There are seven sickle blades, three of which were made of Canaanean blades (Fig. 30:2), a hallmark of Early Bronze Age industries. Another three are made of

Table 8. EB IA Tools Typology and Blank Selection

Tool Type		Primary Elements	Naturally Backed Items	Flakes	Blades	Canaanean Blades	Core Trimming Elements	Other	Not Identified	Total	
										N	%
Bifacial tools								3		3	6
Borer				1					1	2	4
Endscraper				1	2					3	6
Tabular scrapers		1								1	2
Sickle blades					4	3				7	14
Retouch			2	8	2		1		4	17	34
Back					2					2	4
Truncation		1	1	1	1		1		1	6	12
Denticulation				3	1					4	8
Notch				1					1	2	4
Varia								1		1	2
Broken tools									2	2	4
Total	*N*	*2*	*3*	*15*	*12*	*3*	*2*	*4*	*9*	*50*	*100*
	%	*4*	*6*	*30*	*24*	*6*	*4*	*8*	*18*		*100*

blades which are not of the Canaanean sequence, presenting an abruptly retouched back, as well as at least one truncated edge. While such sickles could be found in EB IA assemblages, they are more characteristic of Chalcolithic industries (Rosen 1997:44–60). In this specific context, these items can either be interpreted as part of the EB IA assemblage, or as intrusive elements originating from the underlying Late Chalcolithic layer.

Tabular Scrapers.— Finally, an elongated tabular scraper was found in the assemblage, with its proximal edge broken (Fig. 30:3). Tabular scrapers are a characteristic feature of both the Late Chalcolithic and Early Bronze Age assemblages, disappearing at the end of EB III (see, for example, Rosen 1983; 1997:75; Quintero, Wilke and Rollefson 2002; Fujii 1998). They are often referred to as traded items, markers of exchange systems, during the Early Bronze Age (e.g., Rosen 1983; 1997:71–80; Milevski 2013; Greenberg, Shimelmitz and Iserlis 2014). The current item (7.5 × 1.9 × 1.0 cm) displays a flat, cortical dorsal surface. Notably, it seemed to have been made of the local raw material, implying its production at a nearby locality.

A recent study attempted to correlate between techno-typological affinities and the chronological and cultural associations, based on the lithic assemblage of ‘En Zippori in Lower Galilee, Israel (Zutovski et al. 2016). According to this study, tabular scrapers with a flat, cortical dorsal surface and elongated tabular scrapers are more common in Early Bronze Age assemblages, whereas the tabular scrapers of the Chalcolithic industries tend

to be more convex or irregular in shape (Zutovski et al. 2016). According to the suggested typology, this tabular scraper is more characteristic of the Early Bronze Age than of the Late Chalcolithic industries.

Conclusions

The well-preserved Late Chalcolithic and EB IA flint assemblages retrieved from Kafr Kanna indicate that knapping activity, mostly using local raw material, took place on-site. Both the small Late Chalcolithic and the EB IA assemblages include items exhibiting diagnostic elements of the other period, indicating some degree of mixture, as can be expected in densely stratified sites. Nonetheless, in the Late Chalcolithic assemblage, higher frequencies of blade and bladelet cores are noted in comparison to the EB I assemblage, whilst only a single Canaanean blade was found. Similarly, EB IA characteristics, such as the dominance of flake cores, and the presence of Canaanean blades, are most common in the EB IA assemblage.

The EB IA assemblage, representing the main occupation layer excavated on site, displays attributes that are commonly associated with Early Bronze Age lithic assemblages, indicating an in-site focus on ad hoc flake industries while 'formal items' such as Canaanean blades and tabular scrapers were likely produced off site (e.g., Bankirer 2006; Greenberg, Shimelmitz and Iserlis 2014; Shimelmitz and Rosen 2014).

Ground Stone Tool

A single, perforated basalt ring/whorl was retrieved from the excavation (Fig. 31).

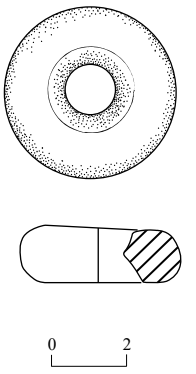


Fig. 31. Perforated basalt ring (L111, B1023).

Summary and Discussion

Four strata were distinguished at the site: Stratum 4, dating to the Late Chalcolithic period; Strata 3 and 2, to EB IA; and Stratum 1, sub-recent. The Stratum 4 Late Chalcolithic remains, exposed in a very small probe, consisted of a stone surface and an underlying fill (L112, L115); Wall 113, built of small stones, may also date to the Stratum 4 Late Chalcolithic period. The EB IA remains, comprising wall segments of three structures, were attributed to two strata: W102 and W108 belonged to two buildings attributed to Stratum 3, and the wall of a large double-apsed structure was attributed to Stratum 2.

The open forms of the small Late Chalcolithic pottery assemblage include small and medium-sized V-shaped bowls, a few fenestrated pedestal bowls and a large, handled basin. The closed forms include holemouth jars and a necked jar. Cornets and churns seem to be absent from the repertoire. Handles include both loop handles and a lug handle. The vessel surface treatments comprise the occasional application of a red slip or paint, whilst only two sherds exhibit incised decoration. The assemblage is attributed to the Late Chalcolithic, or the Ghassulian cultural aspect of the Chalcolithic period. The small assemblage precludes more specific dating, although the apparent absence of cornets and churns could point to the later Late Chalcolithic 2, rather than the earlier Late Chalcolithic 1 phase (for a tentative division of the Late Chalcolithic into two phases, see Brink 2013:53–54).

The EB IA pottery assemblage is a characteristic domestic repertoire. Open forms slightly predominate over closed shapes. Open forms include small, medium-sized and large bowls with incurved rims, frequently red-slipped, with only one bowl exhibiting an applied indented band. Basins invariably have indented rims, and they are sometimes red-slipped. Gray Burnished Ware bowls are common, mostly carinated and knobbed with flaring rims, representing a regional industry, attested from the northern Jordan Valley to the Jezreel Valley and beyond (see Greenberg, Rotem and Paz 2013:197). The holemouth jars mostly have indented rims, a few having an indented applied band below the rim. The necked jars are red-slipped, and the pithoi fragments almost all have externally applied, indented coil as a rope-like decoration around the neck, infrequently extending to the shoulder.

The limited architectural remains exposed in the excavation are probably part of the extensive Late Chalcolithic and EB IA settlement remains uncovered in several excavations carried out by the Israel Antiquities Authority since the 1990s within a radius of c. 200 m around the Kafr Kanna spring. The remains of an EB IA double-apsed building, and a few sporadic Late Chalcolithic features, were exposed in an excavation carried out in 2013, just 50 m north of the present excavation (A-6723; see Fig. 2; Ron Be'eri, pers. comm.). The EB IA structural remains and the pottery assemblage exposed in this small excavation, and elsewhere in Kafr Kanna, resemble those uncovered at the nearby site of Yiftaḥ'el Stratum II (Braun 1997:60–89), considered by the excavator to be "the type site for Early Northern EB I, especially for the architectural traditions which it embodies" (Braun 1997:207).

The technological analysis reveals that the same *chaîne opératoire* was employed to make the utilitarian vessels in the Late Chalcolithic and the EB IA assemblages. This

similarity indicates a phylogenetic connection between the two assemblages, testifying to the transmission between the Late Chalcolithic and Early Bronze Age populations of the way of making utilitarian ceramics, and thus of the same population. The EB IA Gray Burnished Ware is a new tradition, although the shapes (pedestalled bowls) are reminiscent of the Late Chalcolithic vessels. This new tradition, characterized by firing in a reducing atmosphere, could represent an innovation linked to the return of Late Chalcolithic (now EB I) groups to a region they had abandoned in the early fourth millennium BCE (Roux 2022). The few BBW and the RBW sherds retrieved require an analysis of their clay and slip to understand their place in the EB IA assemblage.

The mineralogical composition of the Gray Burnished Ware best matches the 'marly group' with grog as its main non-plastic material, coming from the Galilee, although a more specific location cannot be pinpointed. The petrographic analysis observation that the composition of the grog was identical to that of the parent sherds, and that it was deliberately crushed and added by the potters to the clay paste, may indicate the recycling of pottery production waste as early as c. 3600 BCE.

The small size of the excavation, and the absence of carbonized materials suitable for ^{14}C analysis, precluded determining whether there was a time gap between the Late Chalcolithic and EB IA strata, locally separated from one another by a c. 0.35 m thick, featureless soil fill, and if so, of what duration. Since to date, very few sites in the country have produced a vertical stratigraphy, whether continuous or not, from the Late Chalcolithic to EB IA (for example, Brink 2013), the findings at Kafr Kanna are a welcome addition to the archaeological record concerning the transition from the Late Chalcolithic to the early EB IA in central Lower Galilee.

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