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Lod (Newe Yaraq): A Late Roman Pottery Kiln and Pottery Neolithic A (Jericho IX/Lodian) Remains

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Introduction

The city of Lod is situated on a hill, c. 70 m asl, some 15 km southeast of Tel Aviv. It lies within the Lod Basin, in the border region between the lower Shephelah to the east and the Mediterranean coastal plain to the west (Fig. 1). The Lod Basin is within the catchment area of Naḥal Ayyalon (Arabic: *Wadi el-Kebir*) and is covered mainly with Pleistocene alluvial deposits. Naḥal Ayyalon runs on a south–north course in this vicinity, between the Eocene chalk hills of the Shephelah (Buchbinder 1969) and the modern city of Lod.

From December 1995 through January 1996, salvage excavations were carried out in the neighborhood of Newe Yaraq in the north of the city, in the vicinity of the ancient tell of Lod (map ref. 1908/6518), in preparation for expansion of the Newe Yaraq Junior High School (Fig. 2).[1] Many excavations have been conducted in this same neighborhood (Gopher and Rosenberger 1995; Gopher and Blockman 2004; van den Brink et al. 2015). The present site is situated on the north-facing slope of the hill, above an ephemeral, pebble-filled ancient streambed running in a north–south direction that can be discerned in Section 3–3 of Probe 2 (Fig. 3; Plan 3:7) incised into the reddish loam (*ḥamra*; Fig. 3; Plan 3:8) and alluvial deposits. The channel was active before and during the Pottery Neolithic A occupation of the site and then apparently silted up and changed course. It can also be discerned in Trench I (see below). Alluvial deposits characterize periods in which the channel shifted out of range of Probe 2 (Plan 3:6). At times, the stream moved local sediments (sand, silts and clays; Plan 3:3, 4, 10), while in other periods, it transported pebbles originating in the Shephelah hills and

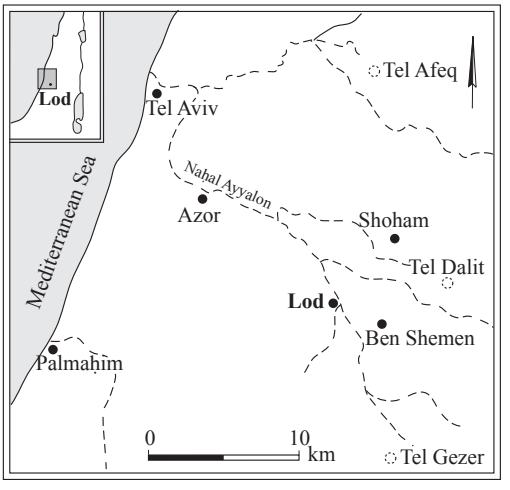


Fig.1. Location map.

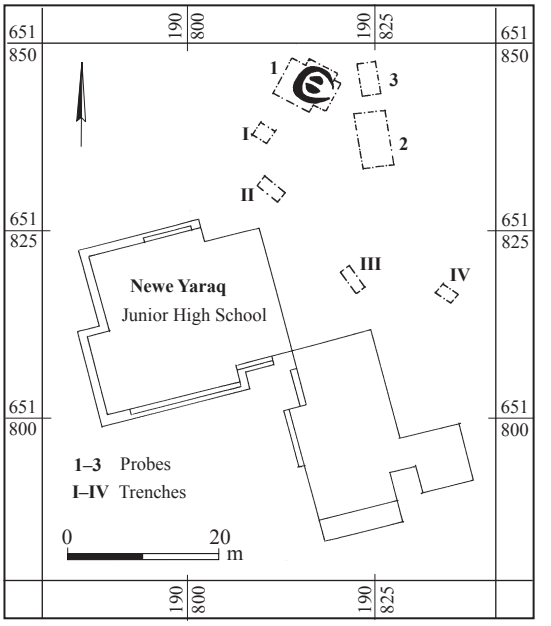


Fig. 2. Location of the trenches and probes.

Fig. 3. Section 3–3 in Probe 2.

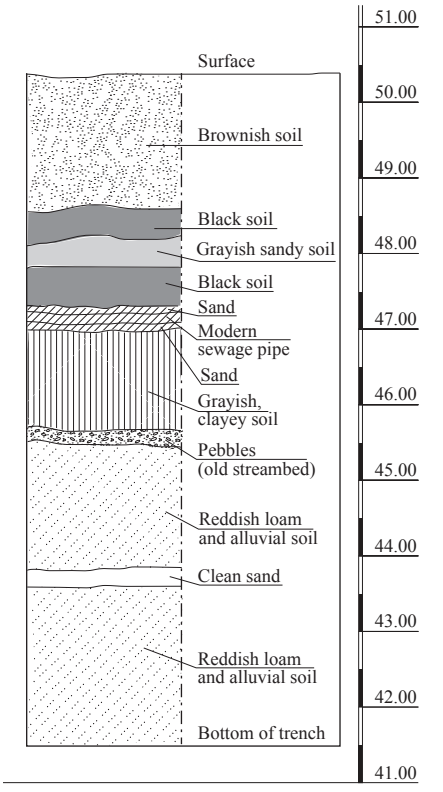
the Ayyalon streambed (Plan 3:7). Sometime during or after the Late Roman period (see below), the stream lost much of its momentum, causing deposition of laminated silts and clays (Plan 3:11),[2] which is characteristic of standing water (see also Probe 1, around the kiln; Plan 2).

THE EXCAVATION

The area under investigation, located immediately northeast of the local Junior High School (Fig. 2; see also van den Brink et al. 2015: Table 1:10; Fig. 2:10),[3] was examined by means of four mechanically excavated trenches (Trenches I–IV) and three manually excavated probes (Probes 1–3).

Trenches I–IV

The general stratigraphy of the site is provided by the northwestern section of Trench I (Plan 1; Fig. 2). The first 3 m consisted of recently deposited soils, from the surface level at 50.48 m asl down to a wide sewage pipe embedded in a thin layer of clean sand. Below this, a c. 1.5 m thick layer of grayish, clayey soil was deposited on top of a layer of pebbles (0.1 m).



Plan 1. Southern section of Trench I.

The latter represents an ancient stream that transported pebbles from the Shephelah and Naḥal Ayyalon. Considering its elevation, at

c. 45.62 m, it can perhaps be associated with a similar horizon identified in Probe 2 (see above).

Below this layer of pebbles, only sterile, undisturbed, alternating reddish loam and alluvial deposits were encountered down to a depth of c. 41.5 m asl, at which point the excavation ceased. At a depth of 43.65 m asl, this layer was locally interrupted by a c. 0.25 m thick layer of clean sand.

Trenches II–IV, situated within the school's playground (Fig. 2) and mechanically probed to a maximum depth of 3.5–4.0 m below surface level, yielded only modern refuse in a matrix of loose, brownish soil.

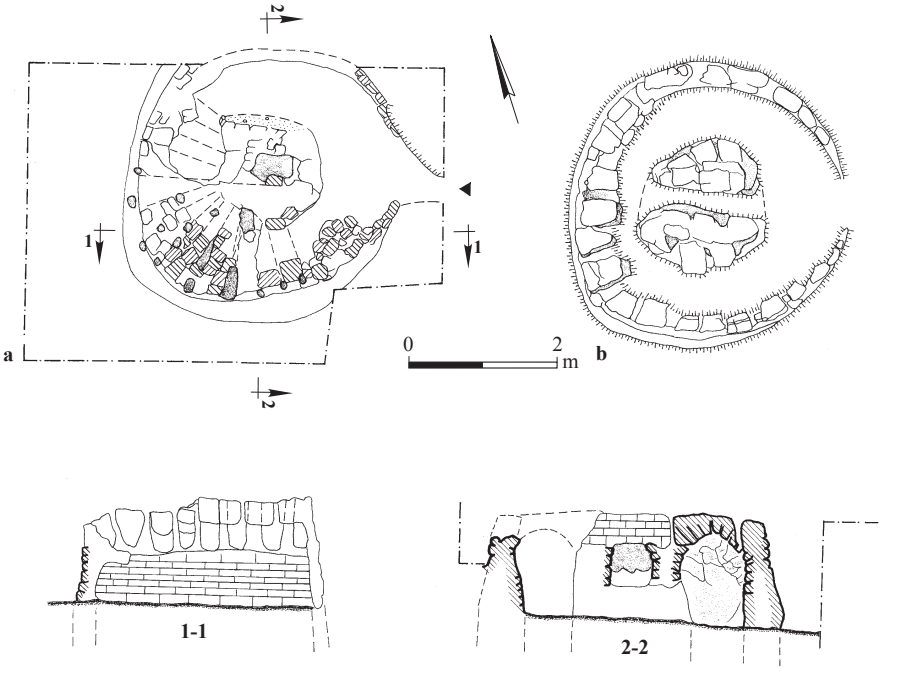
After removal of a small asphalt path, situated a few meters north of Trench I and at a lower elevation, some additional meters of recently deposited soil containing modern refuse were mechanically removed. At c. 47.50 m asl, two shallow pits containing many small sherds from various periods, pebbles, flints and bones (part of the excavation dump of a previous excavation in the area?) began to appear, as well as concentrations of highly fired, oxidized clay, possibly indicating ancient kiln activities in the vicinity. At this point, three probes (1–3) were designated for manual excavation.

Probe 1

Originally laid out as a 5 × 5 m square, Probe 1 yielded the remains of a Late Roman pottery kiln immediately below surface level. In order to uncover the kiln remains as completely as possible, the probe was extended to the north and east (Plan 2). The underground fire chamber of the kiln was cut into the otherwise sterile, reddish loam and covered by alternating clay and sand lenses indicating standing water conditions in post-Late Roman times (see above).

The Roman Pottery Kiln (Plan 2)

The pottery kiln is of the vertical or up-draft type (see, e.g., Vitto 1980). At least seven to



Plan 2. Probe 1, plan and sections: top view of kiln (a); top view of kiln after removal of the vaulted ceiling/stacking floor (b).

eight mud-brick courses of the circular outer wall of the lower chamber or firebox are preserved to a height of just over 1 m (Figs. 4, 5; Plan 2: Section 1–1; see also van den Brink 1999: Fig. 106). The external diameter of this chamber is 3.75 m, the internal diameter is 3 m. It has a round, mud-brick column (diam. c. 1.5 m) in its center, which supported a partially preserved, mud-brick vaulted ceiling that served as the floor of the upper, stacking

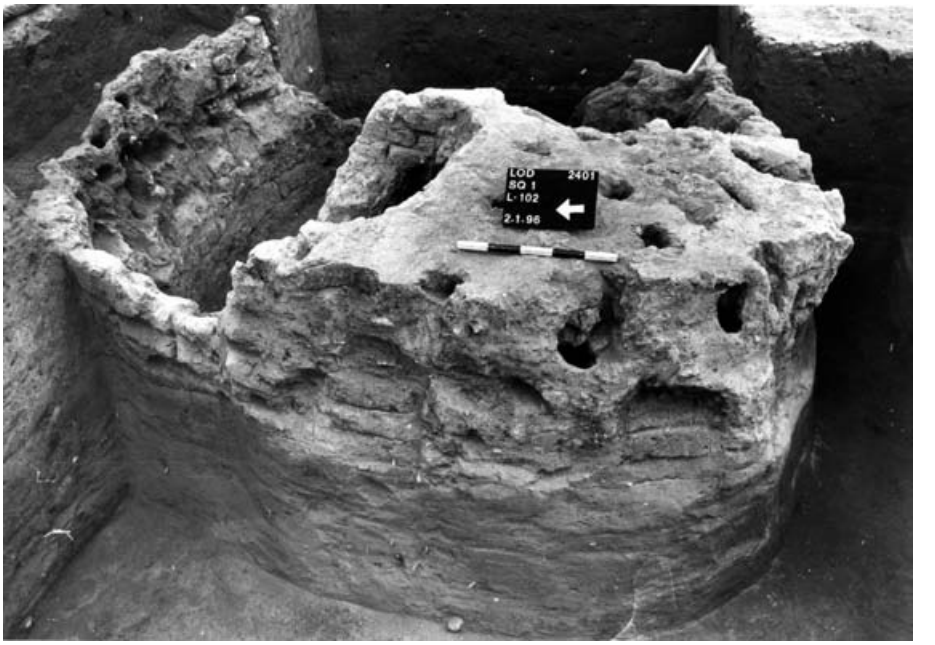


Fig. 4. The firebox and stacking floor of the pottery kiln, looking east.

Fig. 5. The pottery kiln after removal of the supporting arches and the stacking floor, looking north.

chamber (for comparable constructions, see, e.g., Vitto 1980; 1983–1984). The floor of the upper chamber must have been originally supported by some 20 converging arches (Plan 2:a; Figs. 5, 6). Every second arch was complete, starting from the outer wall of the fire chamber and ending against the central pillar, thus spanning a distance of c. 0.75 m. Each of the alternating arches spanned only half this distance, starting from the outer wall, but ending midway between two adjoining and slightly converging 'complete' arches. The complete arches consisted of fourteen trapezoidal-shaped mud bricks, each measuring 0.23 × 0.33 × 0.40 m (Fig. 7).

Fig. 6. Interior view of the firebox, showing some of the arches supporting the kiln's stacking floor.

Only a quarter of the upper, stacking floor, on which the pottery vessels were stacked, was preserved, still supported by five converging arches (three 'complete' and two 'half' ones). The empty spaces between the arches functioned as natural flue holes, through which the heat could rise to the upper chamber, of which no traces remained.

It is of interest to note that only the base of the central support column is solid. Built upon it are two short pillars, at a distance of 0.25–0.30 m from each other and roofed over by bricks. The narrow space between the pillars was constructed in line with the kiln's stocking hole on its eastern side (Plan 2: Section 2–2).[4] This inner space allowed the fuel to be spread out more evenly, even in the rear of the fire chamber, behind the column, farthest away from the kiln's opening. It may also have improved the air circulation and heat distribution in the fire chamber. Therefore, this constructional detail

Fig. 7. Two trapezoidal mud bricks used in the construction of the kiln's arches.

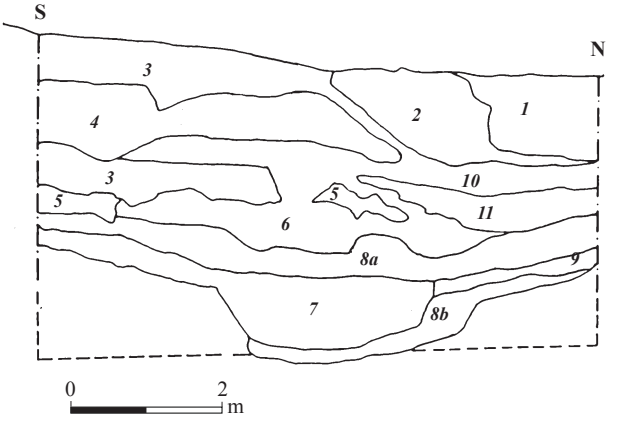
can be considered a technical improvement over earlier kilns, as better heat distribution in the fire chamber would obviously result in a more even firing of the wares in the stacking chamber.

The Fill of the Roman Pottery Kiln

Associated ceramics (including kiln wasters) were encountered only on the fire chamber floor and on the same level in the kiln's stocking hole. Due to natural, post-depositional processes (see above), most of the ceramics found in the fill of the kiln predate its actual construction, including sherds from the Chalcolithic, Early Bronze Age I, Middle Bronze Age II, Late Bronze Age II, Iron Age I and the Persian period (see below). They had apparently been washed in from higher parts of the tell to the south and west.

Probe 2 (Plan 3)

Probe 2, located c. 7 m southeast of Probe 1 (Fig. 2), measured 7.5 × 4.0 m. The upper layers (max. 2 m thick; Plan 3:1–7, 8a, 10, 11) contained mainly first–third-centuries CE Roman ceramics and kiln waste products (see below), apparently to be associated with the pottery kiln uncovered in Probe 1. This probe was devoid of any structural features. Due to post-depositional processes, minor quantities of ceramic sherds ranging from the Chalcolithic period through the Iron Age were also encountered here. In addition, a small assemblage of Pottery Neolithic A (PNA) ceramic sherds was collected, which spurred us to excavate this probe in smaller stratigraphic units of a maximum of 0.2 m in depth and to sieve all excavated material. However, *in situ* PNA remains were not encountered above Layer 8a (Plan 3). Only below these layers of mixed materials and sealed by the thick layer of *ḥamra* soil (Plan 3:8a), did we succeed in identifying a layer of undisturbed Neolithic remains, 0.1–0.2 m in depth, over an area of about 3 × 2 m (Plan 3:9; Loci 208–210, 212–216, 218, 220–222, 228). The remains consisted of a scattering of potsherds, two small, shallow



1 Dark gray sand
2 Brick material
3 Sand
4 Bricks, sand, sherds
5 Black soil
6 Black material, stones, sand, dark alluvial deposits
7 Pebbles
8 Red loam (*ḥamra*)
9 Dark brown soil containing *in situ* PNA sherds, bones, flint
10 Brick material, black soil, sand
11 Black-gray silt, clay, sand

Plan 3. Eastern section of Probe 2.

depressions and several dark spots, indicative of organic materials, together with a few flints and animal bones.

In the absence of any structural features, and given the fact that these artifacts were scattered over a restricted area in Probe 2 only, alongside an ancient, shallow streambed (Plan 3:7), it can be assumed that the remains represent an ephemeral living surface, probably to be associated with the much more substantive, *in situ* Neolithic remains located somewhat farther southwest, excavated in 1992 by Gopher and Rosenberger (1995; Gopher and Blockman 2004; see also van den Brink et al. 2015: Fig. 2:8), today covered by the Newe Yaraq Junior High School. *In situ* PNA remains were also encountered in rescue excavations by Radwan Badhi and Eli Yannai (pers. comm.) some 120 m southeast of the same school, and by Miriam Avissar (1998), 400 m further to the southeast (see van den Brink et al. 2015: Fig. 2:13, 14).

This thin layer of PNA material rests on sterile loam (Plan 3:8b), the same kind of soil encountered in the lower part of Trench I and Probe 1. This situation is in contrast with that at the above-mentioned sites, where the PNA remains rested on sand dunes.

Probe 3

A third probe, measuring 2.5 × 4.0 m, was opened a few meters north of Probe 2 (Fig. 2), with the aim of exposing further *in situ* Neolithic remains. However, due to time constraints, it was not possible to excavate more than the top layer of this probe, containing, as in Probe 2, mainly Roman potsherds and kiln waste products.

THE FINDS

THE ROMAN PERIOD

Pottery[5]

The Roman pottery derived either from the floor of the pottery kiln (Probe 1), or from the upper layers in Probes 2 and 3, which also contained kiln waste products and slags associated with the kiln. No complete shapes were recovered; 386 diagnostic sherds were tallied.[6] Representative sherds are illustrated in Figs. 8–11, in typological order from open to closed shapes.

Bowls (58 rims) are the second largest group in the ceramic assemblage after jars (see below). Notable are two rolled-rim fragments decorated with rouletting on the exterior (Fig. 8:1, 2), and three additional body sherds of similar ware (Fig. 8:3–5), representing Jerusalem rouletted bowls. Slightly below the rim is a ridge, lending them a distinctive profile. Such bowls date from the late third–early fourth through fifth centuries CE (Magness 1993:186).

Basins, comprising the third most common vessel type in the assemblage, have an upward-angled rim with ridges or rills in its upper surface (44 rilled-rim fragments can be attributed to this type), straight or slightly rounded walls, and either a rounded or flat base (Fig. 9:1–3). The ware is well-fired and the surface color is usually light brown. They first appeared in the late third–early fourth centuries CE, and continued well into the sixth century (Magness 1993:203, Nos. 3–5).

The next most common vessels are casseroles (18 rims, 4 handles) and cooking pots (12 rims, 13 handles). The casseroles have either a flat or, as in the examples reproduced here (Fig. 9:4, 5), a beveled rim, and two twisted, horizontal handles, sometimes pulled upward. They are made of characteristic thin, brittle, red-brown gritty cooking ware, frequently with thin, narrowly spaced ribbing on the exterior. In all our examples, the characteristic carination of the wall is not preserved (see Johnson 1988:200, Form 1, Fig. 7-43: No. 630). Only a few casserole lids were identified; they are made of the same ware, with a low convex shape and beveled rim to fit the cooking vessel (Zevelun and Olenik 1979; Wolff 1997). In our examples, the exterior surface is plain (Fig. 9:6), but others may be ribbed or combed (Johnson 1988: Fig. 7-44: No. 640; Magness 1993:215, No. 6). The casseroles first appeared

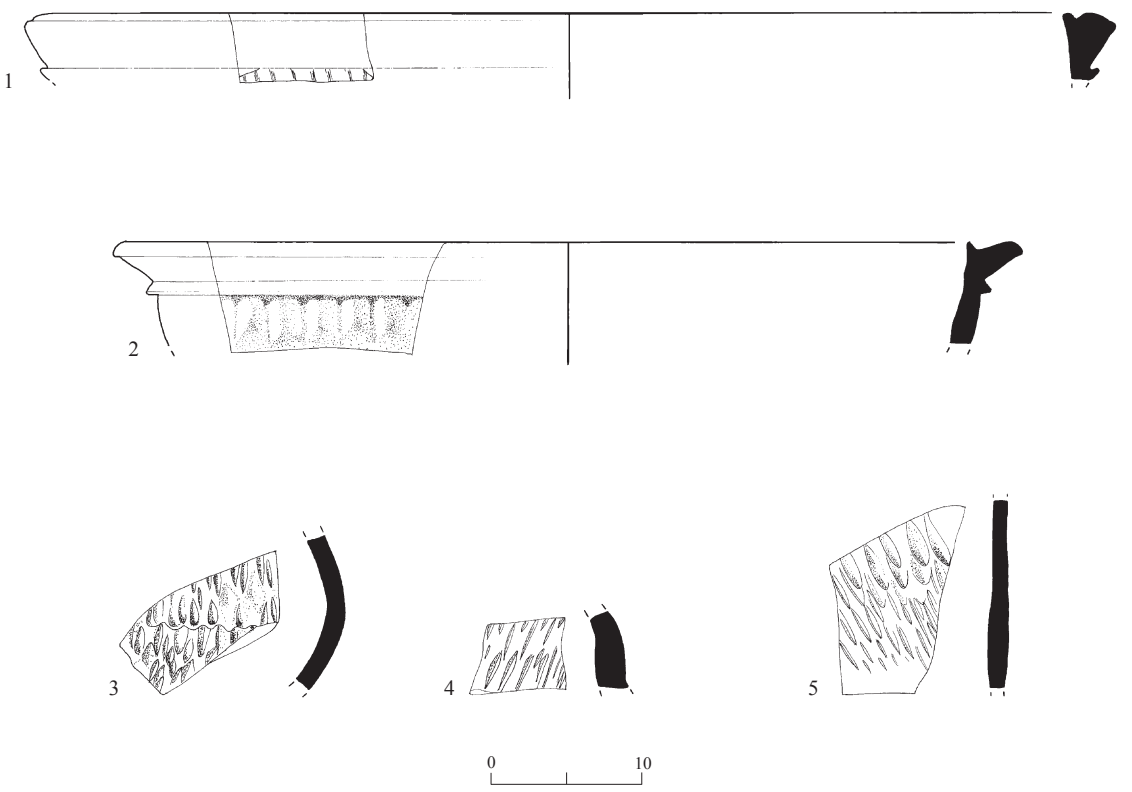


Fig. 8. Roman pottery: bowls.

No.	Locus	Basket	Description
1	301	3001	Red; fine clay; few small, white grits; red-slipped int. and ext.; rouletted
2	227	2047	Red; white grits common; red-slipped int. and ext.; rouletted
3	201	2001	Red; fine clay; few small, white grits; red-slipped int. and ext.
4	301	3002	Red; fine clay; few small, white grits; red-slipped int. and ext.
5	304	3006	Red; fine clay; few small, white grits; red-slipped int. and ext.

in the late third–early fourth centuries CE and continued into the eighth–ninth centuries CE.

The cooking pots, made of the same red-brown, gritty ware, have a grooved, slightly thickened rim and a short neck with two small loop handles drawn from the rim to the upper shoulder. The transition from the neck to the ribbed shoulder is sharp (Fig. 9:7). The cooking pots are chronologically more sensitive than the casseroles (Magness 1993:211–214), dating from the second to third centuries CE (Johnson 1988:190, Fig. 7-35; No. 540 [third century CE]; Magness 1993:216, Form 1, Variant A [second–third centuries CE]).

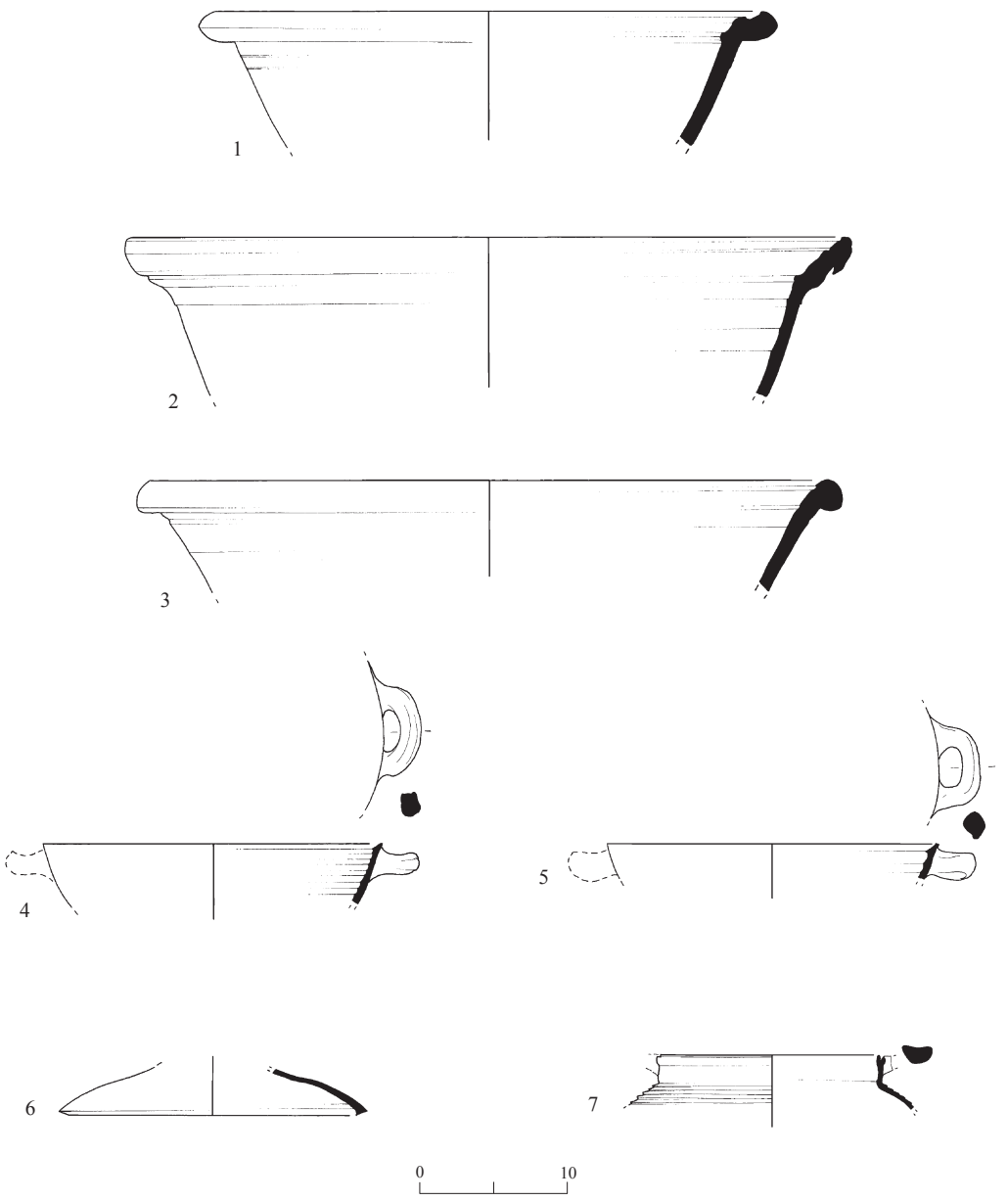


Fig. 9. Roman pottery: basins, casseroles and a cooking pot.

No.	Type	Locus	Basket	Description
1	Basin	216	2035	Light brown; few small white grits
2	Basin	227	2047	Light brown; few small white grits
3	Basin	111	1031	Light brown; few small white grits
4	Casserole	301	3001	Red-brown; gritty
5	Casserole	301	3001	Red-brown; gritty
6	Casserole lid	300	3000	Red-brown; gritty
7	Cooking pot	301	3001	Red-brown; gritty inside; grayish-black ext.

Most common in the assemblage are sherds belonging to a single type of storage jar (176 rim fragments, 53 handles), which, in view of the pottery kiln's location in the city of Lod (Classical Lydda), can be considered as successors of the 'Lyddan jars' mentioned in Talmudic literature.[7] This type possesses a ribbed, bag-shaped body with a rounded base and two ring handles, and is particularly characterized by a folded rim and a ridge or collar at the base of the neck (Fig. 10). These jars are very common at Late Roman sites in the region, dating to the second–fourth centuries CE (Johnson 1988:214–219, Fig. 7-52: No. 787; Magness 1993:223, Storage Jars Form 3).

Only two examples of other jar types (Fig. 11:1, 2) and two amphoras (Fig. 11:3, 4) were found. A fragment of a wine amphora with

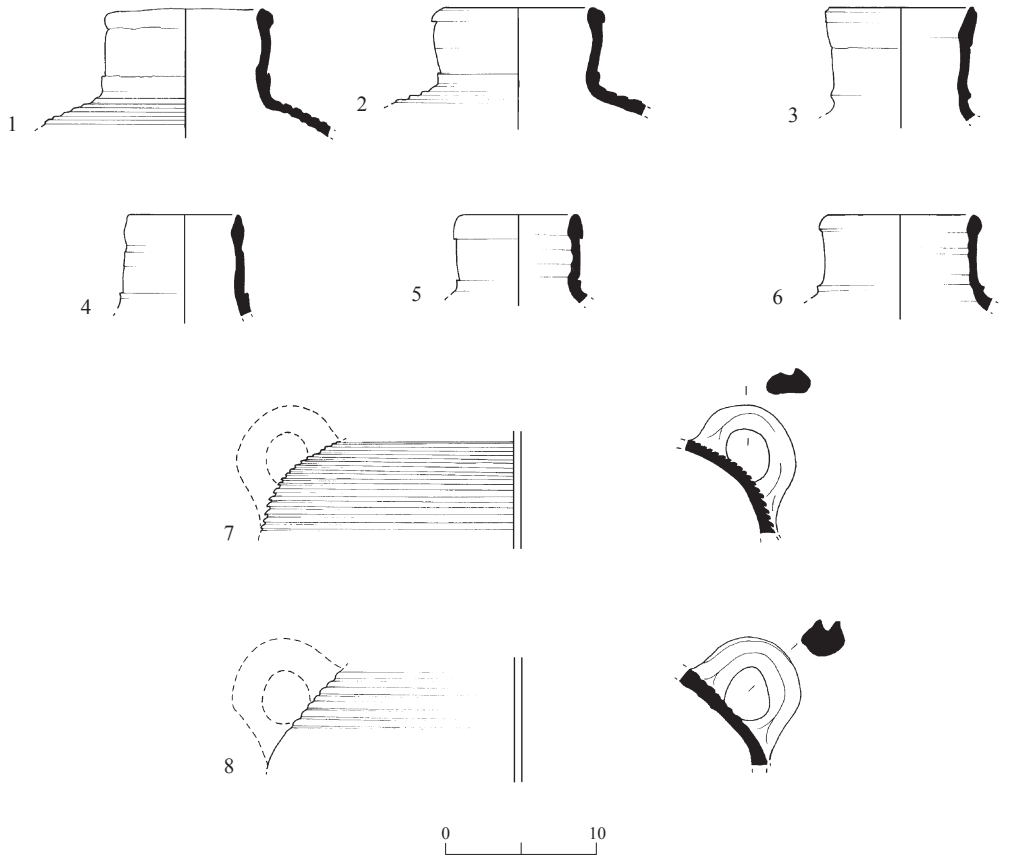


Fig. 10. Roman pottery: storage jars.

No.	Locus	Basket	Description
1	202	2002	Red-brown; few small white grits; well-fired
2	204	2004	Red-brown; few small white grits; well-fired
3	102	1017	Red-brown; few small white grits; well-fired
4	102	1012	Red-brown; few small white grits; well-fired
5	301	3002	Red-brown; few small white grits; well-fired
6	301	3001	Red-brown; few small white grits; well-fired
7	204	2004	Red-brown; few small white grits; well-fired
8	206	2006	Red-brown int.; yellow-green ext.; few small white grits; over-fired

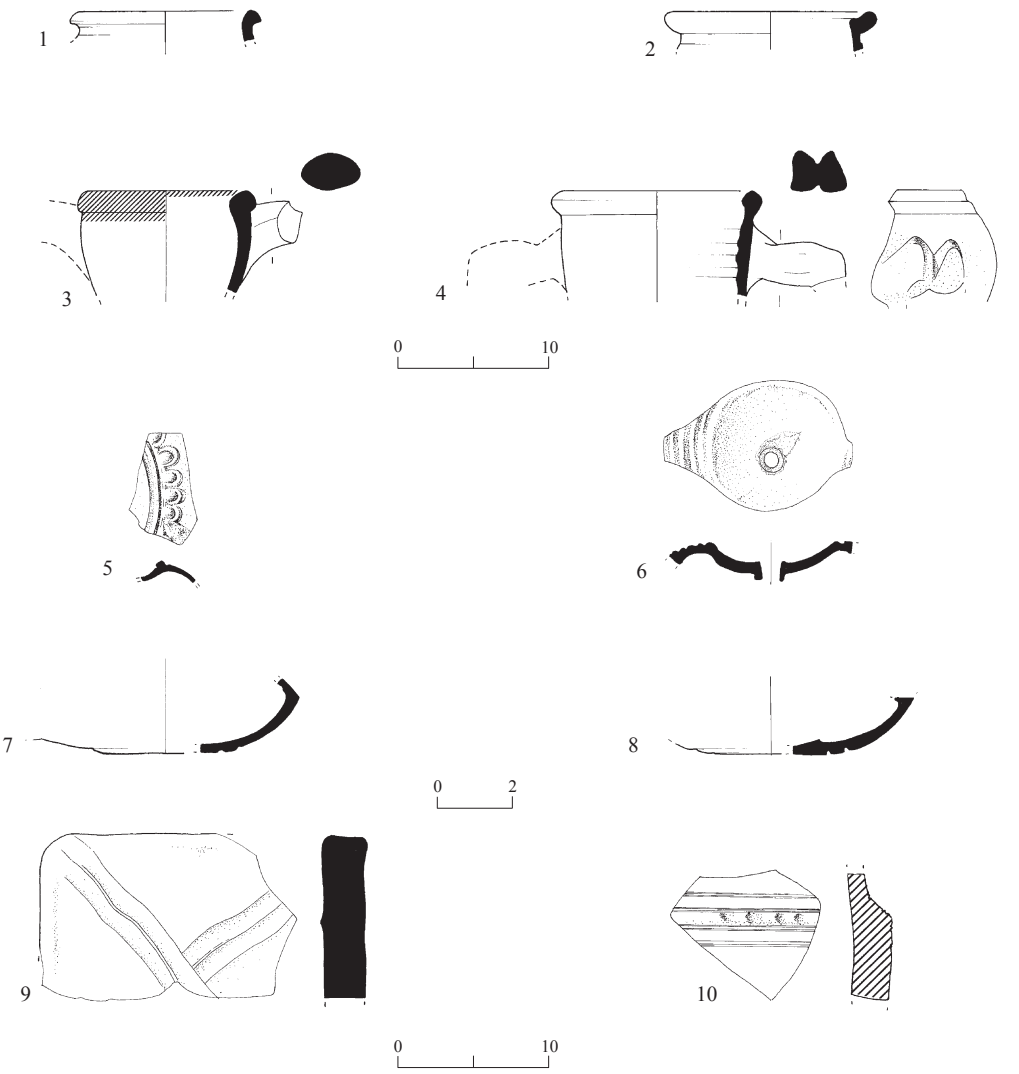


Fig. 11. Roman finds: Jars, amphoras and lamps, and miscellaneous.

No.	Type	Locus	Basket	Description
1	Jar	104	1008	Brown-red; very small, white grits
2	Jar	102	1024	Light red core and int.; cream-white ext.; well-levigated clay
3	Amphora	112	1030	Reddish brown; few small white grits; red-slipped rim
4	Amphora	204	2008	Reddish brown; very fine clay; highly fired
5	Lamp	301	3001	Light brown; few small white grits
6	Lamp	301	3001	Light brown; well-levigated clay
7	Lamp	301	3001	Reddish brown; few small white grits
8	Lamp	301	3001	Light brown; few small white grits
9	Roof tile	204	2011	Reddish brown; white grits; well-fired
10	*Qalal*	204	2011	Soft limestone; well-polished ext.

double handles dates to the Early Roman period (Fig. 11:4), from the late first century BCE to the middle of the second century CE (Peacock and Williams 1986:105–106). The example in Fig. 11:3 dates to the second–third centuries CE (Bar-Nathan and Adato 1986: Fig. 1:15).

Four lamp fragments (Fig. 11:5–8) were recovered. The example in Fig. 11:5 is a rim fragment with a necklace of ovolos. The upper part of the volute has a circle continuous with the ovolo (Rosenthal and Sivan 1978: Fig. 115; see also Wexler and Gilboa 1996:116–120). According to Loeschcke (1919:228–232, Type V), this type first appears in the second half of the first century CE, with several examples continuing into the third century CE. A fragment of a plain discus is surrounded by five concentric circles, and has a plain, central filling hole (Fig. 11:6; Rosenthal and Sivan 1978: Fig. 40). The lower parts of two lamps (Fig. 11:7, 8) have slightly raised base rings.

A date in the Late Roman period, third century CE, for the bulk of the ceramic materials uncovered at the site can be assumed. Although individual pottery types within the assemblage may have had much wider chronological ranges (well into the sixth century CE), the assemblage as a whole points to a third-century CE date. Most decisive for establishing such a date is the presence of the storage jars with a folded rim and a ridge or collar at the base of the neck, which comprise c. 50% of the ceramic assemblage, and the large, deep, rouletted bowls with a ridged rim.

Miscellaneous Finds

Ceramic Roof Tile.— A single fragment of a flat roof tile, or *tegula,* with a plain rim (Fig. 11:9) was found. The upper surface of this tile is distinguished by two pairs of shallow, parallel grooves perpendicular to each other, made by drawing two fingers over its wet surface. This tile is similar to Type A tiles from Tel Kison (Landgraf 1980:85–87, Fig. 27:21, 22). In Israel, roof tiles first appeared in the early first–second centuries CE (Landgraf 1980:83–89).

Stone Vessel.— Of particular interest is a shoulder fragment of a large stone jar or krater (Fig. 11:10). It is made of *qirṭon* (soft limestone) and was produced on a lathe (Magen 2002:130). On the exterior, four parallel incised lines are preserved. Additional ornamentation was created by four small holes drilled between the second and third lines (Magen 2002: Fig. 3.38:3). Stone vessels of this kind (Hebrew: *qalal*) are a reliable indicator of Jewish presence at the site (Cahill 1992:207–209; Magen 2002:80–90). They first appeared in the second half of the first century BCE, becoming most popular at the end of the first century CE, and disappearing from Jerusalem after the destruction of the Second Temple (70 CE). However, they continued in use in the Judean Desert and the Judean Shephelah until the Bar Kokhba Revolt (Magen 2002:162). In light of the general date for the pottery kiln and associated finds at this site, it would appear that this fragment is residual.

THE POTTERY NEOLITHIC A PERIOD

Pottery[8]

Though limited and fragmentary, this pottery assemblage yields complementary information on the unevenly documented pottery industry of a later phase of the Pottery Neolithic A period (PNA), referred to as Jericho IX and, since 1993, also termed Lodian (Gopher and Gophna 1993; Gopher and Blockman 2004). Technical innovation, evidenced by the use of grog (see below, Cohen-Weinberger: Group A), together with pottery-making traditions, such as sequential slab construction, provide insights into PNA pottery production in this region. The selection of raw materials, and the methods and sequences of manufacture, are here considered in an attempt to at least partially reconstruct the production process and to outline the possible significance of the technical choices.

This assemblage comprises 390 pottery sherds. The estimate of a minimal number of 30 vessels is based on vessel rims and bases (n = 47), which represent only 12% of the total

assemblage. The sherds were damaged by the post-depositional environment, most probably saline sediments.

Clays and Technology

The Pottery Neolithic potters had a marked preference for highly carbonatic clays, and the results of petrographic analyses on sherds of this assemblage confirm the almost exclusive use of such clays (Goren 1992:341; 2004:54; see Cohen-Weinberger, below). The source of the carbonatic matrices and most of the mineral inclusions are found in the geological vicinity of Lod (see Cohen-Weinberger, below).

Pottery manufacturing processes can be observed in the fractured zones of the sherds. While a combination of shaping methods cannot be ruled out in the production of complete vessels, many of the potsherds retrieved from the present excavation provide evidence of sequential slab construction. All the fragments of bases attest to slab construction, and some fractures show two or three overlapping slabs of slightly different colored clay, the joints identified by a void left by the burnt-out vegetal temper.

The method of sequential slab construction is a technology that was practiced throughout the ancient Near East during the Pottery Neolithic period (Vandiver 1987), and in Palestine it continued in use into the Early Chalcolithic period (Commenge 2006).

The less-common coiling method of pottery construction is evident in only one sherd from the present assemblage: the medial fragment of a pedestal vessel (Fig. 15:10). A coil-made sherd from Jericho Stratum IX (PNA) was published by Amiran (1965:245, Fig. 3), and another has been recorded in the Dhr'a assemblage (Bennett 1980: Fig. 7:6). This technique was also noted in the Yarmukian assemblage of Jebel Abu Thawwab (Obeidat 1995:20).

Finally, one large fragment of a shallow bowl shows non-distinct, amorphous fractures (Fig. 16:1). The reconstruction of a rounded, convex base is probable, and the shape of this vessel suggests it was molded in a hemispherical receptacle. Molding of bowls, or of the lower part of a vessel, is well-recorded for the second half of the sixth millennium (van As and Jacobs 1989:216–219).

The base of the coil-made pedestal vessel (Fig. 15:10) bears a textile impression that was probably impressed during the manufacturing process, while the vessel was still wet (see Schick, below).

The bulk of the potsherds (91%) were smoothed inside and out, a treatment that interferes in differentiating between open and closed shapes when considering non-diagnostic sherds. This smoothing process was the same whatever the quality of the clay matrix or its tempering.

The fragmentary base of the pedestal vessel mentioned above (Fig. 15:10) displays an unusual surface treatment. Its exterior was coated with a grayish slip, similar in quality to the clay matrix of the vessel, but it seems to have been mixed with a waxy substance, lending the surface a slightly lustrous appearance. This waxy substance may be related to the vessel's contents (Charters et al. 1995).

Typology

Due to the fragmentary nature of the assemblage, which yielded 47 diagnostic sherds, only a general classification, rather than a comprehensive typology, can be proposed. In general, each vessel category provides a size range that may indicate a standardization of vessel sizes within the assemblage. The decorated sherds, mostly small sherds, are presented in Fig. 16.

Open Vessels

Shallow Bowls with Rounded Walls (Figs. 12:1–3; 16:1).— In general, the diameter of the bowl can be estimated as three times its height, ranging from 11 to 21.5 cm. Two bowls are slipped and burnished inside and out (Fig. 12:1, 2); one seems to have had a thick disc base or, alternatively, a ring base or pedestal (Fig. 12:2), like that in Fig. 15:9. One shallow bowl with a rounded base has a red-brown painted design (Fig. 16:1).

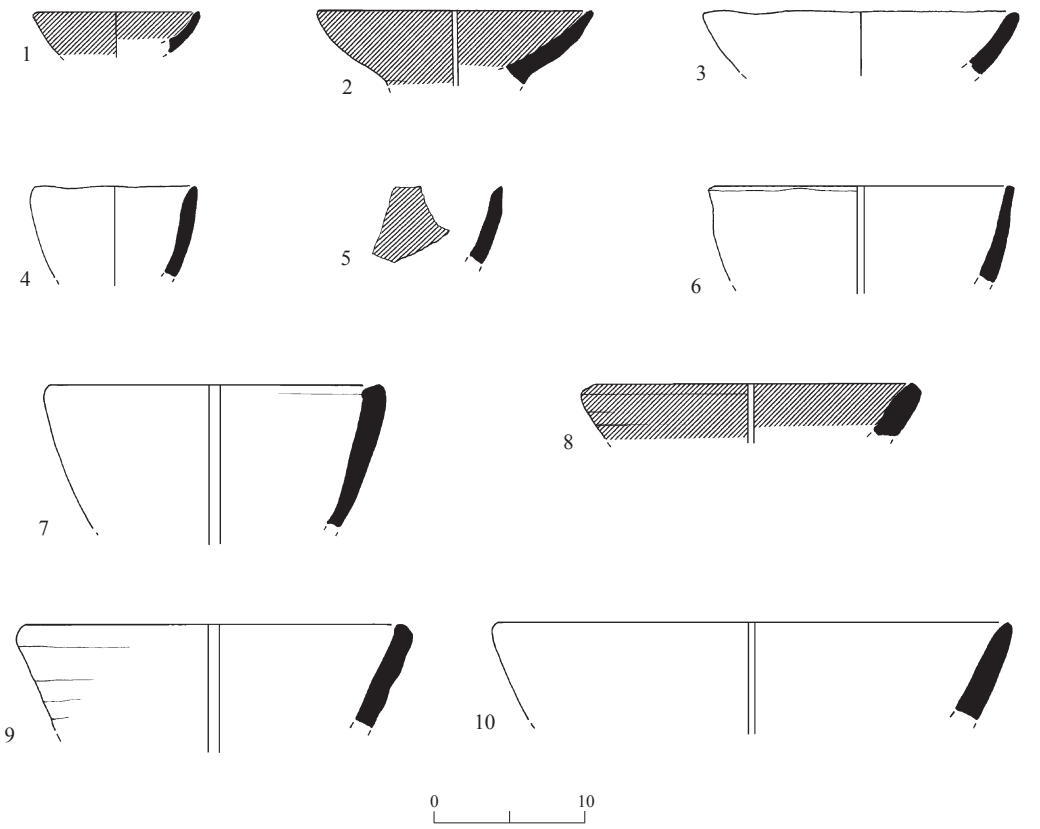


Fig. 12. Late Neolithic pottery: bowls and basins.

No.	Type	Locus	Basket	Description	Parallels
1	Small shallow bowl	-	-	Red-slipped int. and ext., burnished	Gopher and Blockman 2004: Fig. 5:8–12, 21
2	Shallow bowl, probably thick base	228	2050	Red-slipped int. and ext., burnished	Gopher and Blockman 2004: Fig. 5:8–12, 17, 21
3	Large shallow bowl	204	2007.2		Kenyon and Holland 1983: Fig. 75:5 Gopher and Blockman 2004: Fig. 5:13–17
4	Small deep bowl	228	2050		Gopher and Blockman 2004: Fig. 6:1–9
5	Deep bowl	228	2053	Red-slipped ext., burnished	Gopher and Blockman 2004: Figs. 6:1–9; 7:14
6	Large deep bowl	228	2031		Gopher and Blockman 2004: Figs. 5:19; 6:12, 23; 8:1, 2
7	Large deep bowl	228	2053		Gopher and Blockman 2004: Figs. 5:19; 6:12, 23; 7:27; 8:1, 2
8	Large bowl/basin	228	2058	Red-slipped int. and ext.	Gopher and Blockman 2004: Fig. 5:13–17, 24
9	Large bowl/basin	228	2050		Kenyon and Holland 1983: Fig. 5:7 Gopher and Blockman 2004: Fig. 6:1, 5
10	Large bowl/basin	204	2007.1		Gopher and Blockman 2004: Figs. 5:13–17; 6:1, 5

Deep Bowls with Rounded, Upright Walls (Figs. 12:4–7).— The bowl's diameter can be estimated as slightly wider than its height, ranging from 11 to 25 cm. The smaller bowls have an upright, pinched rim (Fig. 12:4, 5), while the larger bowls (diam. 21–25 cm) have a horizontal rim (Fig. 12:6) or a flat, oblique rim slanting inward (Fig. 12:7) or outward. One small, slipped vessel with a pedestal-like ring base (Fig. 15:9) was probably a small deep bowl. The base of another vessel (Fig. 15:10) appears to be a deep bowl on a pedestal base (see below). One deep bowl is slipped and burnished outside (Fig. 12:5), others inside and out.

Large Bowls or Basins (Fig. 12:8–10).— Three fragments of large, V-shaped bowls or basins have flat (Fig. 12:8, 9) or pointed (Fig. 12:10) rims.

Closed Vessels

Kraters and Pithoi (Figs. 13:1, 2; 14:2, 5).— Several deep vessels resembling holemouth jars, but with a more open stance, may be termed kraters or pithoi. The example in Fig. 14:2 has a triangular knob handle near the rim, while that in Fig. 14:5 has a pierced vertical oop handle with a triangular section at the rim.

Holemouth Jars (Figs. 13:3–7; 14:1, 3; 16:3).— The holemouth jars have relatively upright walls and wide openings (diam. 19.5–25.0 cm), a feature characteristic of this type of vessel until the Early Chalcolithic period. The variance in wall thickness (0.9–1.8 cm) may indicate a difference in the jar's function (e.g., Fig. 13:4, 6). Two fragments bear knob handles near the rim (Fig. 14:1, 3). One rim bears red-painted and burnished lines (Fig. 16:3).

Necked Jars (Figs. 13:8–11; 16:4–7).— A small jar has a flaring neck and a tapering rim (Fig. 13:8), and a small painted and burnished fragment also shows a sharp angle between the sloping shoulder and the upright wall of the neck (Fig. 16:4). Two body sherds have a ridge at the base of an everted neck, typical of Jericho IX jars (Figs. 13:9; 16:5). Only one example of a necked jar, with a rounded rim and a cone-shaped neck, had a measurable diameter (21.2 cm; Fig 13:10). Several red-slipped sherds probably belonged to jars of similar shape (Figs. 13:11; 16:6, 7).

Handles (Fig. 14).— Handle types include three knobs (Fig. 14:1–3); two pierced loop handles (Fig. 14:4, 5); a number of vertical strap handles that can be attributed to jars (Figs. 14:6–8); and a crescent-shaped protruberance (Fig. 14:9), probably part of a (knob?) handle.

Bases (Fig. 15).— Four types of bases are defined, which may belong to either closed or open shapes: relatively thick, flat bases with a characteristic rounded joint with the wall (Fig. 15:1–4); flat or slightly concave disc bases (Fig. 15:5–7); a squat ring base with a flat, rather eroded edge (Fig. 15:8); and a concave pedestal base (Fig. 15:9). The fragment in Fig. 15:10 belongs to the base of a pedestal bowl. The fracture occurred at the joint of the bowl and the pedestal, and it would seem that the pedestal was attached to the bowl when it was too dry to adhere well. The breakage left three discernable zones that reveal evidence of successive manufacturing stages. Part of a coil(?) is exposed in Zone A. A thin layer of clay that forms the actual base surface of the bowl covers it. This base had been set on a piece of textile (Zone B), whose characteristics are described below (see Schick, below). Part of the pedestal is still visible (Zone C); it was most probably perforated (Zone D).

Surface Treatment

A number of vessels were red slipped (Figs. 12:1, 2, 5, 8; 13:11; 15:2, 8, 9), and some of these were also burnished. The smooth, lustrous exterior surface contrasts with the roughness of the inner surface, which had been scraped with a sharp tool in horizontal strokes. A gray waxy slip was applied to the outside of the pedestal bowl (Fig. 15:10).

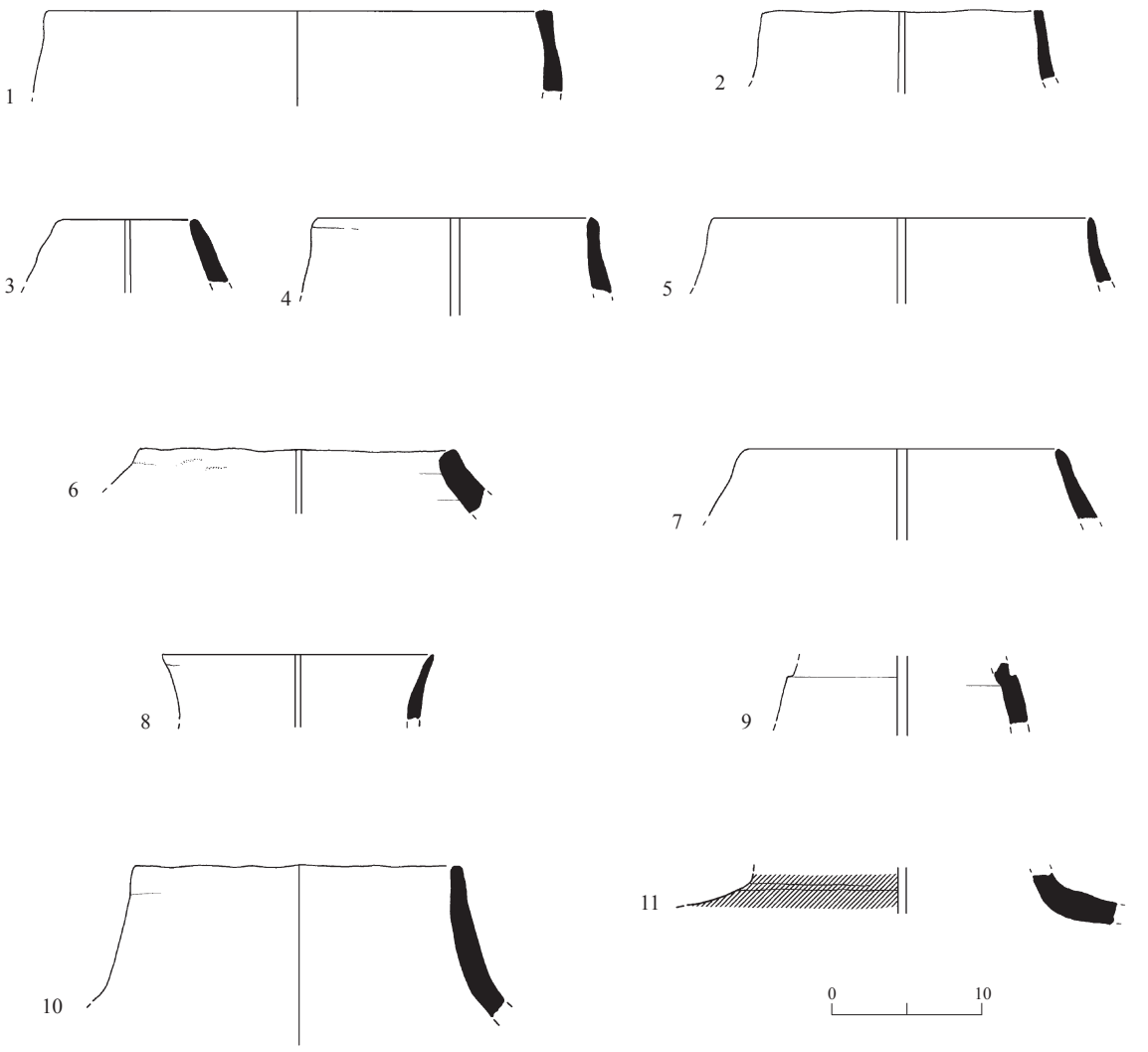


Fig. 13. Late Neolithic pottery: jars.

No.	Type	Locus	Basket	Parallels
1	Krater	214	2023	Kenyon and Holland 1982: Fig. 7:5 Gopher and Blockman 2004: Fig. 8:4
2	Small pithos	-	-	Gopher and Blockman 2004: Fig. 8:8
3	Small holemouth jar	213	2022	Kenyon and Holland 1982: Fig. 8:4, 9 Gopher and Blockman 2004: Fig. 8:20–22
4	Holemouth jar	228	2050	Gopher and Blockman 2004: Fig. 8:20–22
5	Holemouth jar	228	2050	As No. 4
6	Holemouth jar	228	2053	
7	Large holemouth jar	116	1056	
8	Necked jar	228	2050	Gopher and Blockman 2004: Fig. 10:5, 6
9	Necked jar	228	2050	Kenyon and Holland 1982: Fig. 17:14 Garfinkel 1992: Fig. 76:8 Gopher and Blockman 2004: Fig. 10:1
10	Large necked jar	208	2010	Kenyon and Holland 1982: Fig. 10:10 Gopher and Blockman 2004: Fig. 9:21–25
11	Large necked jar	216	2036	

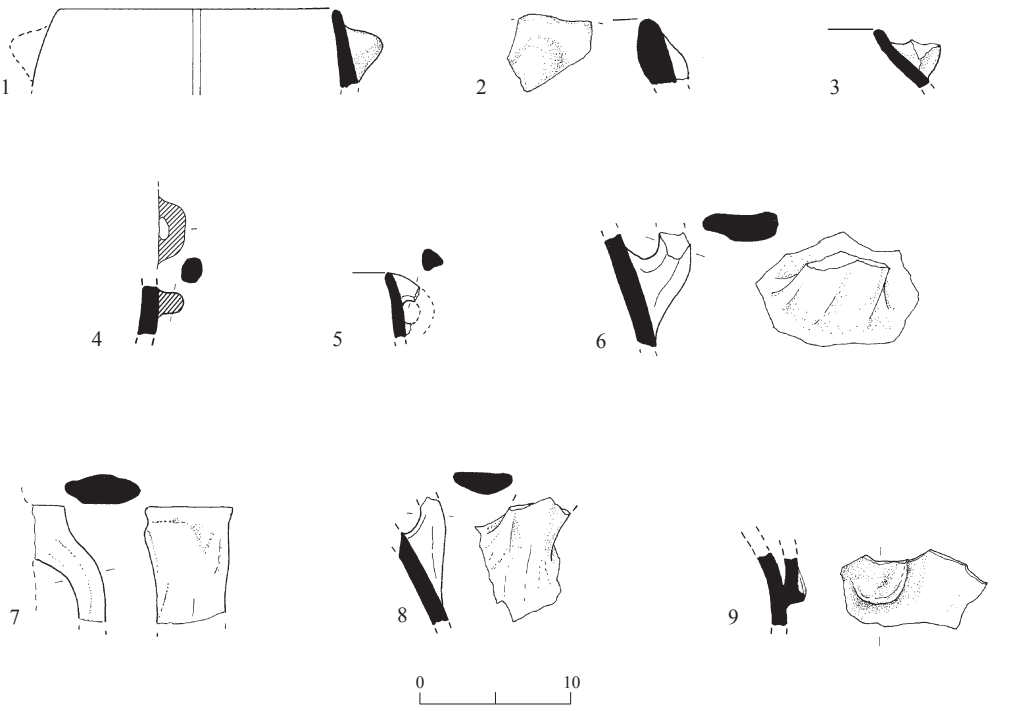


Fig. 14. Late Neolithic pottery: handles.

No.	Type	Locus	Basket	Parallels
1	Knob handle on jar	214	2025	Gopher and Blockman 2004: Fig. 6:1
2	Knob handle on krater(?)	228	2049	Kenyon and Holland 1982: Figs. 7:2; 9:24 Garfinkel 1992: Fig. 56:1–4 Gopher and Blockman 2004: Fig. 8:20
3	Knob handle on holemouth jar	228	2050	Kenyon and Holland 1982: Figs. 2:16; 7:7
4	Horizontal loop handle	228	2053	Gopher and Blockman 2004: Fig. 8:11
5	Vertical loop handle on deep bowl or krater(?)	210	2018	Bennett 1980: Fig. 8:1 Garfinkel 1992: Fig. 39:11 Gopher and Blockman 2004: Fig. 6:16
6	Strap handle on closed shape	228	2053	Gopher and Blockman 2004: Fig. 13:5, 7
7	Strap handle on closed shape	228	2048	Kenyon and Holland 1982: Fig. 13:5, 11 Gopher and Blockman 2004: Fig. 13:13
8	Strap handle on closed shape	228	2050	Gopher and Blockman 2004: Fig. 13:5, 7
9	Crescent-shaped protruberance on fragmentary handle	222	-	

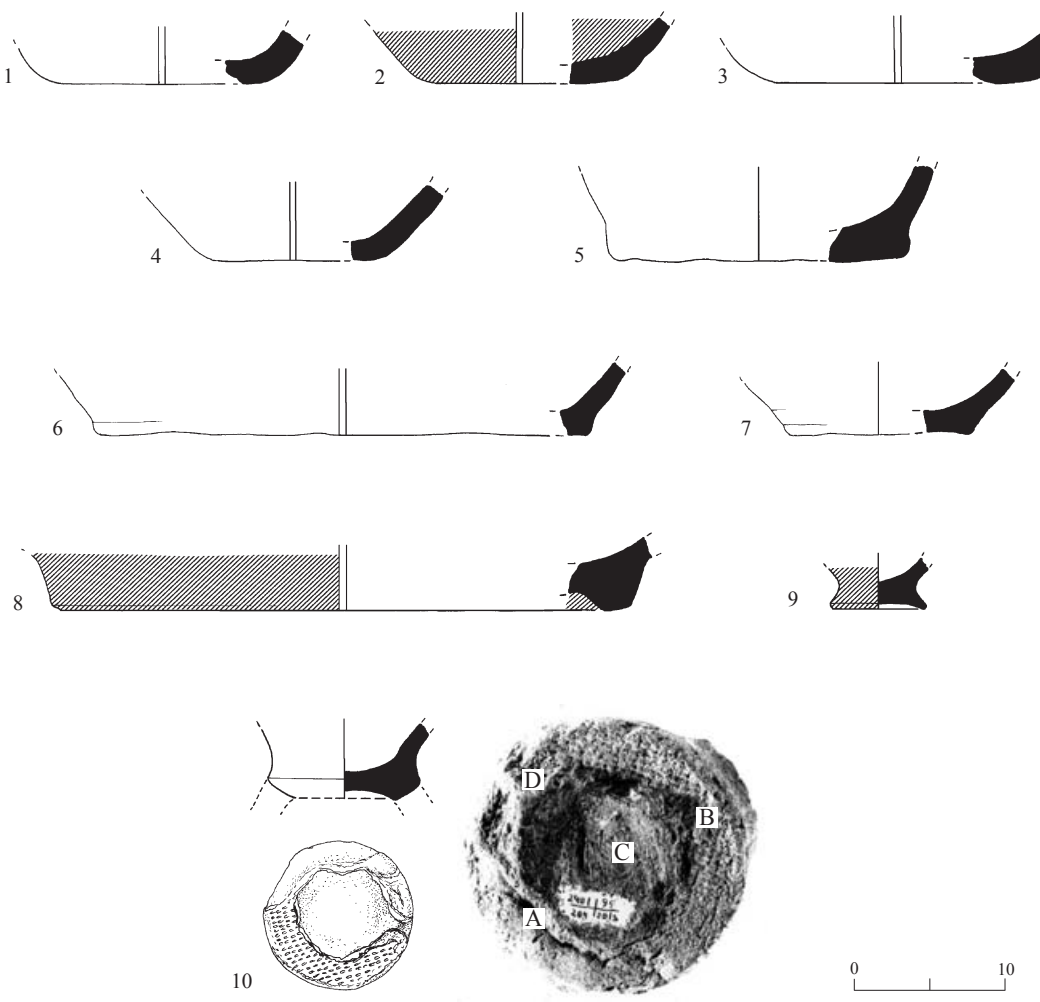


Fig. 15. Late Neolithic pottery: bases and pedestal vessels.

No.	Type	Locus	Basket	Description	Parallels
1	Base of closed shape	228	2050		Garfinkel 1992: Fig. 79:6 Obeidat 1995: Abb. 56:2 Gopher and Blockman 2004: Fig. 12:1–18
2	Base of bowl	220	2039	Red paint on int. and ext.	Gopher and Blockman 2004: Fig. 12:1–18
3	Base of bowl	215	2033		As No. 2
4	Base of open shape	213	2022		As No. 2
5	Irregular disc base of closed shape	214	2025		Gopher and Blockman 2004: Fig. 11:6
6	Large, slightly raised base	207	2012		Garfinkel 1992: Fig. 80 Gopher and Blockman 2004: Fig. 11:10
7	Base of small jar	204	2013		Gopher and Blockman 2004: Fig. 11:29
8	Ring base of large pithos(?)	207	2016	Red paint on int. and ext.	Garfinkel 1992: Fig. 81:10, 11
9	Base of pedestal vessel	214	2023	Red paint	Kenyon and Holland 1982:46, 77, Figs. 16:20; 32:20
10	Base of pedestal bowl	204	2013	Gray waxy slip on ext., textile impression on bottom	

Painted and burnished geometrical patterns occur on both open and closed vessels (Fig. 16). The patterns are composed of linear elements, alternating thin stripes and large bands. Horizontal stripes delineate bowl rims (Fig. 16:1) and the joints of jar necks and shoulders (Figs. 16:4, 5), while intricate patterns of multiple parallel and oblique stripes fill the space set off by these horizontal lines (Figs. 16:1, 4, 5). Large bands delineated by thin lines are displayed on the rounded bodies of jars (Fig. 16:12, 14). One small but noteworthy sherd shows part of a motif of two adjacent lozenges, one red and one dark brown, attesting to the use of various pigments that react differently to firing (Fig. 16:10).

Conclusion

This brief study of a small Neolithic pottery assemblage sheds light on certain aspects of the

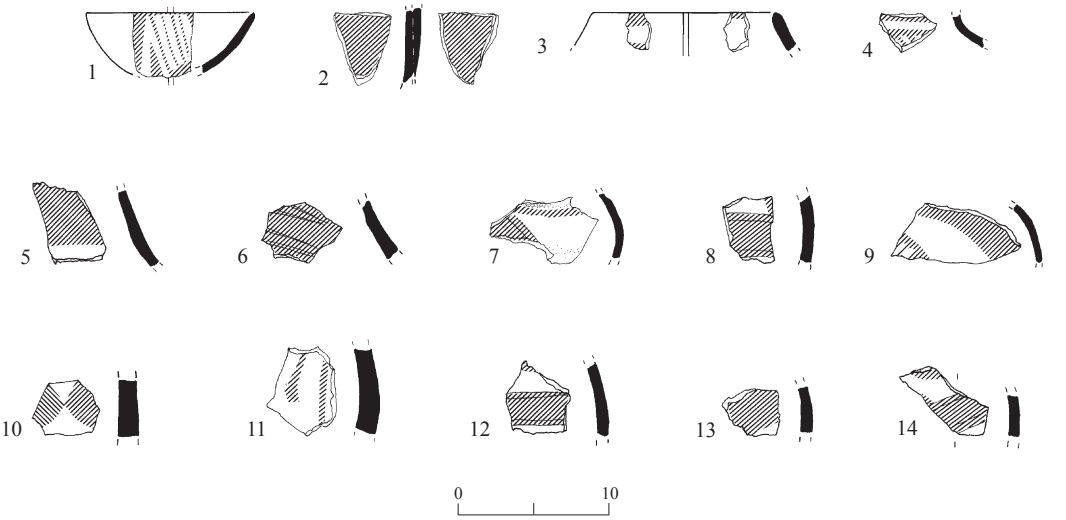


Fig. 16. Late Neolithic pottery: painted and burnished fragments.

No.	Type	Locus	Basket	Description
1	Shallow bowl	228	2050	Red-brown paint, smoothed and burnished
2	Deep bowl	228	2049	Red-brown paint, burnished
3	Holemouth jar	218	2024	Red paint, burnished
4	Jar neck fragment	210	2018	Brown paint, burnished
5	Jar neck fragment	207	2003	Red paint, burnished
6	Jar neck fragment	213	2022	Red paint and incisions
7	Jar neck fragment	228	2050	Red paint, burnished
8	Body sherd	207	2012	Red-brown paint, burnished
9	Body sherd	210	2018	Red paint, burnished
10	Body sherd	216	2035	Two adjacent painted lozenges: one red, one dark brown
11	Body sherd	228	2058	Red paint, burnished
12	Jar body sherd	214	2023	Brownish slip, burnished, longitudinal striations on int.
13	Body sherd	210	2018	Red paint, burnished
14	Jar body sherd	208	2029	Red-brown paint, burnished

technical systems in use in Jericho IX/Lodian pottery production. It reveals that alongside the oldest pottery-formation method of slab construction, coiling and molding were also employed, and a sophisticated and innovative technique of tempering clay with grog was developed.

A study of the technology of pottery production can assist in understanding the dynamics involved in the development of Neolithic societies in the southern Levant.

Petrographic Analysis of the Neolithic Pottery Assemblage

Anat Cohen-Weinberger[9]

Nine sherds, recovered from a Pottery Neolithic layer in Probe 2 (see above), were petrographically analyzed in order to study the technology of one of the earliest pottery-using cultures in Israel, and to define the production provenance of this pottery.

Method

The examination of the fabric of the Neolithic sherds was conducted in two stages. The entire assemblage was examined macroscopically and divided into nine groups according to clay color and amount of temper. In the following stage, representative samples of these groups were selected for petrographic analysis. Thin sections were prepared and examined under a polarizing microscope.

Results

The nine samples were assigned to three petrographic groups (A–C) according to their petrographic affinities (Table 1).

Table 1. Inventory of the Petrographic Samples

Type	Locus	Basket	Group	Fig.
Small jar	204	2013	A	15:7
Open shape	207	2014	A	-
Jar	208	2029	C	16:14
Jar	209	2017	B	-
Jar base	214	2020	A	-
Pedestal base	214	2023	A	15:9
Body sherd	216	2035	C	16:10
Deep bowl	228	2031	A?	12:6
Bowl/basin	228	2058	A	12:8

Group *A*.— This group is characterized by a light calcareous matrix containing some foraminifera and iron oxides. Fibrous carbonatic crystals are abundant in the matrix, sometimes exhibiting weak optical orientation. The non-plastic components (usually 5–10% of the ceramic paste) include mainly grog fragments, elongated voids of vanished straw, and quartz grains that are usually ~300 µm and rare up to 700 µm. A few limestone, chert, *nari* (calcrete) and *kurkar* (calcareous sandstone) fragments and rare feldspar grains also appear. This petrographic group is most likely the marl of the Taqiye Formation of the Paleocene Age, but identification of the foraminifera is necessary to define it for certain. This raw material has been previously described (Porat 1984:63–73; 1989:177–180; Goren 1995:302; Cohen-Weinberger 2006).

Group B.— This matrix is rich in tiny, silt-sized rhombohedral dolomite crystals. The non-plastic components (about 5% of the ceramic paste) consist of grog and limestone fragments, as well as elongated voids of vanished straw. This group is identified as marl of the Moẓa Formation.

Group C.— This group is characterized by a carbonatic matrix rich in foraminifera, with about 10% silt (mainly quartz and rarely oxyhornblende). The non-plastic, sand-size components consist mainly of chalk and smaller amounts of quartz and feldspar grains, as well as limestone fragments. The raw material of this group is an unidentified soil.

Discussion and Summary

Group A is identified with the Paleocene Taqiye Formation, which has a limited exposure about

0.5 km east of the site, but is more widely exposed in the Shephelah, c. 10 km southeast of Lod (Sneh, Bartov and Rosensaft 1998; Yechieli 2008). The appearance of coastal sand (mainly quartz and *kurkar* fragments, but rarely feldspar grains) suggests a local source, as Lod is located on quartz-rich *ḥamra* soils and is close to the coastal sands. However, an aeolian contribution in exposures further east of the coastal plain, in the Shephelah region, cannot be ruled out, and has been attested in some petrographic studies (e.g., Cohen-Weinberger 2006). The distance from Lod to the Taqiye marl exposures in the Shephelah is within the ethnographically attested average of ~10 km that traditional potters usually exploit for their clay and temper sources (Arnold 1985:32–60; 2006). Both the exploitation of the limited local exposure and the transportion of raw materials (or vessels) from the Shephelah—which would represent a concentrated effort on the part of the potters—are possible options. Most of the analyzed samples belong to Group A, and the same raw material was determined in the Jericho IX/Lodian pottery from Lod analyzed by Goren (2004:51–53).

Group B is identified with the marl unit of the Moẓa Formation, which is exposed along the Judean–Samarian anticline at least 20 km east of Lod (Sneh, Bartov and Rosensaft 1998; Yechieli 2008). A single sherd of a jar belongs to this group, and was brought to Lod from a site located in the Judean-Samarian fold belt. Of course, a single body sherd does not allow for any further interpretation as to trade or interregional relations.

Group C is identified as a soil, and the occurrence of quartz and feldspar components suits well the location of Lod, which is in close proximity to coastal sands and quartz-rich soils (Sneh, Bartov and Rosensaft 1998). However, the precise provenance of the soil cannot be determined. Two vessels belong to this group.

Textile Impression on a Neolithic Pottery Base
Tamar Schick

Among the finds retrieved from the Pottery Neolithic layer is a pottery fragment, probably the base of a pedestal bowl, bearing a textile impression (Fig. 15:10; L204, B2013). The impression is in the shape of a circular band, c. 2.5 cm wide, covering only the edges of the base, and no impression is visible in the center. From the clarity of the impression it can be assumed that the vessel had been pressed against the cloth when still wet, during the manufacturing process.

The cloth was woven in the plain-weave (tabby) technique (Burnham 1980:139). The weave is rather coarse, with a thread count of c. 9 × 4 per 1 sq cm. The fibers could not be identified, but the structure seems to be of cloth made of plant fibers (probably flax). The threads were spliced(?) in final 'S' twist (Burnham 1980:161). A few paired-looking threads might have been plied threads. We do not know the original use of the textile; however, it was probably in secondary use here.

Although textile remains from such early periods are scarce due to their perishable nature, there is a growing database on cloth production in the ancient Near East, beginning in the early Neolithic period, and probably even earlier (Schick 1988:37–38; Vogelsang-Eastwood 1993). Remains of Neolithic woven textiles—carbonized or fossilized—or their impressions in clay, bitumen or plaster, are known from Near Eastern sites such as Jericho (Crowfoot 1982:546–547), Çatal Hüyük (Burnham 1965:172), Khirokitia (Le Brun 1989), Jarmo (Adovasio 1975–1977:224–225), el-Kowm (Maréchal 1989:63), Ḥama (Bender-Jørgensen 1988), and elsewhere. The Lod impression is a welcome addition to our growing knowledge of early fibercraft.

CHALCOLITHIC THROUGH PERSIAN PERIODS: SECONDARY CONTEXTS

As very little pre-Roman materials have been excavated to date at Lod, let alone published, and in order to give an account of all the ceramics uncovered, it was decided to illustrate the ceramic materials from earlier periods retrieved from the fill of the kiln, supplemented by contemporary materials from Probes 2 and 3, without detailed discussion (Figs. 17–21).[10]

Only 11 diagnostic Chalcolithic sherds were discerned, belonging to small, V-shaped bowls (Fig. 17:1, 2), deep bowls or basins, one of which was spouted with a decorated rim (Fig. 17:3), and a leg fragment of a fenestrated pedestal (Fig. 17:4).

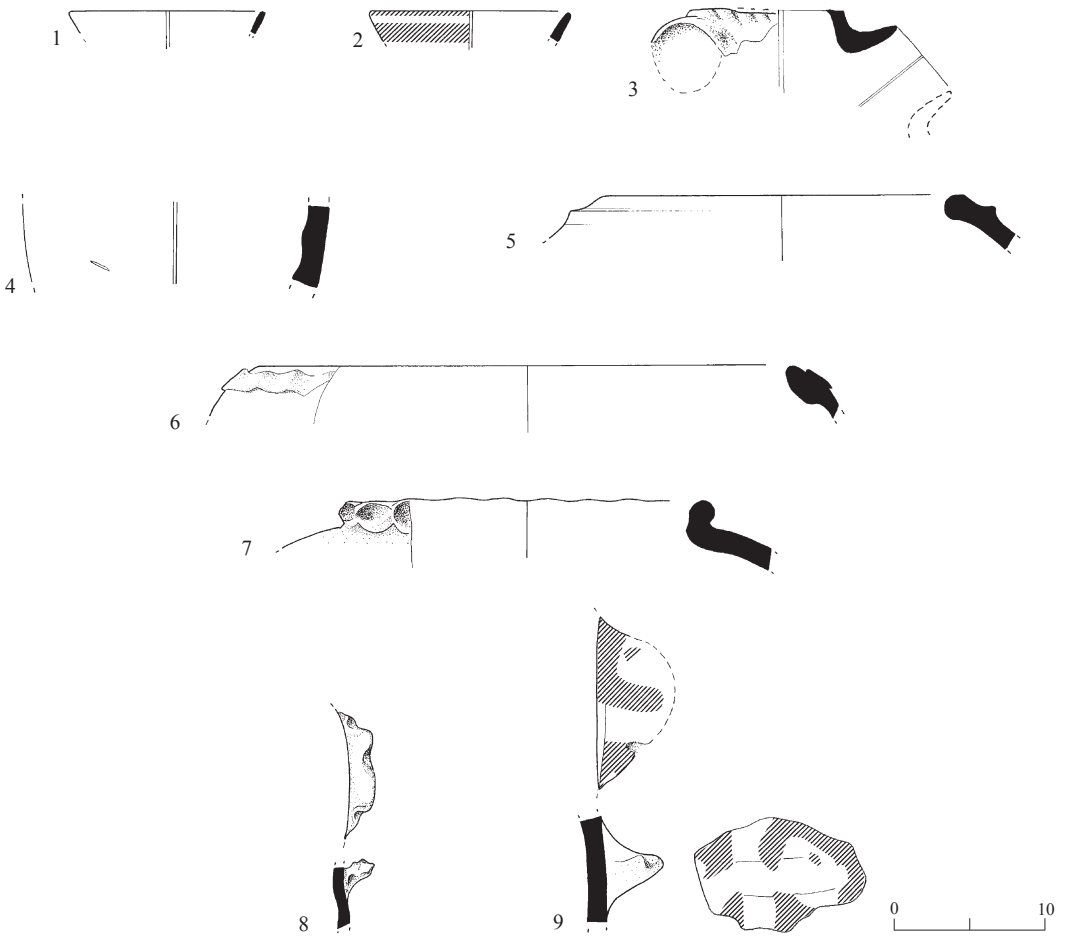


Fig. 17. Chalcolithic (1–4) and Early Bronze Age I (5–9) pottery.

No.	Type	Locus	Basket
1	V-shaped bowl	218	2031
2	V-shaped bowl	211	2019
3	Spouted basin	111	1031
4	Fenestrated pedestal	111	1031
5	Holemouth jar	201	2007

No.	Type	Locus	Basket
6	Holemouth jar	217	2026
7	Storage jar	210	2018
8	Ledge handle	114	1034
9	Ledge handle	115	1035

From the Early Bronze Age, 87 diagnostic sherds were identified, most of them attributed to late EB I, with only a few dating to early EB I. Open forms are absent from the collection. The most common vessels are holemouth jars (Fig. 17:5, 6), while small to medium-sized storage jars (Fig. 17:7) are much less frequent; ledge handles are common (Fig. 17:8, 9).

Thirty diagnostic sherds are dated to MB II. Bowls are characterized by a plain or infolded rim (Fig. 18:1, 2) and a ring base (Fig. 18:3). Cooking pots have an applied band of finger-impressed rope decoration on the exterior, below the rim (Fig. 18:4). Jars are the most common vessel type among the MB II sherds (Fig. 18:5–7).

A significant number (487) of LB II sherds were recovered. Bowls (Fig. 19:1–5) are the most frequent vessels, a small percentage of which are carinated (Fig. 19:3–5). A few kraters (Fig. 19:6) and cooking jars (Fig. 19:7, 8) were discerned. Second in frequency are jars, mostly plain, a few slipped (Fig. 19:9–11). Due to the diminutive size of many of these sherds, not all could be securely placed within the Late Bronze Age sequence. The bulk of the material, however, seems contemporary with Lakhish Levels 6–7 (Eli Yannai pers. comm.; cf. Ussishkin 1983: Fig. 15).

Eighty-three Iron Age sherds were identified. These include bowls, the most common vessel (Fig. 20:1, 2), kraters (Fig. 20:3–5), cooking pots (Fig. 20:6–9) and jars, the second most common vessel (Fig. 20:10, 11). Of particular interest are a body sherd of a Philistine bowl with a very small part of a painted bird motive (Fig. 20:12; cf. Amiran 1969: Pl. 90:1, 2), and a rim fragment of an imported Assyrian carinated bowl (Fig. 20:13; cf. Amiran 1969: Pl. 99:3).

Of 34 Persian-period sherds, half belong to mortaria made of light greenish clay (Fig. 21:1–3). Such vessels appeared as early as the eighth century BCE and continued to exist—although in different form—into the Hellenistic and Roman periods (Stern 1995:55). The second most frequent vessel type is a flat-shouldered jar (Fig. 21:4, 5), apparently representing a jar with sack-shaped body, the later of two

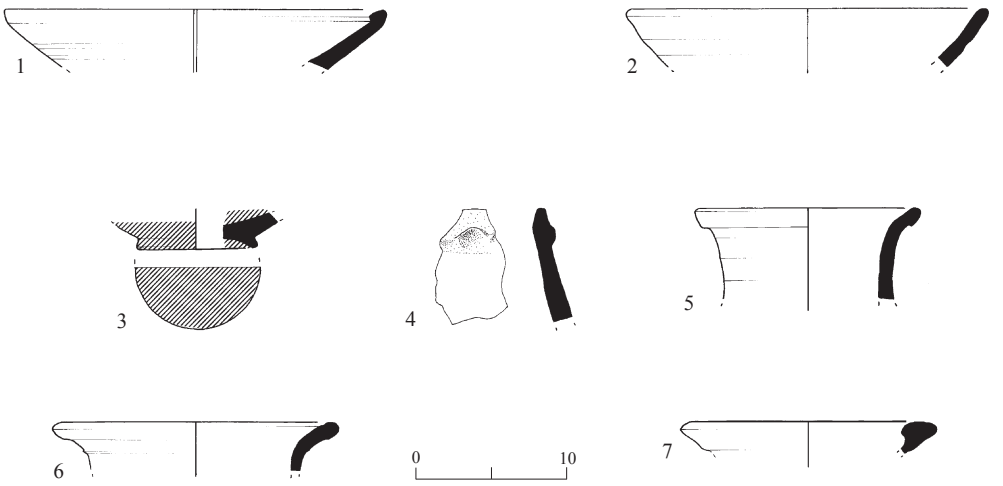


Fig. 18. Middle Bronze Age II pottery.

No.	Type	Locus	Basket
1	Bowl	114	1034.1
2	Bowl	114	1034.2
3	Bowl	222	2047
4	Cooking pot	102	1026

No.	Type	Locus	Basket
5	Storage jar	114	1034.3
6	Storage jar	102	1006
7	Jar	101	1001

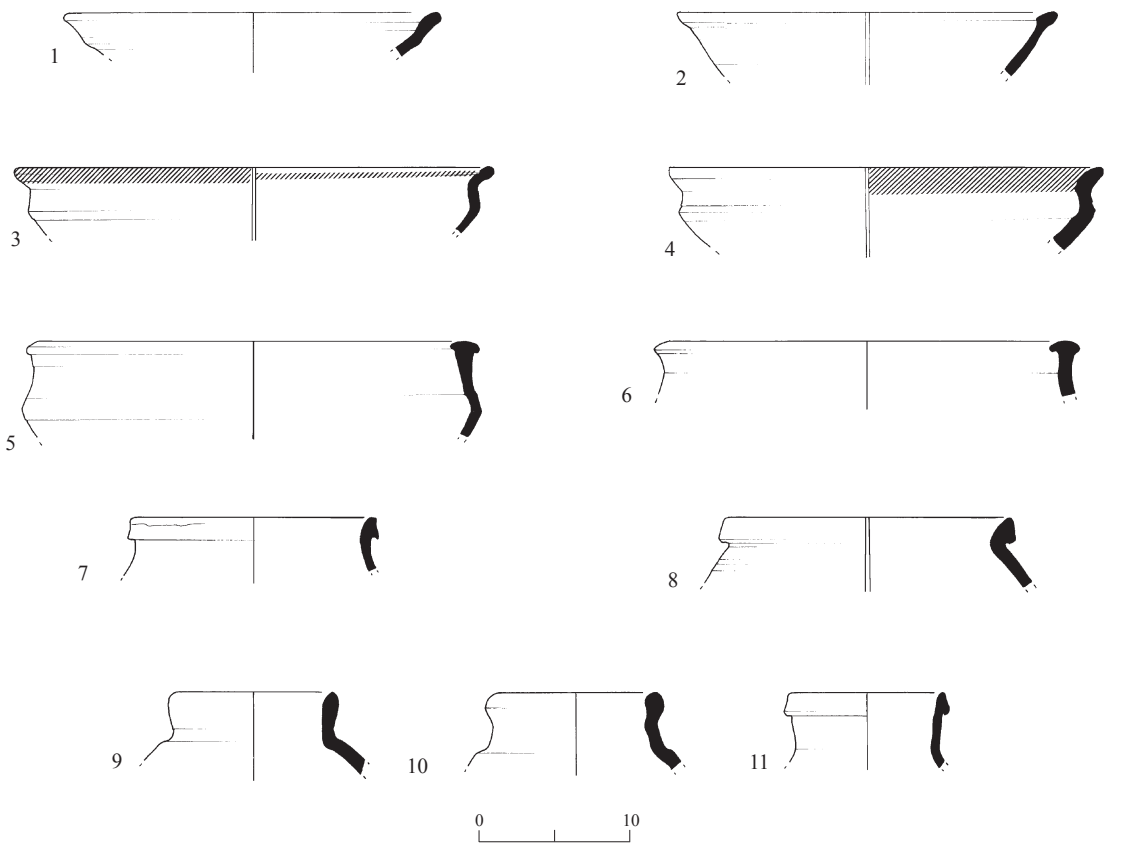


Fig. 19. Late Bronze Age II pottery.

No.	Type	Locus	Basket
1	Bowl	228	2049
2	Bowl	207	2007
3	Carinated bowl	114	1034.4
4	Carinated bowl	204	2008
5	Carinated bowl	114	1034.5
6	Krater	207	2014

No.	Type	Locus	Basket
7	Cooking jar	228	2053
8	Cooking jar	228	2050
9	Jar	113	1032
10	Jar	228	2049
11	Jar	302	3004

chronologically distinct types (Stern 1982: Type H-8; 1995:62) dated to the fifth–fourth centuries BCE. Open lamps with wide rims are represented by a few sherds (Fig. 21:6). The typical pinched, single-wick hole was not preserved. They first appeared in the sixth century BCE, and became most common in the fifth–fourth centuries BCE (Stern 1995:67).

Of particular interest are a fragment of an imported Attic lekythos (Fig. 21:7) and a fragment of a Cypriote Bichrome VII table amphora (Fig. 21:8; cf. Thalmann 1977: Pl. 5:11:90). The painted decoration of the table amphora consists of a row of pendent red tongues or leaves above a drop decoration, each with a dark line down its center. The tongues hang from a single, horizontal band. According to Mook and Coulson (1995:97), such motifs are found on vessels from Cyprus, the Levant and Macedonia, and can be dated to the Cypro-Classic II period (400–325 BCE). Parallels from Israel are rare, and comprise one example

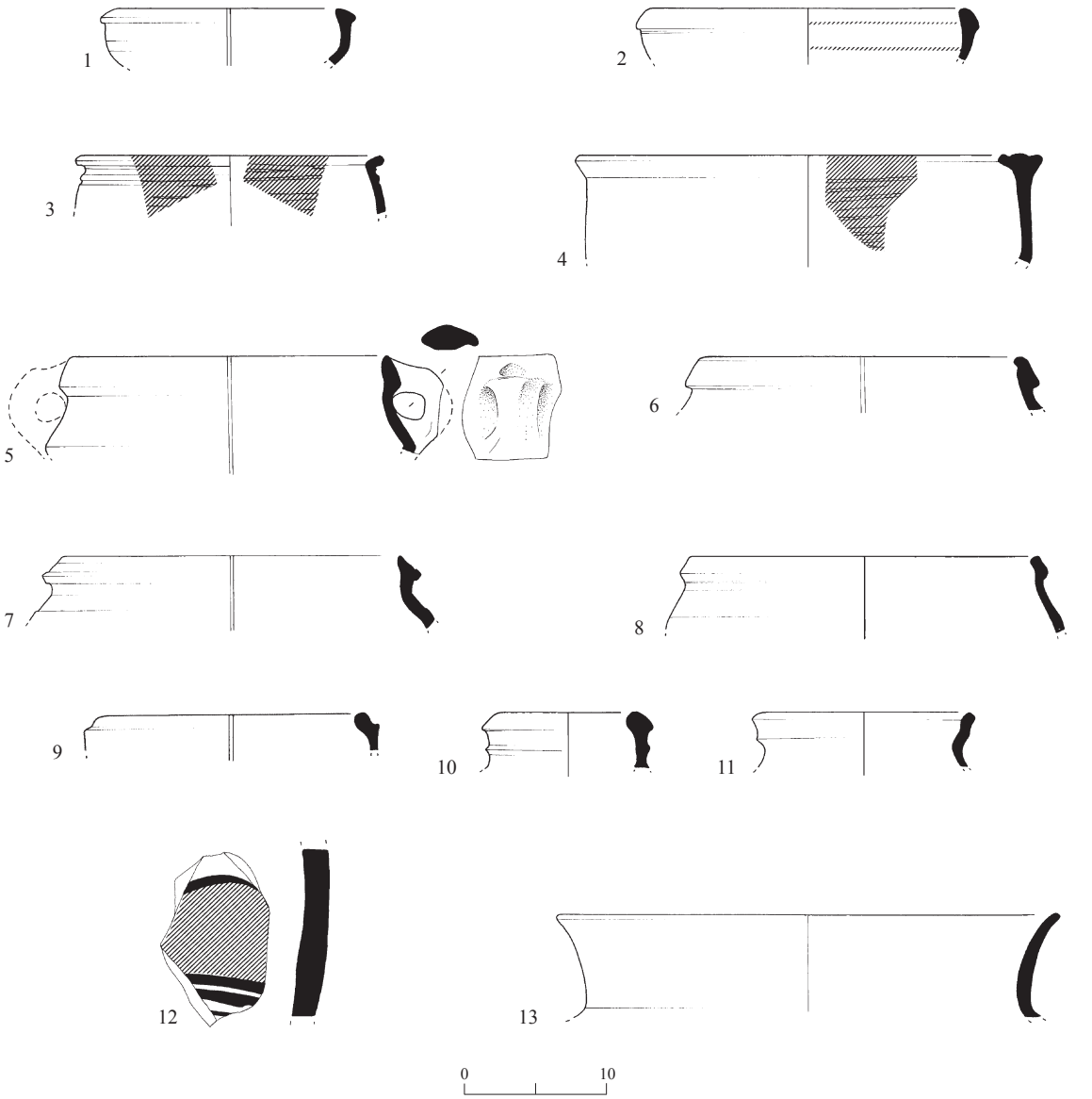


Fig. 20. Iron Age pottery.

No.	Type	Locus	Basket
1	Bowl	202	2002
2	Bowl	111	1029
3	Krater	208	2029
4	Krater	108	1023
5	Krater	109	1027
6	Cooking pot	102	1011
7	Cooking pot	216	2038

No.	Type	Locus	Basket
8	Cooking pot	212	2020
9	Cooking pot	116	1036
10	Jar	216	2026
11	Jar	114	1034
12	Philistine bowl	102	1015
13	Assyrian bowl	227	2047

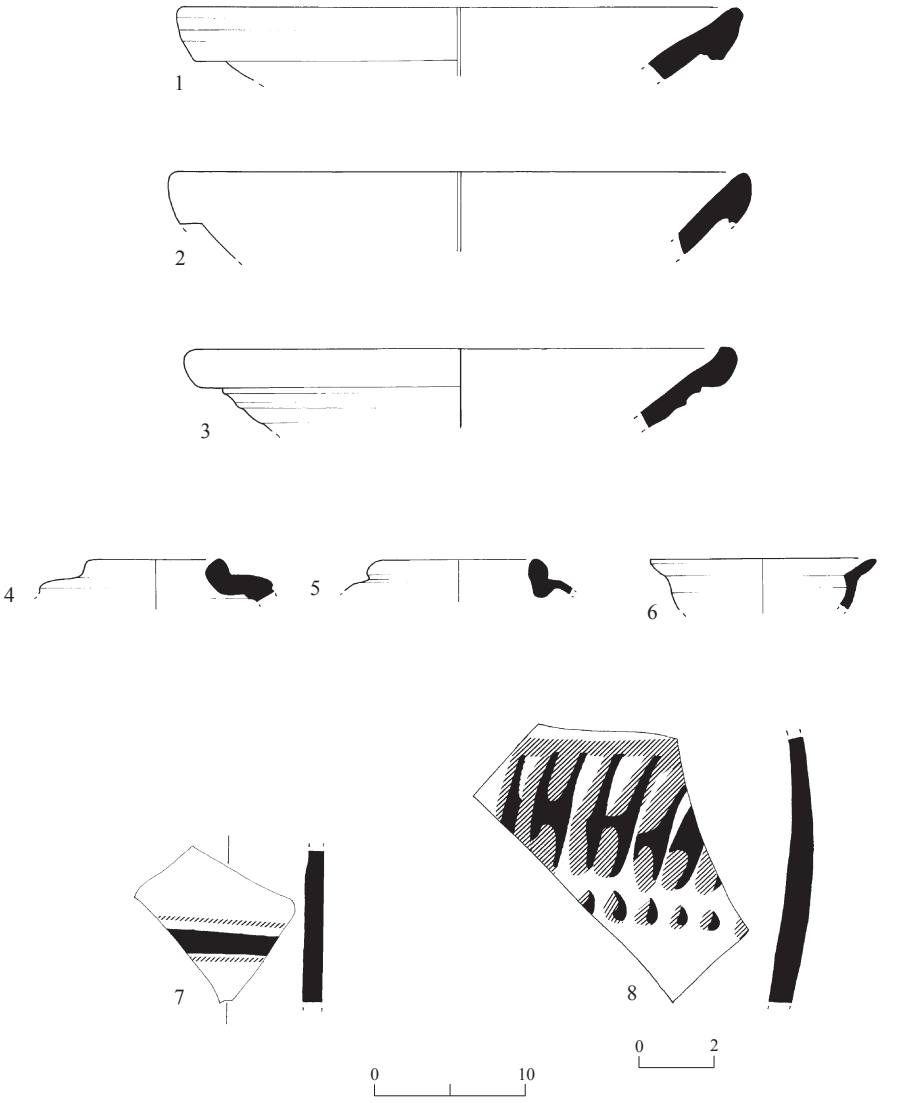


Fig. 21. Persian-period pottery.

No.	Type	Locus	Basket
1	Mortarium	116	1034
2	Mortarium	-	1017
3	Mortarium	228	2053
4	Jar	104	1008

No.	Type	Locus	Basket
5	Jar	102	1017
6	Lamp	102	1015
7	Lekythos	102	1017
8	Table amphora	301	3001

from Dor (Mook and Coulson 1995:97–98, Fig. 3:12:3), and another identified in the 1996 excavations at Tel Mikhal (Kapitaikin 2006:44–50).

THE FLINT MATERIAL
Hamoudi Khalaily

The flint assemblage was collected throughout the excavation, but mostly from the deeper layers associated with PNA remains in Probe 2. Due to the small quantity of flint artifacts recovered, the majority of which are waste products, the entire collection of artifacts is presented as a single assemblage, regardless of stratigraphic context.

The artifacts are classified into two major groups, waste and tools. No attempt was made to analyze the waste technologically; on the other hand, some technological observations on the tools and debitage will be noted.

Raw Material

Most of the raw material originated in Naḥal Ayyalon, which flows adjacent to the excavation area. The stream transported pebbles of varying sizes from sources of Senonian flint located c. 15 km northeast of the site. This local raw material is, for the most part, of medium to poor quality, dominated by gray to brown brecciated flint. Some of the items were produced of better-quality flint from Eocene sources.

Waste

More than half of the artifacts are natural chunks and pebbles bearing white patina. The chunks were probably prepared for knapping. The flint debitage is dominated by a flake industry, while the blade and bladelet blanks make up a low frequency of the total debitage (7.2%; Table 2).

Cores

Most of the cores are amorphous in shape, ranging in size between 2 and 4 cm, and were used for the production of flake blanks. One core with a single platform was also used for flake production. Cortex covers c. 50% of the surface of the cores.

Tools

Retouched flakes are the most common tools, comprising 24 of the 34 tools. All of them were produced from the local raw material. Different types of retouch were discerned, including fine, marginal, and irregular retouch fashioned on a limited part of the flake's circumference. The remaining ten tools presented below (Table 3) all derive from Probe 2.

Sickle Blades.— Three complete and two fragmented sickle blades were recovered. Two sickle blades are identified as Neolithic. That in Fig. 22:1, of which only the distal part is preserved, was fashioned from high-quality, brown Eocene flint. Irregular denticulation fashioned by pressure retouch appears on the working edge; the other side was also fashioned by pressure retouch. The distal end was shaped by straight truncation. Heavy gloss is visible on the dorsal and ventral faces. The second Neolithic sickle blade (52 × 21 × 11 mm) is a

Table 2. The Flint Assemblage

Type	No.	%
Primary elements	27	17.5
Flakes	108	70.1
Blades	8	5.2
Bladelets	3	2.0
CTE	8	5.2
Total Debitage	*154*	*100.0*
Chunks	210	85.0
Chips	37	15.0
Total Debris	*247*	*100.0*
Debitage	154	34.7
Debris	247	55.6
Tools	34	7.7
Cores	9	2.0
Total	*444*	*100.0*

Table 3. Tools Recovered from Probe 2

Tool	Period	Locus	Basket	Fig. No.
Sickle blade	Neolithic	221	2044	22:1
Sickle blade	Neolithic	204	2013	22:2
Sickle blade	Early Bronze Age	220	2036	22:3
Sickle blade	Iron Age	207	2007	22:4
Sickle blade	Iron Age	208	2010	22:5
Fan scraper on pebble	Neolithic	221	2040	23:1
Elongated fan scraper	Neolithic	228	2050	23:2
Borer	-	213	2022	23:3
Borer	-	220	2036	23:4
Bifacial	Neolithic	221	2044	24

complete tool of light brown flint (Fig. 22:2), trapezoidal in section. Irregular retouch appears on both sides, and remains of sickle gloss are visible on both sides. A Canaanean sickle blade fragment, broken at both ends and burnt (Fig. 22:3) is triangular in section. Irregular retouch fashioned both sides, and only one lateral side bears sickle gloss.

Two sickle blades dated to the Iron Age are defined as parallelogram-shaped (Rosen 1983:108–115; 1997:143). The blade in Fig. 22:4 was manufactured from a wide flake (56 × 42 × 9 mm), and the working edge is located on the wide distal end. The two parallel short sides were shaped by semi-abrupt retouch. The bulb of percussion was thinned, probably for hafting. A fine denticulation fashioned the working edge, and heavy sickle gloss covers both faces. The fifth sickle (Fig. 22:5) is similar in shape to the previous example, but is wider (56 × 52 × 14 mm) and fashioned from high-quality brown flint. The working edge has fine denticulation, while the lateral sides were bifacially retouched. One side is slightly arched.

Fan Scrapers.— Two fan scrapers were recovered, and they can be attributed to the Neolithic period. One was prepared from a broken pebble that had been previously used as a hammerstone (Fig. 23:1). Steep retouch fashioned three-quarters of its circumference, while the remainder is cortical. Limestone cortex covers the dorsal surface. The second fan scraper is an elongated tool (Fig. 23:2). The distal end is broken; abrupt retouch appears over the entire circumference, and there is no cortex on the dorsal face.

Miscellaneous.— Two borers (Fig. 23:3, 4) were fashioned on flakes, and their date is unknown. A rounded, bifacial tool (Fig. 24) is dated to the Neolithic period.

Summary

Analysis of the flint tools reveals at least three periods of occupation at or in the vicinity of the site. The earliest material belongs to the PNA (Jericho IX/Lodian; Gopher 1993; Gopher and Gophna 1993), a thin occupation layer that was encountered in the deepest levels of Probe 2. This assemblage is characterized by the presence of wide and denticulated sickle blades (Fig. 22:1, 2), similar to tools from other excavations at Lod (Kaplan 1977:74; Khalaily and Gopher 1999; Gopher and Blockman 2004:31–35; van den Brink et al. 2015:145). The scrapers and the bifacial (Figs. 23:1, 2; 24) also belong to this occupation.

The Canaanean sickle blade in Fig. 22:3 shows affinities with Early Bronze Age assemblages (Rosen 1983). Pottery sherds from this period were encountered in secondary contexts throughout the excavation.

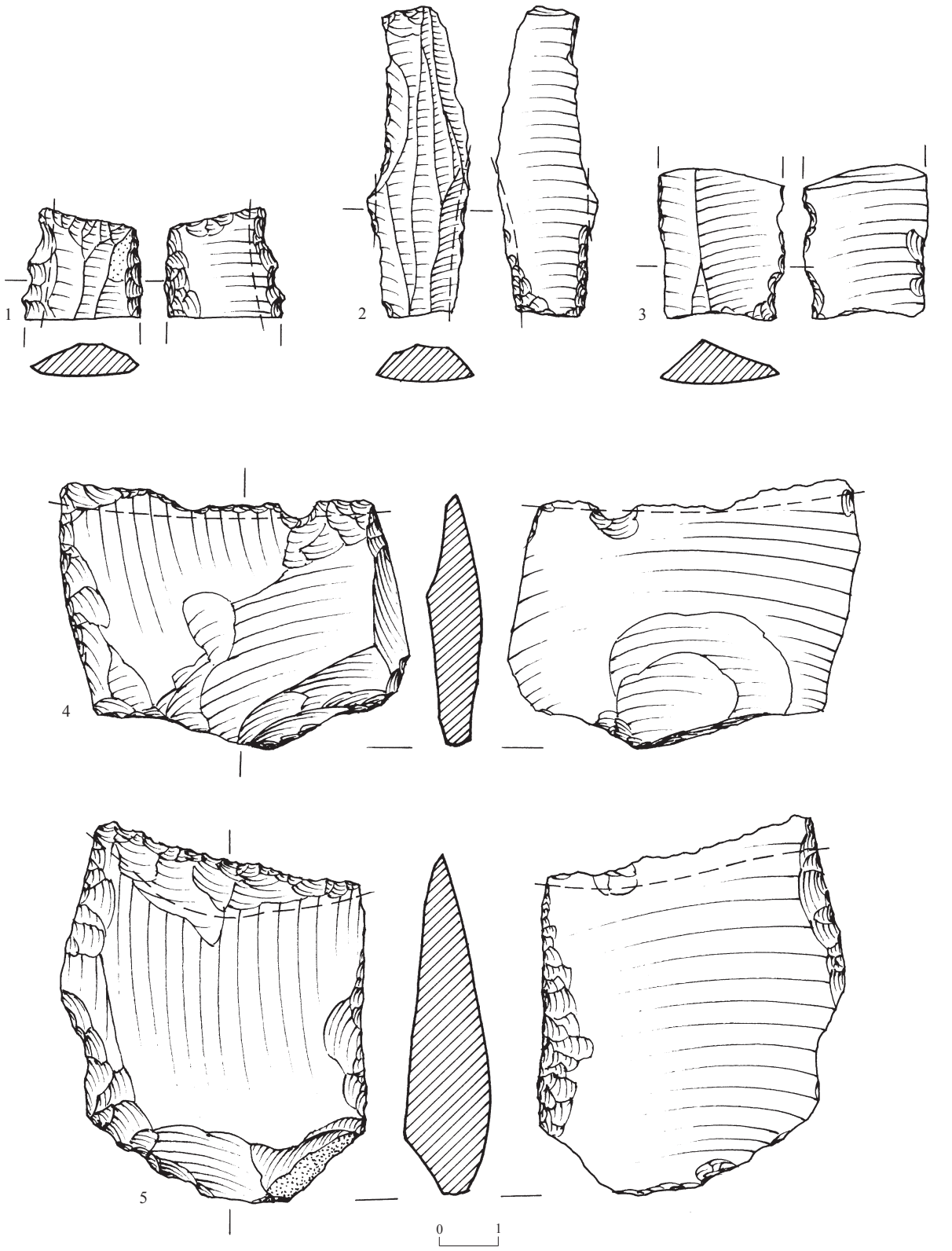


Fig. 22. Neolithic sickle blades (1, 2); Canaanean sickle segment (3); Iron Age sickle blades (4, 5).

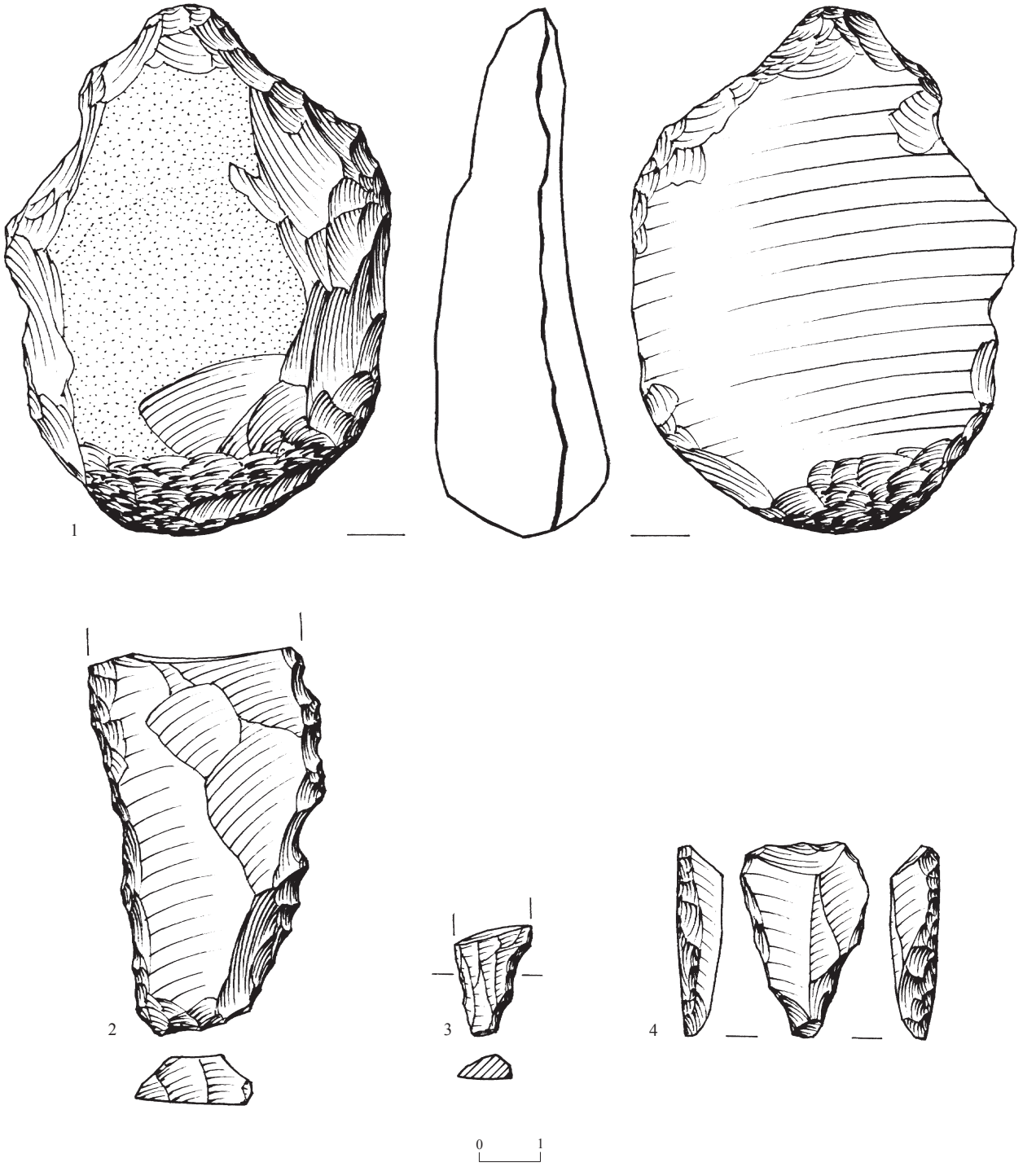


Fig. 23. Neolithic fan scrapers (1, 2); borers (3, 4).

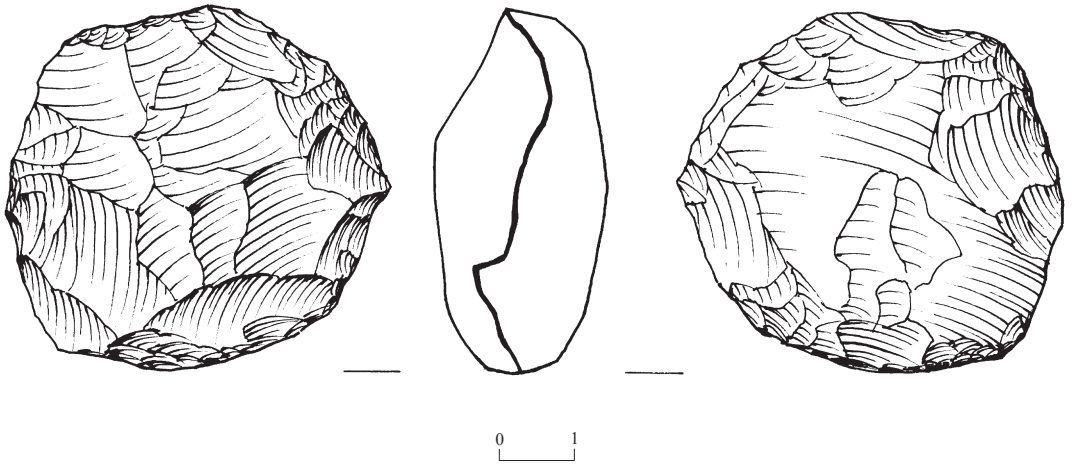


Fig. 24. Neolithic bifacial tool.

Parallelogram-shaped sickle blades (Figs. 22:4, 5) occur in later periods such as the Late Bronze and Iron Ages, and it is difficult to distinguish morphologically between sickles of these two periods. However, rectangular and trapezoidal pieces are most common in Iron Age assemblages (Rosen 1983:114), and similar sickles were found at Iron Age Gezer (Rosen 1986) and ʻIzbet Ṣarṭa (Wadae, IAA internal report). Pottery sherds from the Iron Age were encountered in secondary contexts throughout the excavation.

FAUNAL REMAINS
Moshe Sade

The archaeozoological remains derive from 11 loci (23 baskets) recovered from the PNA layer in Probe 2. The 84 bones and teeth were identified based on the atlas of Schmid (1972), and measurements were taken following von den Driesch (1976).[11]

Results

Remains of domestic species were the most common, representing the following taxa: sheep/goat (*Ovis aries/Capra hircus*), cattle (*Bos taurus*), equid (*Equus* sp.) and dog (*Canis familiaris*). While in the NISP count, the percentage of cattle is the same as that of the sheep/goat, in the MNI count cattle comprise twice as many as the sheep/goat, equid and dog, and apparently comprised the main branch in the economy of the settlement (Tables 4, 5).

The few remains of wild taxa comprise one individual fallow deer (*Dama mesopotamica*) and fish, the latter identified as Nile perch (*Lates niloticus*), represented by three vertebrae and a mandible. A Mediterranean seashell, the common cockle, *Cardium edule* (Linneus), was identified, as was a common terrestrial mollusc, *Helix engaddensis*.

While the small sample limits the conclusions that can be reached regarding the economy of this settlement, the presence of cattle indicates that the site had a steady water supply. The equid may represent a dietary item.

CONCLUSIONS

The long, complex settlement history of Lod covers an archaeologically attested timespan of nearly eight millennia (from the sixth millennium BCE to the present). The current excavation has opened very small windows onto two occupation phases within this range: the Roman period (third century CE) and the PNA period (first half of the sixth millennium BCE).

Table 4. Representation of Skeletal Elements of Domestic Mammals (NISP and MNI Counts)

Skeletal Elements	Sheep/Goat	Cattle	Equid	Dog	Total NISP
Horn core	2	1			3
Cranium	1				1
Orbit	1				1
Mandible	1	1		1	3
Molar	1	9	1	1	12
Premolar	1		1		2
Scapula	5	2			7
Radius	1	1			2
Ulna		2			2
Metacarpus	1	1			2
Pelvis	3	4			7
Femur	1	1			2
Os molleolare		1			1
Metapodial	7	8			15
Calcaneus	1				1
Astragalus	1	2			3
Phalanx I	1				1
Phalanx II		1	1		2
Vertebra—thoracic	1	2			3
Vertebra—lumbar	1	1			2
Ribs	9	3			12
Total NISP	39	40	3	2	84
% NISP	46.43	47.62	3.57	2.38	100.00
MNI count	1	2	1	1	5
% MNI	20	40	20	20	

Table 5. Representation of Bones of Domestic Mammals by Side and End (P = proximal; D = distal)

Bones	Sheep/Goat	Cattle
Side	R	L
Radius P		1
Ulna P		2
Metacarpus P	1	1
Femur D		1
Astragalus	1	2
Calcaneus	1	

In situ materials dating from the Roman period at Lod have been uncovered in previous excavations (van den Brink et al. 2015: Table 1), providing evidence of an extensive cemetery, several villas, and a number of industrial installations. To these we add the pottery kiln and the ceramics associated with it. As it can be assumed that such kilns were not located within the actual settlement but on its margins, the location of this kiln is a good indicator of the maximum northern extent of Lod/Lydda during this period.

In situ material from the PNA period at Lod has also been previously and subsequently excavated, attesting to dispersed habitation, including a few circular dwellings, and human and canine burials (van den Brink et al. 2015: Table 1). An ancient streambed identified at the present site must have been active during the PNA period, and its location may partly explain the presence of human occupation here during the first half of the sixth millennium BCE.

The short technological study of the pottery assemblage contributes to a better understanding of the Pottery Neolithic A pottery production. An early textile impression on the base of a ceramic vessel was recognized and described.

A small tool kit of flints, including wide and denticulated sickle blades, scrapers and a bifacial, can also be attributed to the PNA occupation.

With the exception of the Intermediate Bronze Age and Hellenistic period, ceramic sherds from all the major cultural phases between these two extremes, the PNA period and the Roman period, have been recovered from secondary contexts, eroded by the shifting water course of the stream that meandered through this area, and lateral erosion washed down from the tell. They are a testimony to the rich prehistoric, protohistoric and historical past of Lod.

NOTES

[1] The work was carried out on behalf of the IAA under the direction of Edwin C.M. van den Brink (Permit No. A-2401), assisted by Maya Dagon, and with the participation of Eldad Barzilay (geomorphology), Moshe Biton and Amnon Navon (administration), Anna Bodin (drafting), Anat Cohen-Weinberger (petrography), Catherine Commenge (Neolithic pottery), Avi Hajian and David Hanan (surveying), Hamoudi Khalaily (lithics), Marina Shuiskaya-Arnov (pottery drawing), Moshe Sade (archaeozoology), Tsila Sagiv (photography), Tamar Schick (textile imprint), Erella Tsarfati (pottery restoration) and Leonid Zeiger (flint tool drawing). The excavations were financed with the assistance of the Lod Municipality.

We are indebted to Etan Ayalon, Eliot Braun, Avi Gopher, Aric Rosenberger, Fanny Vitto and Eli Yannai, who visited us in the field and offered valuable advice. After the close of the excavations, Noga Blockman, Uza Zevulun, Shelley Sadeh and Etan Ayalon kindly commented on the Neolithic and Roman pottery.

For the results of a subsequent salvage excavation conducted in 1997 by van den Brink (Permit No. A-2739) on behalf of the IAA in a nearby lot, see van den Brink 2002; van den Brink et al. 2015.

[2] Similar deposits were observed in other excavations at Lod (e.g., van den Brink et al. 2015: Fig. 2:11, 14).

[3] Excavations were carried out in the same area prior to the construction of this school (Gopher and Rosenberger 1995; Gopher and Blockman 2004; van den Brink et al. 2015: Fig. 2:6).

[4] Other examples of kilns with the opening in the east were revealed, e.g., at Ẓur Natan (Matthews, Neidinger and Ayalon 1990) and Kefar Sava (Ayalon 1998). According to Ayalon (1998:116), the actual direction of the wind was not always important, since the kiln had its own circulation dynamics through the opening in its roof.

[5] I (E.v.d.B.) would like to thank Etan Ayalon for guiding me to the relevant literature. David Adan-Bayewitz kindly offered to analyze some of the ceramics and wasters associated with the pottery kiln. This project has not yet been concluded.

[6] To these can be added 4838 ribbed, but otherwise non-distinctive body sherds. Of the latter, 932 derive from Probe 1; 2853 from Probe 2; and 1053 from Probe 3.

[7] The Babylonian Talmud, *Menaḥot* 87a, referring to Mishnah *Menaḥot* 8:7, which discusses wine brought to the Temple in Jerusalem, states: "it was taught: medium-sized Lyddan jars and jugs were used to bring the wine." According to Schwartz (1991:164), this apparently indicates that "medium-sized jars and jugs used to transport superior wine to the Temple were apparently manufactured in Lod, since the vessels used were named after that settlement."

[8] This section is based on a more extensive, and technically detailed report originally written in 2000 by Catherine Commenge, to be published elsewhere. The text section at issue has been updated only with the results of the petrographic analysis by Goren (2004) of the nearby PNA Lodian assemblage and comparisons with the pottery in Gopher and Blockman 2004.

[9] This paper was first submitted in 1997, and minor updates were made in 2013.

[10] I (E.v.d.B.) would like to thank Eli Yannai, once again, for helping to sort out these materials.

[11] I (M.S.) wish to thank Edwin van den Brink for the opportunity to analyze the archaeozoological finds from this excavation.

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