The Wine Storage Complexes at the Middle Bronze II Palace of Tel Kabri: Results of the 2013 and 2015 Seasons

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This report presents the architecture of the storage rooms found during the 2013 and 2015 excavations within the Middle Bronze Age Canaanite palace at Tel Kabri in present-day Israel, as well as the ceramic finds within them, and the initial results of the petrographic and organic residue analyses. We hope that this detailed preliminary report can supply some insights into a few of the activities conducted within this Canaanite palace during the early second millennium B.C.E.[1]

INTRODUCTION

Tel Kabri, located 5 km east of Nahariya in the Western Galilee of modern-day Israel, has been the focus of two large-scale expeditions: the first led by Kempinski and Niemeier from 1986 to 1993 and the second led by Cline and Yasur-Landau from 2005 to the present. The initial excavations by Kempinski and Niemeier uncovered the palace and its painted floor with additional wall fragments but came to an untimely halt because of the premature death of Kempinski in 1994.[2]

As we have written elsewhere, including in this journal,[3] during the Middle Bronze Age and specifically in the first half of the second millennium B.C.E. Tel Kabri was one of the major political centers in the southern Levant. It most likely served as the capital of a significant polity in the Western Galilee during the Middle Bronze (MB) II period, in the later 18th century and first half of the 17th century B.C.E.[4]

The palace occupied an area of 4,000–6,000 m^2, of which approximately 2,000 m^2 have been excavated (fig. 1). It went through five major phases (table 1) during the centuries of its existence from the MB I into the MB II

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[2] Kempinski et al. 2002a.

[3] Cline et al. 2011.

[4] Yasur-Landau et al. 2008; Yasur-Landau et al. 2015; Höflmayer et al. 2016.

FIG. 1. Aerial view of the storage rooms and western excavated areas of the palace at the end of the 2015 season; north at top (Griffin Aerial Imaging/Skyview Photography Ltd.).

TABLE 1. Stratigraphic overview of the Middle Bronze Age phases at Tel Kabri.

Revised Stratigraphic Phasing	Original Stratigraphic Phasing[a]	Archaeological Phase	Settlement Activity in Kabri Area D
Phase VII		mid Middle Bronze I	domestic units, pre-palace
Phase VI		mid to late Middle Bronze I	earliest monumental building
Phase V	Kempinski stratum 4	transitional Middle Bronze I/II	enlargement and fortification
Phase IV	Kempinski stratum 3a, b	early Middle Bronze II	further enlargement; Aegean-style wall paintings and floors
Phase III	Kempinski stratum 3c	Middle Bronze II	major renovation; wine cellar; Orthostat Building

[a] After Kempinski et al. 2002b.

(19th–17th centuries B.C.E.). During our decade of excavation and survey, we have uncovered additional Aegean-style frescoes, elaborate palatial architecture, and storage rooms for wine.[5] The stratigraphic sequence from the palace has provided us with a robust ceramic record, a relative chronology for much of the Middle Bronze Age, and, most recently, a tentative revised chronology based on radiocarbon dating.[6] Our findings have also provided zooarchaeological data, technical data on the painted plaster, and evidence for textile production. They have led to tentative hypotheses concerning the palatial economy and the precise nature of the palace at Tel Kabri.[7]

It was in 2013 that we first uncovered a single storage room, Room 2440, filled with approximately 40 large storage jars. It was in use during the latest phase of the palace, phase III, which is dated to the MB II period (see table 1).[8] Organic residue analysis indicated that the storage jars found in the room were once filled with wine, primarily red wine, which was spiced with resin, honey, and herbal additives.[9]

During the 2015 excavation season, we uncovered portions of three more rooms, south of the original room (2440), containing a total of approximately 70 additional jars (fig. 2). These demonstrated that Room 2440 is not an isolated storage room but rather is part of a southern complex that included at least four rooms, in addition to a northern complex with more rooms. Overall, these may be described as multiroom storage complexes separated by a narrow corridor, all located to the west of the ceremonial wing of the palace. The ceremonial wing includes the Orthostat Building[10] as well as Hall 611, which is a generous space adorned with an Aegean-style frescoed floor.[11]

To date, this is the largest storage area found in any second-millennium B.C.E. palace in the southern Levant. As the storage complexes were found full of pottery, with the overwhelming majority consisting of large storage jars, it presents us with a unique opportunity to study numerous aspects of the Canaanite political economy and palatial consumption patterns. Moreover, organic residue analysis studies conducted on the 70 additional jars provided some surprises, which in turn have led us to consider whether we might be uncovering a small winery rather than simply a wine cellar, as previously supposed. It is on these new results that we focus in this article, including the architecture of the storage rooms, the ceramic finds within them, and the initial results of the petrographic and organic residue analyses.[12]

THE STORAGE COMPLEXES: ARCHITECTURE AND FINDS

More than 170 m^2 of the storage complexes have been uncovered to date. The southern edge of our excavation area is the old Nahariya-Meona road, although the remains continue into the balk and under the road. The southeastern quadrant of the current excavation area meets Kempinski's excavated area in this region.[13] Based on the stratigraphic relationship with the Orthostat Building and the rest of the palace, as well as a comparison of the pottery assemblages found in all these areas (see below), the final days of the storage complexes are attributed to the last phase of the palace (phase III) and are dated to the MB II period, when general renovations were executed in the palace's main building.[14]

Architecture

The two multiroom storage complexes excavated in 2013 and 2015 are located on either side of Corridor 2460/2517 (see fig. 2). Both are constructed with walls that have a foundation of three courses of fieldstones and a mudbrick superstructure. The floors and walls are covered with a thick layer of compacted crushed lime laid over a rubble construction.[15] The floor surface is

[5] Aegean-style frescoes: Cline et al. 2011. Palatial architecture: Yasur-Landau et al. 2012. Storage rooms: Koh et al. 2014, 27 August.

[6] Ceramic record: Yasur-Landau et al. 2011; Samet 2014; Samet and Yasur-Landau 2016. Relative chronology: Yasur-Landau and Cline 2014; Yasur-Landau et al. 2014. Tentative revised chronology: Höflmayer et al. 2016; Cline et al. 2017.

[7] Zooarchaeological data: Marom et al. 2014, 2015. Data on painted plaster: Goshen et al. 2017; Linn et al. 2017. Evidence for textile production: Goshen et al. 2013. Hypotheses concerning the palace at Tel Kabri: Yasur-Landau et al. 2015.

[8] Goshen et al. 2013; Höflmayer et al. 2016.

[9] Koh et al. 2014, 27 August.

[10] Yasur-Landau et al. 2012.

[11] Kempinski et al. 2002a; Niemeier and Niemeier 2002.

[12] The results of the 2017 field season yielded seven additional jars, but the analysis of those vessels is not yet complete, so the data are not included in this article.

[13] Oren 2002, fig. 4, no. 57.

[14] Yasur-Landau et al. 2014.

[15] Goshen et al. 2017.

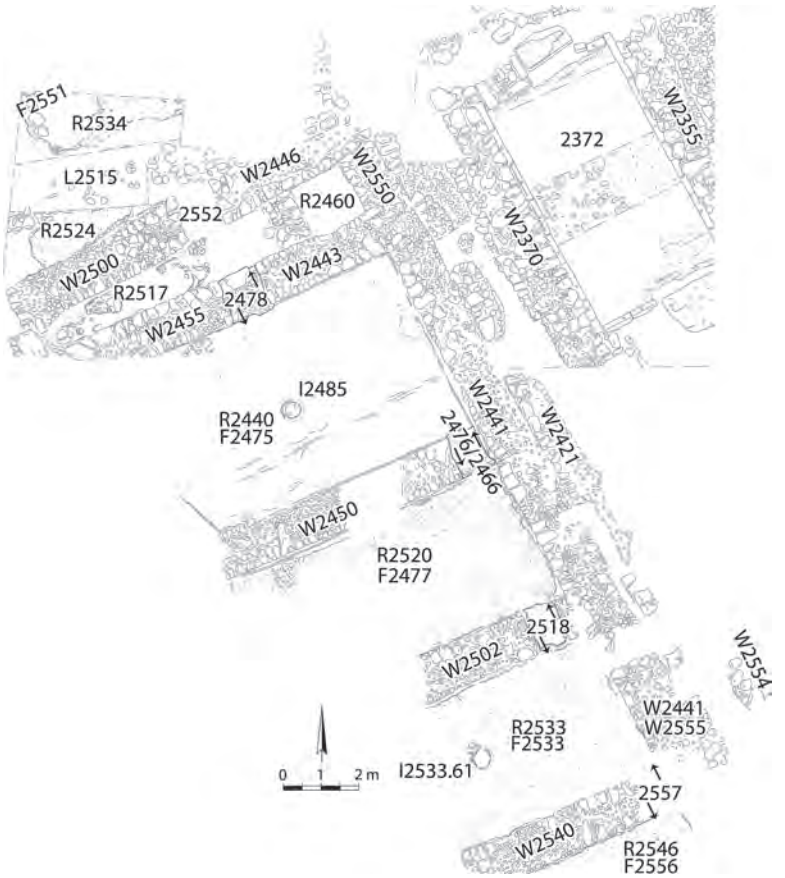

FIG. 2. Plan of the southern and northern storage complexes after the 2015 season (drawing by S. Pirsky). Feature labels are abbreviated as follows: F = floor; I = installation; L = locus; R = room; W = wall.

uneven and regularly dips toward the center of each room, most likely because of the installations placed there (see below).

Southern Storage Complex. Four rooms have been identified within the southern storage complex; these are Rooms 2440, 2520, 2533, and 2546 (fig. 3). The excavated portion of Room 2440 measures 9.0 x 4.5 m and is the most complete of the four rooms, with only a small portion to the west still unexposed (fig. 4). The excavated portion of Room 2520 measures approximately 4 x 8 m (fig. 5), and that of Room 2533 measures 4 x 5 m (fig. 6). In Room 2546, only a small triangular area adjacent to the road, measuring 1.5 x 1.0 m, was available for excavation (fig. 7).

A single wall (2441) delineates the eastern edge of the southern complex, running the length of all four rooms (see fig. 2). Measuring nearly 17 m long, it prevents direct access between the storage complex and the area of the palace immediately to the east of it. The western portion of the southern complex remains unexcavated to date, apart from a small section at the western end of Room 2440 where the west wall was robbed. Walls 2455 and 2443 define the northern edge, with a central threshold (2478) allowing entry into the complex.

Three east–west walls (2450, 2502, and 2540) that are consistently the same width, measuring approximately 1.20–1.30 m, divide the rooms. Access to, and passage between, the rooms in the southern complex was via thresholds located where the internal east–west walls meet Wall 2441. These inner thresholds (2476/2466, 2518, and 2557) measure approximately 95–110 x 120–130 cm and are paved with pulverized chalk laid over a rubble foundation, similar to the floors in the rooms.

In Rooms 2440 and 2533, a jar had been inserted into the center of the floor in each during its construction, such that the jar rim is aligned with the floor of pulverized chalk (fig. 8). The jar's base was intact in each case, indicating that the vessel functioned not as

FIG. 3. Southern storage complex: *left*, view from the north, looking at (in order, from north to south) Rooms 2440, 2520, 2533, and 2546; *right,* view from the south, looking at (in order, from south to north) Rooms 2546 (between chain-link fence and black pipe), 2533, 2520, and 2440.

FIG. 4. Room 2440: *left*, with jars in situ, looking from northwest to southeast; *right,* after removal of jars, looking from northeast to southwest.

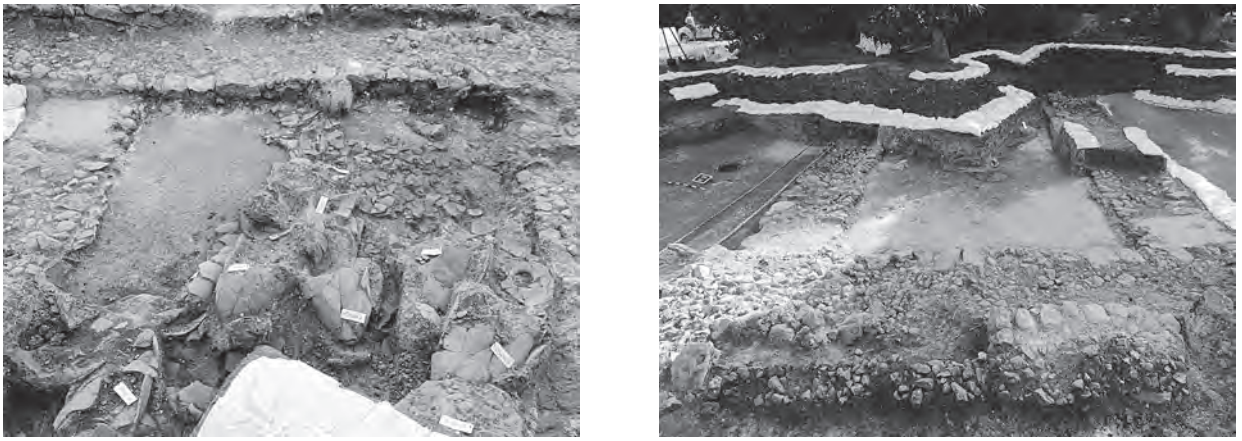

FIG. 5. Room 2520: *left*, with jars in situ, looking east (note clean northeast corner, where jars had previously been removed at the end of the 2013 season); *right,* after removal of jars, looking west.

FIG. 6. Room 2533: *left,* with jars in situ, looking west; *right,* after removal of jars, looking east, with pithos installation visible.

FIG. 7. Room 2546: *left,* with jars in situ, looking west; *right,* with Room 2533 (center), after removal of jars, looking west. The pithos installation in Room 2533 is visible.

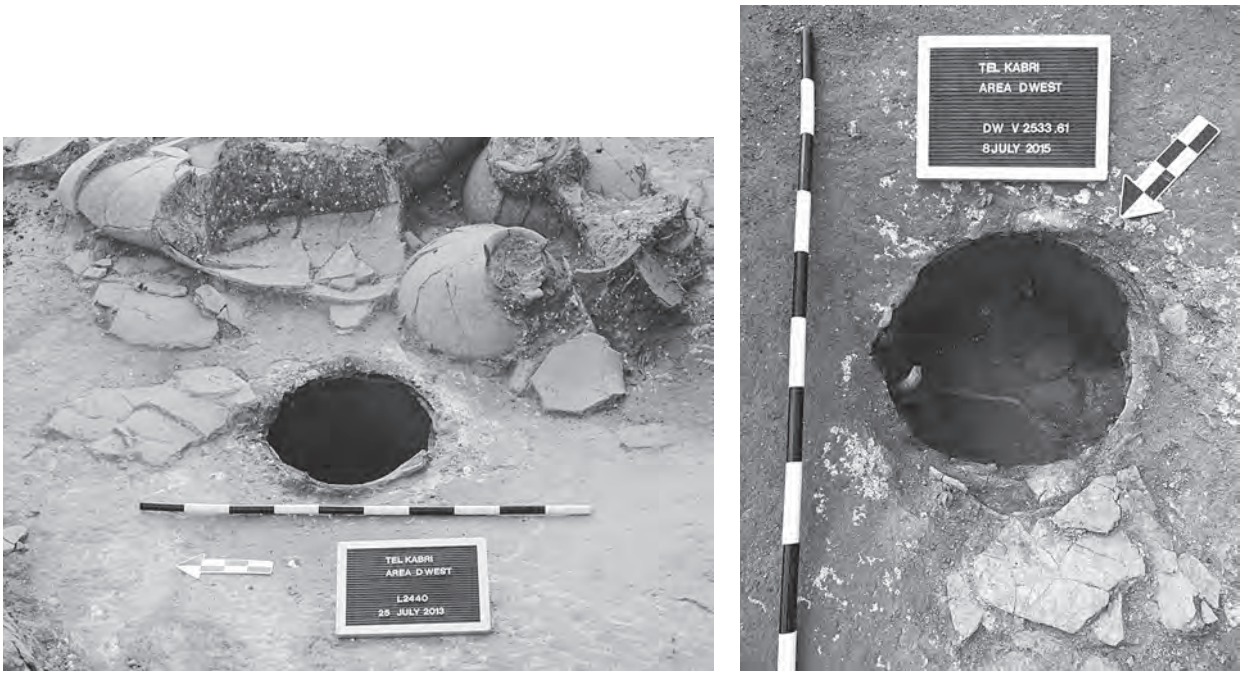

FIG. 8. Jar installations in the southern storage complex: *left,* Installation 2485 in Room 2440, from 2013 season; *right,* Vessel 61 in Room 2533, from 2015 season.

a type of drain but rather as a basin or installation probably meant to collect liquids that might have spilled on the floor and trickled down toward the center of the room, following the gradual slope. A significant amount of carbonized material and grape pips were recovered from the fill of the installation in Room 2533. We assume that similar jars will also be found sunk into the floors of Rooms 2520 and 2546, but in neither case has the center of these rooms yet been excavated.

The access patterns to the southern storage complex are clearly linear and restricted; in the eastern part of the rooms, which have all been exposed through excavation, doorways and thresholds lead from one room to the next. However, while all other thresholds were made of pulverized chalk and are located at the eastern side of the rooms, Threshold 2478, leading north from Room 2440, was constructed of fieldstones and situated at the center of the north wall (Wall 2455/2443). This suggests that this doorway was of special status, connecting the southern complex to Corridor 2460/2517.

Connecting Corridor (2460/2517). As stated above, Threshold 2478 leads north from Room 2440 of the southern complex into Corridor 2460/2517. This corridor is paved with compact earth rather than with the crushed lime found on other surfaces. It is blocked at its east end by Wall 2550, constraining passage to the east (fig. 9). The area between the southern storage complex and the Orthostat Building (Walls 2550 and 2441) is disturbed, making it difficult to determine their connection. The entrance to the northern complex from the corridor is through Threshold 2552, which is also constructed of fieldstones and is in north–south alignment with Threshold 2478 (fig. 10).

We attribute both the final deposit of the storage complexes and the construction of the Orthostat Building to the final renovation phase of the palace. However, it is possible that the original construction of the storage complexes predates the Orthostat Building and that in its earlier phase this connecting corridor led farther toward the palace; if so, construction of the Orthostat Building apparently changed the area's function. Further exploration under the floors of the rooms should enable us to establish the date of the original construction of the complexes before their final use during phase III of the palace (first half of the 17th century B.C.E., according to the radiocarbon dates).

Northern Storage Complex. The northern storage complex is heavily disturbed by a modern intrusive trench (2515). So far, portions of one room, divided

FIG. 9. Corridor 2460/2517 between southern and northern storage complexes, looking west; the corridor is blocked at its east end by Wall 2550. Wall 2455/2443 and the northern edge of Room 2440 are visible on the left side of the photograph.

FIG. 10. Detail of fig. 9, showing Corridor 2460/2517 and northern storage complex, looking west. Wall 2500/2446 with Threshold 2552 is visible in the middle of the photograph; Room 2524/2534 (divided by an unmoved portion of a balk) is visible at the top right of the photograph.

into two parts (2524 and 2534), have been excavated (fig. 11). The room is paved with the same thick, plaster-like, crushed lime floor seen in the rooms of the southern complex. Wall 2500/2446 (with Threshold 2552) is the southern wall of this room. The northern and western walls have yet to be excavated and defined. The eastern wall was apparently heavily disturbed by later activities, so that only a few stones remain.

The interior of the room was covered with a thick layer of collapse, ranging from 42 to 67 cm deep. This was characterized by degraded mudbrick in patches of reddish orange set into a dark-brown matrix flecked with lime and scattered with small pebbles.

Finds

The predominant form of material culture found throughout both storage complexes was pithoi, lending identification to the complex. Their typology and analysis are discussed later in this article, as well as their number per room. They created a massive layer of pottery covering almost every part of the rooms' floors (see figs. 4, left; 5, left; 6, left; 7, left).

In the southern complex, no discernible orientation was observed among the jars within Room 2440; they are simply in position where they fell (see fig. 4, left). Additional vessels, including a smaller storage jar

with two handles, a goblet of the "Kabri cup" type,[16] and fragments of a jug and dipper juglet, were found scattered throughout the room.

Similar material was found in Room 2520, dominated by a large number of pithoi lying on the floor but oriented east–west across the room (see fig. 5, left). Vessels were highly concentrated in the threshold between the two rooms as well as along the northern internal wall of Room 2520. A concentration of two small bowls, a cup, and a juglet was also found in the northwest corner of the room.

The excavated areas in Rooms 2533 and 2520 were of similar size, but a higher concentration of pottery was found in Room 2533. However, the vessels in Room 2533 were also more fragmented than those in the other rooms, with many either crushed or degraded for reasons that have yet to be determined; the individual sherds were also more susceptible to crumbling as they were removed. The highest concentrations of degraded pottery were found in the eastern end of the room. Additionally, numerous fragments of bowls, cups, jugs, and juglets were found inside and around the larger vessels throughout the room, particularly concentrated against Walls 2502 and 2540 (see fig. 6, left). Generally, we observed a noticeable directionality to the in situ vessels in Room 2533, similar to that in Room 2520. Most vessels are aligned on an east–west orientation, with their bases to the west. However, not all vessels adhere to this pattern. This repeating pattern may indicate post-deposition processes that affected the entire storage complex, such as an earthquake or the building's collapse pattern. This phenomenon will be explored through further excavation of the storage complex floors.

Additional in situ pithoi and a conglomeration of flat-lying sherds, also belonging to pithoi, were uncovered in the southernmost room (Room 2546). Again, the orientation of the vessels was roughly east–west, but with rims and bases oriented in both directions (see fig. 7, left). No other small vessels were found in this limited area.

The material remains found in the rooms of the northern complex were also primarily storage jars, similar to those identified in the southern complex, but without any consistent orientation in their deposition. Additionally, three small storage jars with handles were found upside down in the collapse on the floor in Room 2534.

FIG. 11. Locus 2534 (northern part of Room 2524/2534) during excavation, looking west.

THE CERAMIC EVIDENCE: TYPOLOGY

Our preliminary observations in the field and in the laboratory indicate that the pottery assemblage from the storage rooms is mainly composed of pithoi, with a few other vessels such as bowls, jugs, and juglets (fig. 12; table 2).

Pithoi are usually defined in local Bronze Age archaeology as very large storage vessels more than 70–75 cm in height with a rim diameter greater than 15 cm and a storage capacity ranging from 60 to 90 liters.[17] The Kabri pithoi, in fact, present slightly larger examples (in terms of height and volume) and have exceptionally thick walls (ranging from 0.9 cm at the shoulders to 1.4–1.5 cm on the body and nearly 2.0 cm at the base).

To date, only one of the many pithoi from the storage complexes, Vessel 18 from Room 2440 (see fig. 12, no. 1), has been successfully restored. It provides a complete profile with the following dimensions: height 105.2 cm, maximal external body diameter 49.6 cm, maximal rim diameter 19.4 cm, internal neck diameter

[16] Yasur-Landau et al. 2011.

[17] Bonfil 1992, 26; Maeir 2007, 267.

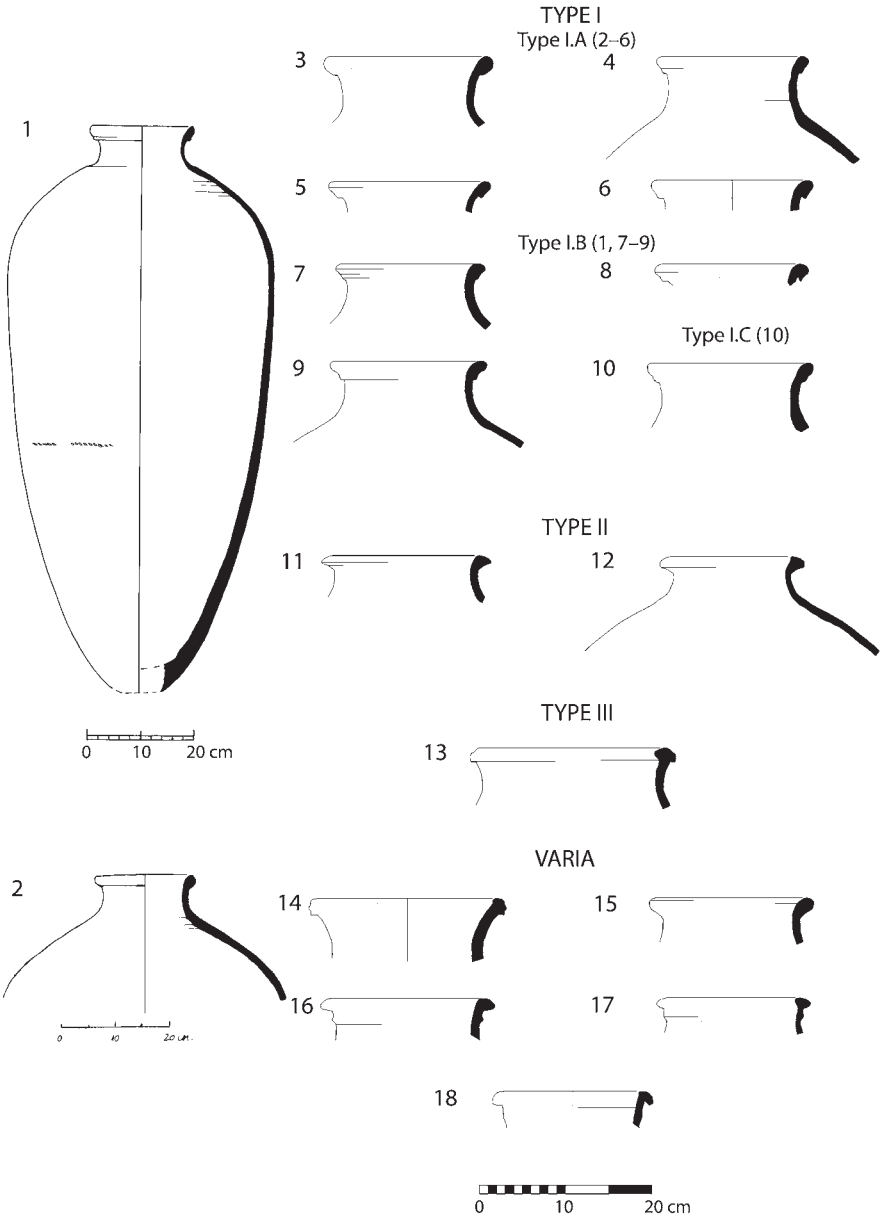

FIG. 12. Pithos Types I–III and Varia.

14.3 cm, and total volume 113 liters.[18] This handleless pithos appears to be representative of most of the storage-room pithoi. Vessel 10 from the same room, for example, was partially restored to its maximal diameter (50.4 cm) and significantly resembles Vessel 18 (see fig. 12, no. 2).

Furthermore, most of the Kabri pithoi have long necks (see fig. 12, Types I and III in particular; see also below), closely resembling those of Bonfil's Type V pithoi, which are characterized by their high necks and lack of handles.[19] Type II rims, in contrast, are a shorter-necked type. A total of 96 rims were suffi-

[18] The volume was calculated by Ortal Harouch of the Hebrew University. An additional four pithoi are currently also in the process of reconstruction and show profiles similar to that of Vessel 18. It is our aim to reconstruct 10% of the entire corpus as a sample, which may be sufficient considering the overall typological uniformity.

[19] Bonfil 1992, 29–30, fig. 5.

TABLE 2. Descriptions of pottery in figure 12.

No.	Room	Vessel No.	Dimensions (cm)[a]	Rim Type
1	2440	18	rim diam. 19.4; neck diam. 14.3	I.B
2	2440	10	rim diam. 18.8; neck diam. 13.4	I.A, rolled
3	2533	36.35	rim diam. 19.8; neck diam. 13.4	I.A, rolled
4	2440	24	rim diam. 17.7; neck diam. 13.0	I.A, folded/elongated
5	2517	7.52	rim diam. 18.8	I.A, folded/elongated
6[b]	2520	n/a	rim diam. 18.8	I.A, folded with overhanging lower ridge
7	2533	54.26	rim diam. 17.3; neck diam. 12.6	I.B
8	2533	32.82	rim diam. 17.8	I.B, square profile
9	2440	FG9–10	rim diam. 18.3; neck diam. 13.0	Type I.B, externally profiled
10	2533	22.77	rim diam. 19.3; neck diam. 13.8	I.C
11	2533	41.1	rim diam. 19.6; neck diam. 14.7	II
12	2440	FG1	rim diam. 16.8; neck diam. 12.2	II
13	2440	FG2	rim diam. 24.0; neck diam. 18.7	III
14	2533	28.14	rim diam. 22.8; neck diam. 14.8	Varia
15	2533	3.17	rim diam. 19.1; neck diam. 14.0	Varia
16	2440	7	rim diam. 20.2; neck diam. < 14.6	Varia
17[b]	2520	n/a	rim diam. 17.8; neck diam. 14.4	Varia
18	2440	23	rim diam. 18.6	Varia

[a] The terminology used here is as follows: rim diam. = maximum diameter, measured from the exterior of the rim; neck diam. = minimum diameter of the neck, measured at the narrowest point of the neck.
[b] No vessel number was assigned to this particular vessel.

ciently preserved to be cleaned, measured, and three-dimensionally scanned.[20]

Rim Typology

The pithos rims were recovered from Rooms (or loci) 2440, 2460/2517 (corridor), 2520, 2524, 2533, 2534, and 2546. Three main types appear: Types I–III.

Type I includes three subtypes. Type I.A rims, which are by far the most numerous, are folded, ranging from rolled and rounded forms (see fig. 12, no. 3) to more flattened and elongated rectangular forms (see fig. 12, nos. 4, 5). Some have pronounced overhanging lower ridges that appear to have formed when the fold was not pressed down all the way (see fig. 12, no. 6). Two other Type I subtypes are evident as well. Type I.B rims are externally profiled with a shallow and wide impressed indentation, most commonly with a pronounced ridge at the bottom of the rim (see fig. 12, nos. 7, 8). Three in particular, all from Room 2440, are more elongated and everted versions of this subtype, with a noticeable protruding lower ridge (see fig. 12, no. 9). Type I.C rims are externally profiled with a deep groove about halfway down the exterior fold of the rim creating two distinct rounded ridges (see fig. 12, no. 10). Overall, Type I rims have close parallels elsewhere at Kabri in contexts contemporary with the storage rooms.[21] The elaborate Type I.B rims (see fig. 12, nos. 7, 9) appear in other contemporary contexts

[20] The pottery was scanned at the Institute for Archaeology at the Hebrew University of Jerusalem.

[21] Kempinski et al. 2002b, fig. 5.57, nos. 11, 12; Samet 2014, fig. 14, nos. 4, 5. For another variant, see also Kempinski et al. 2002b, fig. 5.41, no. 12. Rim Type I seems to appear in rare cases already in the MB I, such as at Aphek (Yadin 2009, fig. 7.6, no. 20). It appears more frequently during the MB II at sites like Qashish and Shechem (Cole 1984, pl. 32a; Ben-Tor and Bonfil 2003, fig. 86, no. 21). At Yoqne'am, it has been argued not to be chronologically significant (Livneh 2005, 43), although it is a rare type at the site and appears only in the MB IIA strata.

at Kabri and were a common form throughout the Middle Bronze Age.[22]

Type II rims are everted and externally molded, creating a triangular section (see fig. 12, no. 11). One example has a subtle interior gutter (see fig. 12, no. 12). They exhibit similarity to pithos rims from MB II Shechem,[23] but in general there are fewer published parallels for Type II rims than for Type I. A collared version of this rim type was found at MB III Shiloh.[24]

Type III rims have an exterior molding as well as an interior molding in the form of an interior ledge, almost wedge-shaped (see fig. 12, no. 13). At Kabri, a collared version of this rim was found in the contemporary stratum III.[25] Other examples of this type of rim were found mainly in MB II and MB III contexts, but the type already appears during MB I.[26]

Another group, labeled "Varia," includes five pithos rims that do not correlate with Types I–III: a folded, rilled rim (see fig. 12, no. 14);[27] a thickened, everted rim (see fig. 12, no. 15); an everted rim resembling Type II but with an additional ridge below the rim on the neck (see fig. 12, no. 16);[28] a rim resembling Type III with the addition of an exterior ridge on the neck (see fig. 12, no. 17); and an everted and downward-pointing hook-shaped rim (see fig. 12, no. 18).[29] These types have parallels beginning in MB I and becoming more common in MB II–III.

Overall, our comparative analysis has shown that the assemblage does appear to reflect the later MB II period, when the plain rolled and folded Type I rims and the Type III rims were apparently more popular and before the rilled rim became one of the more favored pithos rim types (i.e., prior to the end of MB II). This conclusion stands in agreement with the relative chronology of late MB II assigned to phase III by the previous study of the material from the palace.[30]

There was a high degree of standardization in rim types and likely in the general size of the pithoi. Eighty-three of the 96 rims analyzed (86%) were Type I rims, and of those nearly two-thirds were simple and rolled. In fact, Type I rims make up 80% or more of every room's assemblage (excluding Room 2524; table 3). The other types are significantly less common in the assemblage. The average maximal exterior diameter of the pithos rims is 19.0 cm, with two-thirds of the samples within 1 cm of that average.

Different rim types present slight variation in metrics. Type I rims were much more standardized than the others, with an average rim diameter of 18.9 cm and average neck diameter of 13.2 cm; 64 of the 83 Type I rims are within 1 cm of that average. Type II rims are mainly smaller, with an average rim diameter of 17.6 cm and average neck diameter of 12.9 cm. Type

[22] Kempinski et al. 2002b, fig. 5.57, nos. 10, 13. Type I.B rims find parallels beginning in the MB I at Aphek (Beck 2000, fig. 10.20, no. 11) and into the MB II at Akko (Beeri 2008, pl. 9, nos. 6–8). They are attested at Yoqne'am (Livneh 2005, fig. 2.8, no. 5; fig. 2.15, no. 19), at MB II Shechem (Cole 1984, pl. 33a–j), and over the duration of the Middle Bronze Age seaside sanctuary at Nahariya (Ben-Dor 1950, fig. 20a–f).

[23] Cole 1984, pl. 32d–i.

[24] Bunimovitz and Finkelstein 1993, fig. 6.7, no. 19.

[25] Kempinski et al. 2002b, fig. 5.41, no. 9.

[26] Type III rims span the MB II–III periods at Yoqne'am (Livneh 2005, fig. 2.18, no. 1; fig. 2.24, nos. 1–5), and they appear in the MB III period at Beth Shean (Maeir 2007, pl. 5, nos. 37, 38; pl. 6, no. 10; pl. 33, no. 9) and Megiddo (Ilan et al. 2000, 187, fig. 9.1, no. 15; fig. 9.5, nos. 22, 25). A similar type, which occurred throughout MB I–III at Akko (Beeri 2008, fig. 9, no. 16), closely resembles one of the varia recovered from Room 2520 (see fig. 12, no. 17), and in fact Maeir considers pithoi resembling our Type III, and the pithos from Room 2520, to be the same type (Maeir 2007, pl. 21, no. 12). Thus, many sites yield Type III rims during MB II and MB III, but already in the MB I similar rims appear at Akko.

[27] Pithoi with rilled rims appear during MB II at Aphek (Yadin 2009, fig. 7.17, no. 24), Shechem (Cole 1984, pl. 36j–m), and Qashish (Ben-Tor and Bonfil 2003, fig. 88, no. 3; fig. 92, no. 8; fig. 93, nos. 28, 29) and during MB II–III at Shiloh (Bunimovitz and Finkelstein 1993, fig. 6.7, nos. 12, 13; fig. 6.11, no. 9; fig. 6.15, no. 1). At Qashish, it becomes the most common pithos type in the late MB II before nearly disappearing in the MB III (Ben-Tor and Bonfil 2003, 244). Although rilled rims are argued to be a MB III type (Bunimovitz and Finkelstein 1993, 91), the data demonstrate that they were popular already during the latter part of the MB II, and this is supported by our MB II context. The fact that they are rare at Kabri attests to regional preference for other rim types, specifically Type I.

[28] The everted rim with an additional ridge on the neck appears in earlier MB II contexts at Kabri (Kempinski et al. 2002b, fig. 5.44, no. 18; Samet 2014, fig. 4, no. 23). This rim type first appears in the southern Levant in MB I at Akko (Beeri 2008, pl. 9, no. 5) and Tell Mevorakh (Kempinski 1984, fig. 15, no. 20). Thus, this rim appears already in the MB I and continues into the MB II.

[29] The everted and downward pointing rim resembles a contemporary rim at Kabri (Samet 2014, fig. 14, no. 7) and appears as early as MB I at Akko (Beeri 2008, fig. 9, no. 2). Other examples of similar rims occurred in MB II at Shechem (Cole 1984, pl. 32e), Shiloh (Bunimovitz and Finkelstein 1993, fig. 6.7, nos. 5, 8), and Beth Shean (Maeir 2007, pl. 6, no. 12). Thus, this rim type appears during the MB I–II.

[30] Samet 2014; Yasur-Landau et al. 2015.

TABLE 3. Estimated total number of pithoi and projected capacity in the storage areas.

Room	Min. No. Pithoi[a]				Max. No. Pithoi[b]	Est. Area Excavated (%)	Storage Capacity (liters)[c]	Reconstructed Capacity (liters)[d]
	Type I	Type II	Type III	Varia				
2440	22	0	1	2	48	75	2,500–4,800	3,300
2460	5	1	0	0	7	100	600–700	600
2517	2	2	0	0	8	100	400–800	400
2520	21	1	0	1	31	50	2,300–3,100	4,600
2524	1	0	1	0	4	unclear	200–400	unclear
2533	24	3	1	2	47	50	3,000–4,700	6000
2534	2	0	0	0	3	unclear	200–300	unclear
2546	4	0	0	0	8	10	400–800	4,000

[a] By rim type.
[b] By field count when first exposed.
[c] Based on 100 liters per pithos.
[d] Based on minimum number of pithoi and percentage of area excavated.

III rims on the whole are significantly larger, with an average rim diameter of 22.4 cm and average neck diameter of 18.7 cm.

These trends indicate that rim types are not only morphologically different but are also associated with different rim and neck diameters. The average neck diameter, calculated from the 61 samples preserved well enough to measure the neck, is 13.3 cm. The standardization of typology is supported by the petrography analysis (presented below), which shows that all the pithoi were produced using the raw material found at the foothills of the tell on the banks of the Ga'aton River.

Evidence of mass production can be seen in the large quantity of nearly identical rim types and diameters as well as in the asymmetrical and irregular form of many of the rims. It seems that vessels with Type I rims were produced en masse. This possibly also explains why numerous Type I rims, which we have designated as Type I.B, have slightly impressed grooves.

CAPACITY OF THE STORAGE COMPLEXES

It is possible to provide a general estimate of the number of pithoi as well as the volume of storage within the rooms in the northern and southern complexes. This is because Type I, with its remarkable standardization in the rim and neck diameter, so overwhelmingly dominates the assemblage. It is likely, therefore, that the numbers and capacity of the restored Type I pithos (see fig. 12, no. 1) will allow us to compute the overall capacity of the rooms, because the direct liquid storage capacity depends on the volume of pithoi and their number rather than on the area of the room.

We calculated the number of vessels in the unexcavated parts of the rooms based on the assumption that the ratio of vessels to floor space is the same in both the excavated and the unexcavated portions of the rooms. For the maximum estimate of the number of vessels in the excavated areas, we counted both the recovered rims and the partial vessels without preserved rims. The minimum estimate of the number of vessels is based only on the rim count (see table 3).[31] In the interest of caution, we have reconstructed the capacity of

[31] Many of the pithos rims were either 100% or nearly 100% preserved, while 47 others were more than 50% preserved and so represent complete vessels. Another 35 rims were somewhere between 20% and 40% preserved, distinct enough in their measurements and the shape and form of the rims to additionally be considered as their own vessels. Fourteen rims that were analyzed were ca. 10% preserved and may not represent separate vessels, possibly inflating the total number of pithoi analyzed. These were included, nonetheless, since no connections were found with other vessels, and since these rims appeared distinct enough from the other pithos rims in terms of their metrics. However, 30 rims were too fragmentary to analyze, so it is also possible that the total count in this article somewhat underrepresents the total number of pithos rims.

both the excavated and unexcavated parts of the rooms using the minimum estimate by rim count.

While in the field, we estimated a capacity of only 50 liters per jar.[32] However, after Vessel 18 (see fig. 12, no. 1) was reconstructed, and Vessel 10 (see fig. 12, no. 2) was partially reconstructed, it became apparent that the volume of each pithos is approximately 113 liters—that is, more than double the initial estimate. While the figures in table 3 are only best estimates, we suggest that they can be used to obtain a general impression of the scale of storage in the various rooms. We suggest that the new reconstructed storage capacity of approximately 19,000 liters (if all the jars were filled to capacity; see discussion below) may actually be a very conservative estimate for the complete storage complex, as it uses the minimum number of items by rim count and takes into account neither rooms that may be located to the south of Room 2546 (and currently covered by a road) nor the capacity of the heavily disturbed northern complex.

PETROGRAPHY

The amount of uniformity within the assemblage and the question of whether the wine jars were imported or manufactured locally in the immediate vicinity of Kabri were examined through petrographic analysis. The geological features of the surroundings of Kabri are well known from several geological reports and surveys.[33]

Tel Kabri is located on Upper Cretaceous marine sedimentary formations that include dolomites and limestones with chert nodules. In addition, there are soft yellow marly chalks of the Turonian Yirka formation, which is rich in fossils typical of shallow-water reefs. The fossils mostly consist of reef builders: radiolites, coralline algae such as *Amphiroa*, and sea urchins.[34] Erosion products of these sedimentary rocks may be found in alluvial deposits. They are rich in clay minerals, suitable for ceramic production, and are common around the site. These raw materials are found at the Ga'aton River that flows from the Western Galilee to the Mediterranean at Nahariya, 6 km west of the tell. The river's course runs through the exposed Turonian Yirka geological formation and passes right by the foot of the tell, where sediments suitable for ceramic production could have been collected by ancient potters.

The 18 samples of pithoi in the current study, all taken from vessels excavated in the storage complex at Kabri, were analyzed by ceramic petrography.[35] Preliminary observation shows a variety of clay recipes characterized by different combinations of soils and calcareous rock formations available within the site's region (fig. 13). This variability could be attributed to the dynamic nature of the river sediments that change periodically as a direct result of the ecosystem of the Western Galilee. These are affected by the diversity of rainfall and the direction of the wind, causing the erosion of different rock formations whose particles flow in the streams and eventually settle in the banks of the river. Both the previous provenance analyses carried out on pottery from the palace and the initial results from the analysis of the pithoi support the use of local clay sources from the immediate vicinity of Kabri.[36]

ORGANIC RESIDUE ANALYSIS

The uncommon situation presented in the palatial storage rooms at Kabri, where a large number of pithoi have been found undisturbed, has also provided us with a rare opportunity to study spatial patterns in the storage of organic goods through organic residue analysis. The preliminary results are presented below.[37] The aim has been to characterize organic commodities that were stored and consumed in the palace and to help determine how various palace contexts

[32] Yasur-Landau et al. 2015.

[33] Issar and Kafri 1972; Sivan and Gvirtzman 1999; Wachs et al. 2011; Arad and Ramon 2012.

[34] Levi 1980.

[35] The provenance analysis of the pithoi from Kabri is part of an Israel Science Foundation–funded research grant (no. 910/15) on the destruction of the Tel Kabri palace, conducted in collaboration with R. Shahack-Gross at the Laboratory for Sedimentary Archaeology, Department of Maritime Civilizations, University of Haifa.

[36] Yasur-Landau et al. 2015. Future work on the Kabri assemblage will include additional sampling of pithoi as well as other shapes of vessels such as jars and/or jugs and open vessels found on-site. In addition, clay sources suitable for ceramic production in the vicinity of the site will be collected and characterized.

[37] Organic residue analysis is conducted by the ARCHEM Project field team and Koh lab group based at Brandeis University's Department of Chemistry; see Koh et al. 2014, 27 August. The ARCHEM Project is an initiative that has collected thousands of samples for organic residue analysis throughout the eastern Mediterranean. As part of this initiative, the OpenARCHEM archaeometric database (http://openarchem.org) now serves as a new open-access repository, collaborative resource, and publication outlet for archaeometric data and methodologies.

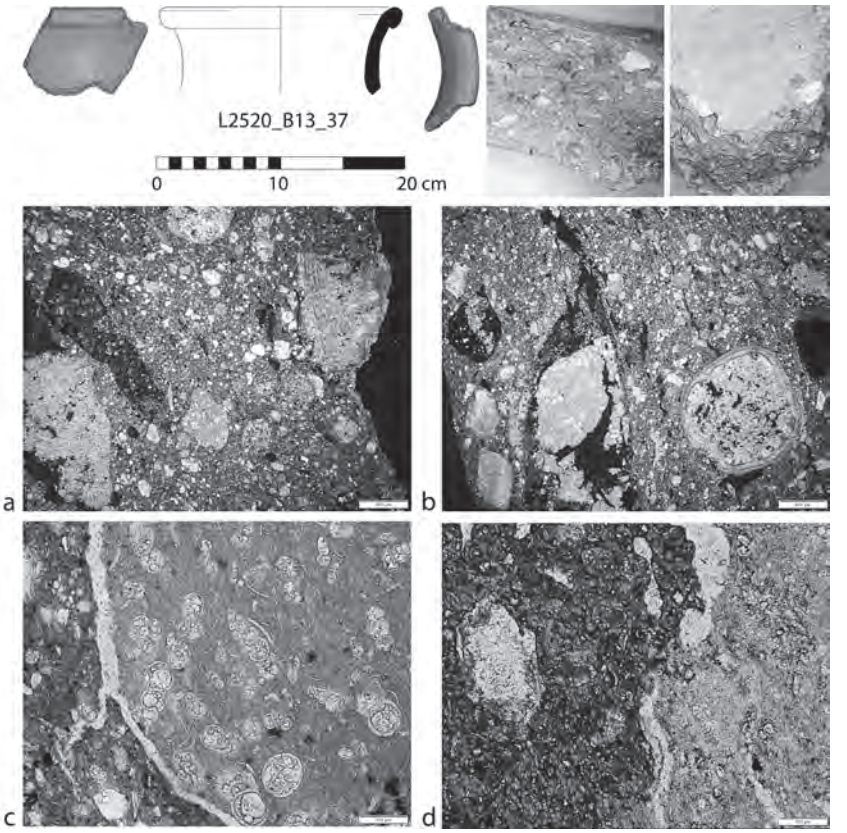

FIG. 13. Ceramic petrography of Vessel 13 from L2520, a Canaanite Type I pithos with a rolled rim: *top,* overview, showing the fresh break and surface treatment; *a–d,* photomicrographs of fresh break at 40× (*a, b*) and 100× (*c, d*) magnifications.

relate to the ancient palatial economy. To date, more than 100 organic residue analysis samples originating from vessels at Kabri have been analyzed by gas chromatography-mass spectrometry (GC-MS), using the Archaeochemistry Research in the Eastern Mediterranean (ARCHEM) extraction protocol.[38]

To begin with, 30 jars in Room 2440 were analyzed (including Vessel 33, found in the northern threshold 2478). All showed evidence for either tartaric acid or syringic acid, or both, indicating that they most likely once held wine. One jar (Vessel 5) produced evidence for the presence of red wine without resins, but the rest of the wine, in all the other 29 tested jars, was apparently resinated. Both storax and terebinth (*Pistacia*) resins were detected in each during the analyses (tables 4, 5; fig. 14).

While it is possible that one or more of the resins were added at the production centers (i.e., vineyards), since virtually all the jars filled with wine within this storage complex are resinated, it seems much more likely that resins were added while the jars were in the storage rooms, since there are jars in these rooms that contain resin but no wine and at least one jar with wine but no resin. The resins most likely served as a wine preservative, to stop it from turning into vinegar and to keep it fresh for as long as possible.[39] However, resins might also be present as a coating for waterproofing the inside of the pithoi.

Of the 30 jars in Room 2440 that held resinated wine, fully 28 show evidence for herbal infusions as well (only Vessels 1 and 4 produced evidence for resinated wine without herbs). Surviving organic compounds suggest

[38] For a full description of the methodology involved, see Koh et al. 2014, 27 August.

[39] McGovern 2003, 70–1, citing Pliny (*HN* 14.25), who says that terebinth resin was most often used for this purpose.

TABLE 4. Preliminary results of the organic residue analysis for the southern and northern storage complexes excavated at Tel Kabri in 2013 and 2015.

Room (R) or Locus (L)	No. Samples Tested	No. Samples Yielding Results				
		Resinated Wine with Herbs	Resinated Wine without Herbs	Unresinated Wine	Only Resin	Modern Contaminant
R2440 (incl. L2478)	31	28	2	1	0	0
R2460/2517	7	2	1	0	1	0
L2518	1	0	0	0	1	0
R2520 (incl. L2526)	15	0	1	0	3	3
R2524	1	0	1	0	0	0
R2533	25	0	1	0	4	2
R2534	3	0	2	0	1	0
R2546	7	0	0	1	0	0

that the wine in these 27 jars was flavored with a variety of additives, which may have included honey, cedar oil, *Cyperus*, juniper berries, and perhaps even mint and myrtle (see tables 4, 5; fig. 14). Most of these, such as honey, juniper, mint, and myrtle, could be locally obtained in the nearby Mediterranean maquis, while others, such as cedar oil and storax (liquidambar) balsam, had to be imported.[40]

It is as yet unknown whether the herbal additives were actually kept in these storage rooms. It seems quite possible that they were stored in the small jugs and juglets found in some of the rooms, which have not yet been analyzed, or in perishable materials such as sacks. It is also possible that they were kept elsewhere, although probably nearby.

In addition, the organic residues from the installation in Room 2440—that is, the base of the pithos that was sunk into the floor (labeled "IN" in fig. 14, located near Vessels 6 and 7), presumably to catch spilled liquids—also produced clear and strong evidence for resinated wine with herbal additives, including both storax and *Pistacia* resins, as well as methyl syringate, which comes from honey, and caryophyllene, which comes from cedar, mint, or juniper berries.

In contrast, organic residue analysis results from 15 jars in Room 2520 (including locus 2526 at the western end), located immediately to the south of Room 2440, indicate that only one jar contained storax-infused wine (Vessel 1), while three produced only resins (Vessels 9, 11, and 16), and at least seven did not produce any residues at all (see tables 4, 5; fig. 14). Another jar, found in locus 2518, a threshold between Rooms 2520 and 2533, also contained only resin. None of the jars in Room 2520 produced any signs of herbal infusions, although three of the jars did contain trace amounts of oleic acid (Vessel 2 from 2520 and Vessels 1 and 2 from locus 2526, all at the western end of the room). These trace amounts of oleic acid are most likely the result of modern contamination from the avocado trees that were located above the room and were removed just before excavation; we believe that organic traces from fallen avocados were carried below by irrigation water. When a 2005 aerial photograph, taken prior to our excavations in this area, was overlaid on our most recent aerial photograph (from 2017), we verified the location of avocado trees directly on top of these potential organic residue analysis contamination hotspots. The 2005 photograph could also explain why the organic residues in the original wine cellar in Room 2440 were so well preserved; by good fortune, Room 2440 lay underneath an area largely clear of avocado trees.

Similarly, at least 18 of the 25 jars in Room 2533 did not produce any trace of organic residues (see tables 4, 5; fig. 14). However, four vessels from this room did produce evidence for resins (Vessels 2, 16, 18, and 33), and two others (Vessels 12 and 15) indicated probable modern contamination in the form of trace amounts of oleic acid and linoleic acid, again most likely from the

[40] Koh et al. 2014, 27 August.

TABLE 5. Components found in the organic residue analysis for the southern and northern storage complexes excavated at Tel Kabri and the possible source(s) from which they come.

Room (R) or Locus (L)	Components Found	Possible Source(s) of Components	Interpretation
R2440 (incl. L2478)	tartaric acid	wine	
	syringic acid	wine	
	cinnamic acid	storax resin	
	moronic acid	*Pistacia* resin	
	masticadienoic acid	*Pistacia* resin	
	oleanoic acid	*Cyperus*, *Pistacia* resin, or storax resin	storax-infused wine with terebinth (*Pistacia*) resin and herbs
	cineole	*Cyperus*, mint, or juniper berries	
	methyl syringate	honey	
	cedrol	cedar oil	
	caryophyllene	cedar oil, mint, or juniper berries	
	myrtenyl acetate	myrtle	
R2460/2517	tartaric acid, syringic acid, cinnamic acid, moronic acid, masticadienoic acid, oleanoic acid, cineole, methyl syringate, cedrol, caryophyllene	as above	storax-infused wine with terebinth (*Pistacia*) resin and herbs
L2518	cinnamic acid, moronic acid	as above	probably storax-infused wine with terebinth (*Pistacia*) resin
R2520 (incl. L2526)	syringic acid, cinnamic acid, moronic acid, oleic acid	as above plus oleic acid, probably from avocado	storax-infused wine, with empty jars possibly for decanting; evidence for terebinth (*Pistacia*) resin (and possible avocado contamination)
R2524 (room in northern complex)	syringic acid	wine	evidence for wine; organics possibly washed away by nearby modern intrusion and/or irrigation
R2533	syringic acid, cinnamic acid, oleic acid, linoleic acid	as above plus linoleic acid, probably from avocado	storax-infused wine; empty jars for decanting (with possible avocado contamination)
R2534	tartaric acid, syringic acid, cinnamic acid, moronic acid	as above	storax-infused wine with terebinth (*Pistacia*) resin
R2546	syringic acid	wine	evidence for wine; organics possibly washed away by burst irrigation pipes nearby and pooling water in small trench

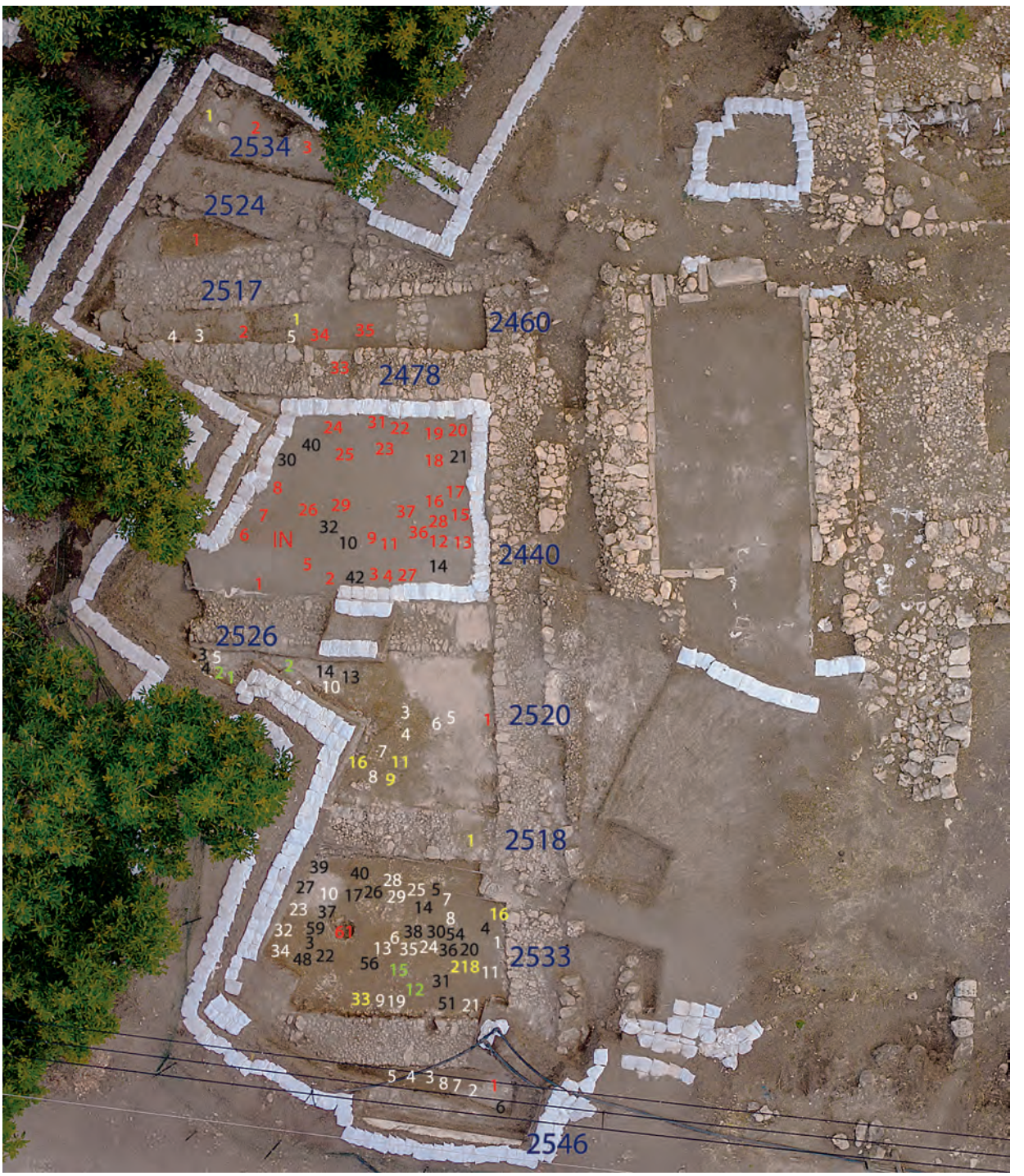

FIG. 14. Distribution map of ceramic vessels, color-coded to organic residue analysis results (red = contains resinated wine; yellow = contains only resin; green = contaminated by avocado residue; white = analysis produced no evidence of any organic residue; black = not tested). There is a separate sequence of jar numbers (usually beginning with Vessel 1) for each room or area.

avocado trees above the room. Interestingly, it was the organic residues from the installation in this room—that is, the base of the pithos that was sunk into the floor (Vessel 61 in fig. 14)—that produced the clearest and strongest evidence for resinated wine, for it contained moronic acid, from *Pistacia* resin; cinnamic acid, from storax resin; and syringic acid, most likely from wine (fig. 15). To date, this is the only vessel known from Room 2533 to contain wine (see tables 4, 5; fig. 14). Analysis of a second sherd located halfway up the sunken pithos produced no results at all; this supports the hypothesis that the pithos installation was used to catch spillage and not to store or mix wine.

Because of the proximity of Room 2546 to the road, only a very small area at the northernmost end of the room could be excavated. However, we still managed to recover eight jars from this small area (see tables 4, 5; fig. 14). Of these, only one showed evidence of having contained (probably unresinated) wine (Vessel 1), while six produced no results at all (Vessels 2–5, 7, 8) and one was not tested (Vessel 6).

To the north, although the northern complex was heavily disturbed by a modern intrusion, one pithos (Vessel 1) found on the floor of Room 2524 was verified as holding resinated wine (see tables 4, 5; fig. 14). North of the disturbance were the remains of three small storage jars with handles, found upside down in the collapse within Room 2534, with two showing evidence for resinated wine (Vessels 2 and 3) and the third showing evidence only for the presence of resin (Vessel 1). It may be that these fell from a second story or from a high shelf.

Finally, in Corridor 2460/2517, which separates the southern complex from the northern complex, two jars (Vessels 34 and 35) were found that were among those having the most complete contents of any that we tested—meaning that evidence was found for wine, resins, and multiple herbal additives in both of them. A third jar contained resinated wine (Vessel 2), while a fourth (Vessel 1) contained evidence for resin (see tables 4, 5; fig. 14).

WINE STORAGE ROOMS OR WINE MIXING ROOMS?

Overall, it is clear that the organic residue analysis results can provide us with a fuller picture of how this wine complex may have functioned, though some interpretations remain hypothetical. For instance, it seems that, of the jars in these rooms that have been tested to date, as many as 30 held resinated wine with herbal additives, but 31 other jars may have been empty at the time the storage rooms went out of use. Ten more held only resins, while six held resinated wine without herbal additives and two more held unresinated wine. What is of great interest is the locations of these various jars, as well as the two installations that have been uncovered to date.

Of the 30 jars that contained resinated wine with herbal additives, 27 were found in Room 2440; one more was lying on Threshold 2478, which leads north out of Room 2440 and into Corridor 2460/2517, and two others were in the corridor itself. Six of these jars in particular (Vessels 27, 29, 33, 34, 35, and 36) seem to have contained wine that was fully mixed and ready for imminent consumption nearby, perhaps in the Orthostat Building or Ceremonial Hall 611. Moreover, the installation in Room 2440 also provided evidence for resinated wine with herbal additives, meaning that jars in this room spilled during transfer, or that one or more such jars had broken here, or that the final herbal additives were being mixed into the wine in this room with associated spillage and perhaps breakage. We would emphasize again that this is the only area in the entire complex to have jars with such complete contents—that is, wine, resin, and herbal additives.

In fact, if we reverse ourselves and work from south to north within the southern complex (see fig. 14), we see that Room 2546, farthest to the south, has one jar with wine, probably unresinated, and six empty jars. Just to the north, Room 2533 has no jars with wine, four jars with resins, two jars with modern contaminants, and 18 empty jars, but the installation sunk into the floor (Vessel 61) provides evidence for resinated wine, although without any herbal additives. Threshold 2518, connecting Room 2533 to Room 2520, has one jar with resin in it, while Room 2520 itself has one jar with resinated wine, three jars with resins, three jars with modern contaminants, and seven empty jars. We expect to find a sunken installation in this room, but the central area of the room has not yet been uncovered and excavated. Finally, Room 2440, the original wine cellar, has 27 jars with resinated wine and herbal additives—we note again that it is the only room to have wine with herbal additives and that even the installation in this room provided evidence for resinated wine with herbal additives—plus two more jars with resinated wine without herbs and one jar with unresinated wine. Three additional jars with resinated wine and herbal additives are either on the northern threshold or in the corridor immediately to the north. (There

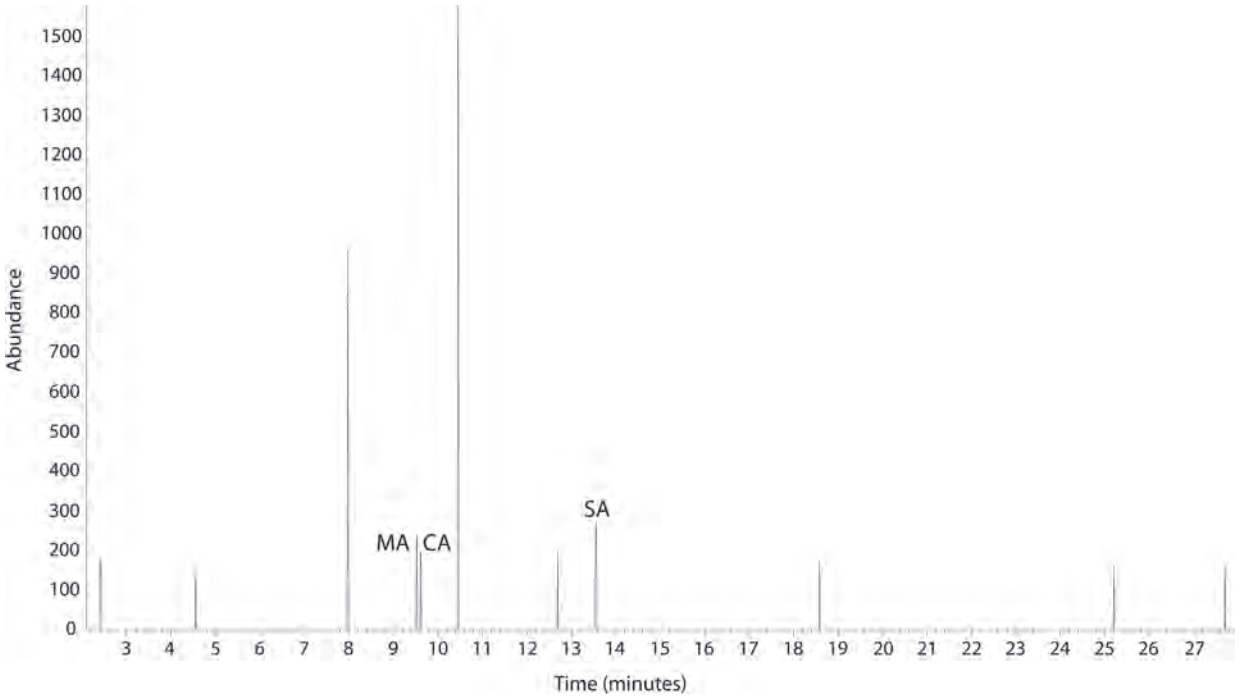

FIG. 15. Chromatogram of sample no. 4420 (the ARCHEM sample number given to a base sherd from the installation [Vessel 61] in Room 2533), indicating the presence of resinated wine (MA = moronic acid, from *Pistacia* resin; CA = cinnamic acid, from storax resin; SA = syringic acid, from wine).

are also, in the western half of Corridor 2460/2517 and in Rooms 2524 and 2534 of the northern complex, four more jars or vessels with resinated wine and two more with resin, but we suspect that this area may have had a slightly different function than the southern complex.)

This evidence could support the notion that there was a south-to-north sequence for flavoring the wine within the southern storage complex, so that wine was moved from 2546 to 2533 to 2520 to 2440 and then into the corridor before being taken to the banqueting and feasting halls of the palace. It is possible, for instance, that Room 2533 provides evidence for the bulk transfer or decantation of wine between vessels, as well as for the addition of resins. This is suggested by the sheer number of varied jars in the room, including some containing resin, and the remains of at least four small jugs/juglets that were too crushed to be reconstructed. In addition, the pithos installation produced evidence for resinated wine without any herbal additives. This may also be the case for Room 2520, and in this regard it will be of great interest to test the installation that we expect to find here. Further evidence supporting our hypothetical south-to-north assembly line may come from the installation in Room 2440 (labeled "IN" on fig. 14), which contained evidence for all the ingredients—wine, resins, and herbs. This installation may have collected wine that was spilled in the final stages of preparation or from broken jars holding completed wine.

UNDERSTANDING THE KABRI WINE-RELATED ACTIVITIES

The ceramic finds in the Kabri storage complexes are characterized by one predominant type, as mentioned above: large, handleless storage jars or small pithoi of Bonfil Type V with a height of approximately 1 m. These were apparently chosen over the alternatives available in the Middle Bronze Age ceramic repertoire, which include small transport amphoras with two handles or larger pithoi of Bonfil Type I, which are approximately 1.4 m tall and have considerably greater capacity than the Kabri jars.[41] This choice, as

[41] For complete examples from Tomb 498 at Kabri, see Kempinski et al. 2002b, fig. 5.28. For Bonfil Type I, see Bonfil 1992, 27.

well as the other feature found in two of the rooms so far—namely, the sunken storage jars used as installations—helps us to better characterize the activities conducted inside these rooms. They also help differentiate Kabri from other Middle Bronze Age palaces with storage rooms and jars.

For example, very large pithoi—that is, pithoi that are larger than ours at Kabri and cannot be moved when full—combine a large volume of storage with the sturdiness and stability needed to protect their contents. They seem to be the containers of choice in many palatial and other large-scale storage rooms in the second millennium B.C.E., such as in the palaces of Crete in the Proto- and Neopalatial eras; the palace at Pylos on the Greek mainland (e.g., Room 27, the northern storage room); the storage rooms of Temple 1 at Hattuša in Anatolia; the level IV palace at Alalakh in northern Canaan (Room 35); the administrative structures in Late Cypriot II–III Cyprus, including the huge storage area in Building X at Kalavasos-Ayios Dhimitrios; Rooms 78 and 80 at the palace of Mari in Mesopotamia; and even the Late Bronze Age palace of Hazor in southern Canaan, which is still under excavation.[42]

Alternatively, smaller containers, as well as pithoi, were sometimes placed inside built benches to make them stable, and to protect them on the one hand and to facilitate access to the open mouth of the large jar on the other hand. Such is the case with the pithoi set within the floor and benches or stands built around them in the wine and olive oil magazines of the palace at Pylos and at Mari (Room 116).[43] Benches without jars built into them also existed along the walls of the storage rooms of the northern palace of Ebla, dated to MB II, and in Room 8 of the MB II palace of Kamid el Loz.[44]

We believe that the predominance in the Kabri storage complexes of the large handleless storage jars or pithoi, as opposed to either the larger or smaller options that were also available, was a deliberate choice, in that it was the largest container that could still be moved by hand while full, although movement would have been limited since their weight while filled was well above 120 kg. Indeed, a painting of a very similar storage jar being transported by two porters can be seen in the Theban tomb of Rekhmire (TT 100), which dates to the reign of Thutmose III in the 15th century B.C.E.[45] This storage jar or pithos is nested within a net made of sturdy ropes and is carried suspended from a pole between two porters, who seem heavily burdened by the load. Nearby porters are depicted holding filled, smaller transport amphoras over their shoulders with apparent ease.

The choice of the largest form of containers that could still be moved when full may explain two other phenomena in the Kabri storage complexes. The first is the absence of any device used to stabilize or anchor the jars, such as sinking them into the floor or placing them on stands or within benches. We still do not fully understand how these jars could have stood upright without toppling over, but it may simply be that they were originally packed so closely together—from wall to wall—that they could not fall over while the room was in active use. In the vitification scene within the same Theban tomb of Rekhmire, a group of large, handleless jars stands in exactly that manner—side by side without support—and in the depiction of the royal storage rooms of Amarna in the tomb of Meryre at that site, storage jars are also shown standing next to each without any visible supports.[46]

The second phenomenon is the presence of the installation basins set in the middle of Rooms 2440 and 2533. The very mobility of such large containers would occasionally result in broken jars, and the basins represent an apparent measure to retrieve the spilled wine. Catch basins are regular features of some Minoan palatial structures, such as the storage rooms of Malia,[47] but they are not used everywhere; for example, there are no such basins in the storage rooms at Pylos (including the wine magazine, the olive oil magazine, and the north magazine).

The need to move the jars may suggest that the complex was not used only to store the wine from nearby vineyards but also as a place in which to prepare the

[42] Proto- and Neopalatial Crete: Christakis 2011; Militello 2012, 258–60. Pylos: Blegen and Rawson 1966, 146–49, fig. 421. Hattuša: Sagona and Zimansky 2007, 269–70. Alalakh: Woolley 1955, 127, figs. 44, 45. Late Cypriot II–III Cyprus: South 1997, 152–56; Knapp 2008. Mari: Parrot 1958, 146–47, 155–56. Hazor: Ben-Tor 2016, 78–89.

[43] Pylos: Blegen and Rawson 1966, 134–41, 344–47, figs. 420, 428. Mari: Parrot 1958, 95.

[44] Ebla: Matthiae 2013, pl. 79, L. 4043. Kamid el Loz: Heinz et al. 2010, fig. 52.

[45] Davies 1935, pl. 15.

[46] Davies 1935, pl. 15; Kemp 2012, fig. 4.9.

[47] McEnroe 2010, 53.

wine with botanical additives for imminent consumption. The textual records regarding the storage and consumption of wine in the palace at Mari suggest that wine was not consumed as it was stored but was mixed and repackaged. The texts also suggest that the treatment of the wine at Mari included herbal and other additives, just as seems to have been the case at Kabri.

At Mari, the mixing was done according to the preferences of the king. The process is described in a letter to the king of Mari, who was on a campaign away from his palace: "my lord wrote me [about] 'blending' [wine] and [having it carried] to Saggaratum. I opened the wine house [and] blended 4 containers of red wine as my lord likes to drink it, and 4 containers of red wine of second quality as my lord likes to drink it, I have had [them] carried to Saggaratum."[48] We would interpret these instructions as two separate instances of blending, each merging four containers of wine of similar quality (first quality and second quality), rather than mixing all eight containers together (which would have resulted in a larger amount of mediocre-quality wine).

The importance of mixing wine and handling it with care is reflected in the detailed instruction of Zimri-Lim to his wife regarding the mixing of the wine intended for Hammurabi of Babylon. This includes instructions to mix together 11 jars of similar-quality wine, probably to achieve uniformity among them, and a reminder to make certain that the wine-mixing specialist Şidqum-maşi, who was helping her, had washed his hands beforehand: "Open up the wine stockroom with Şidqum-maşi standing by, let him purify his hands, then select 11 jars of red wine of good quality that I drink. Mix it in one vat, fill 10 jars of red wine, seal them with a seal."[49]

Another letter from Mari mentions three types of wine: one jar of liquor (*sí-mi/sîmum*), one jar of sweet wine ($du_{10}ga$), and eight jars of wine of the second quality (*ús*).[50] They are shipped together with three types of herbal aromatics: one kirippum-jar of oil of cypress (*šu-úr-mìn*), one kirippum-jar of oil of myrtle (*a-si-im*), and one kirippum-jar of oil of juniper (*za-ba-lim*). While the intended use of the oils is not mentioned directly in the text, it is possible that the oils in the shipment were used to flavor the wine according to consumer tastes just before it was served.[51] The frequent occurrence of honey together with wine in the Mari texts certainly suggests the possibility of wine flavored with honey, a combination known in Hittite as LÀL GEŠTIN.[52]

One possible reason that the wine was mixed only shortly before consumption at Mari is that the mixing was conducted according to personal taste, such as for the king. Another practical reason to mix the wine not long before it was used is that, in the less-than-controlled storage environments of the Middle Bronze Age, it is very likely that the wine would lose its quality even while in storage. Since there was no climate control, the pithoi were not airtight, and there was no way to prevent fungi from harming the wine, the degradation of the wine undoubtedly began even before the pithos was opened. Thus, the resins were probably added as preservatives earlier in the mixing process.[53] Opening the wine and mixing it with herbal additives no doubt decreased the shelf life of the wine even further.

The finds from the Kabri storage rooms may similarly suggest that the final herbal additives were mixed in only shortly before consumption. The more southern rooms within the storage complexes at Kabri could be the loci for adding resins and even decanting the wine before the jars were moved to Room 2440 for the final preparation with herbal additives for local consumption.

PALATIAL BANQUETS AND THE SCALE(S) OF THE KABRI EVENT(S)

The number and volume of vessels discovered within the Kabri storage complexes far exceed the storage volume in other Canaanite palaces discovered so far. Elsewhere, the best record of storage is published from the MB II palace at Lachish, phase P-4, which was destroyed by a massive fire probably before the end of MB II, during the 17th century B.C.E.[54] It contained two clear storage contexts. Room 3125 adjacent to the courtyard of the palace yielded seven pithoi and four storage jars.[55] Another two rooms, 3106 and 3156, which were a storage room and its annex, were located in inner rooms of the southern wing of the palace; these yielded eight pithoi and one storage jar.[56]

[48] Durand 1988, no. 242; translation by Heimpel 2003, 169.
[49] Dossin 1978, no. 133; translation by Sasson 2015, 157–58.
[50] Bardet 1984, no. 354; Chambon 2009, 9, 48.
[51] Chambon 2009, 9.
[52] Chambon 2009, 9 (e.g., Bottéro 1957, no. 257).
[53] Supra n. 39.
[54] Ussishkin 2004, 153–56.
[55] Singer-Avitz 2004, fig. 16.16–18.
[56] Singer-Avitz 2004, figs. 16.13, 16.14, 16.19.

The estimated volume of storage in the Kabri storage complexes, ranging from a minimum of approximately 9,600 liters (based on the capacity of the minimum number of vessels found) to a maximum of approximately 19,000 liters (based on the reconstructed number of vessels in the excavated area and assuming all the jars were full, as noted above), falls somewhere between the storage capacity of Minoan palaces and that of Minoan mansions.[57] Indeed, with an estimated palace size of 6,000 m^2, Kabri was smaller than the Minoan palaces of Knossos, Phaistos, and Malia and also smaller than the 10,000 m^2 Late Bronze Age palace of Ugarit.[58] Kabri's storage capacity, however, seems more impressive if one considers that the storage rooms were dedicated solely to the storage and handling of wine and of substances added to the wine with absolutely no indication for any other commodity stored in the jars, such as olive oil or preserved meat or fish. The choice to store and handle so much wine within the palace is intriguing.

By contrast, at Ugarit, in which viticulture was an important part of the palatial economy, wine was made, stored, and administrated at "vineyards" (*gt*). A prime example of the administrative pattern is seen in tablet KTU 4.213 (alternatively identified as RS 16.127).[59] The first part of the tablet mentions the wine inventory at 11 *gt* sites, with a total of 507 jars (*kd*) of "good wine," 556 jars of "average wine," and 40 jars of "spoiled wine," for an estimated total of 24,226 liters. The second part of the tablet deals with large-scale disbursements of wine and oil, in which 640 jars of wine are distributed, which is approximately 60% of the wine kept at the *gt* sites. The palace of Ugarit, excavated in full, did not yield any wine storage rooms or indeed any storage area that could hold such a capacity of wine.

We would suggest two reasons for the choice to create storage areas for wine within the palace itself at Kabri. The first is the *oikos* model that we have previously suggested for the Kabri palatial economy, in which the palace acted like a self-sustaining large house, rather than leading a palatial sector of the economy of the polity.[60] If the palace is conceived as a house writ large, it is only reasonable that it will have all the facilities of a regular house, including storage. The other possible reason for the existence of the wine-storage complexes is that the major locus for the consumption of wine was within the palace but included some dissemination to points farther afield, which could necessitate decanting into smaller pithoi for easier transport.

The existence of at least 3,300 liters, and possibly much closer to 4,000 liters, of mixed wine ready for immediate use in Room 2440 alone may be an indication that one or several large events were about to happen in the palace, during which massive amounts of wine were to be consumed. Similarly, large amounts of wine amassed for banquets are mentioned in literary sources of the second millennium B.C.E. in both the Aegean and the Levant. For example, a tablet from Ugarit, KTU 1.91, gives a long list of royal sacrificial rites, followed by a list of sites that provided wine for the events—very likely banquets following the sacrifices rather than the offerings to the gods, as the latter rarely included wine. The wine is of two qualities and is measured in storage jars (*kd*). The total is approximately 96 storage jars, meaning more than 2,000 liters of wine.[61]

In the Aegean, the wine listed in the Linear B tablet Gm 840 from Knossos records the disbursement of an equivalent of 14,342 liters of wine. If it was indeed intended for a banquet, as suggested by Bendall, it will have been a spectacularly large event.[62] In contrast, the scale of events on the Greek mainland at Pylos may have been somewhat smaller, and perhaps wine was not the chief beverage used. It is interesting to note that the full capacity of the wine magazines at Pylos was calculated to be 4,683 liters, somewhat similar in scale to Room 2440 at Kabri, although of course it is possible that some of the pithoi at Pylos did not contain wine.[63]

Still, the magazines at Pylos would be large enough to store wine for the events mentioned in the site's Linear B tablets. For example, tablet Un 718 records donations to Poseidon made by two high-ranking individuals and two corporate bodies of people. Based on the amount of grain and meat, the total amount of food recorded on Un 718 is adequate to feed well over 1,000 people.[64] However, only 172.8 liters of wine were recorded (a total of "V 108" in Pylian liquid units). Another tablet from Pylos, Un 2, which describes

[57] Christakis 1999, 11; 2011, 251.
[58] Yon 2006, 35.
[59] Heltzer 1990, 128–29; McGeough 2011, 388–90.
[60] Yasur-Landau et al. 2015.
[61] Heltzer 1990, 127–28; Pardee 2002, 214–16, 220.
[62] Bendall 2007, 154–55.
[63] Palmer 1994, 193; Bendall 2007, 159.
[64] Palaima 2004, 243; Nakassis 2012, 3–4.

commodities allotted to the "initiation of the *wanax*," includes a larger quantity of wine, approximately 585.6 liters (a total of "V 366" in Pylian liquid units).[65]

Piteros et al. and Shelmerdine estimated that the commodities listed on tablet Un 2 (i.e., 32 sheep, four goats, one fattened pig, and six sows) were sufficient to provide each of 1,000 people with 0.5 kg of meat and 0.5 liter of wine.[66] Using a larger estimate of the available meat, Ruipérez and Melena calculated that each of 2,000 people at the same event could have been served with 1.0 kg of meat, 0.5 kg of barley bread, and 1.0 liter of mixed wine (in which one part of wine was mixed in three parts of water).[67]

By way of comparison, even if not mixed and/or diluted further the 3,300–4,000 liters attested in Room 2440 at Kabri could have provided 0.5 liter of wine for each of at least 6,600–8,000 people. It is, of course, possible that the wine, or some portion of it, was being readied to be shipped somewhere else rather than to be consumed at the palace. It is also conceivable that it was meant for day-to-day consumption at the palace but not for large feasts, for this amount of wine would provide a daily half liter for 50 people for about half a year. These alternative possibilities, however, seem less likely than the scenario that we envision. Shipping the wine elsewhere would have been done in considerably smaller containers, such as Canaanite amphoras that were better suited for such a journey, and not in the rather larger pithoi found at Kabri. Similarly, since zooarchaeological and other evidence indicates that feasting took place in several locales within the palace at Kabri, we see it as likely that the wine was used at large feasts. Certainly, it could also have been used for daily consumption by the king and his immediate family and entourage.

CONCLUSIONS: STORAGE AND FEASTING IN THE KABRI PALACE

Nakassis, in discussing tablet Un 718 from Pylos, has argued, following Pierre Bourdieu's terms, that the Pylian *wanax* used the social event of the feast to convert material wealth into symbolic capital.[68] It may be that we should envision similar situations as having occurred at Kabri.

The price of wine is mentioned in a Mari tablet, in which 120 jars of wine are bought with 38 Mari silver shekels in what was considered to be an exceptionally good deal.[69] Unfortunately, the volume of the vessels cannot be deduced, but these are unlikely to be as large as the Kabri pithoi. This sum—38 silver shekels—had a significant purchase value, especially when two mina of bronze cost one silver shekel, meaning that 38 silver shekels could buy 76 mina of bronze, which was enough to make, for example, 760 javelin heads.[70]

In contrast, the value of wine in Ugarit, according to one tablet, may be calculated to be 6.4 liters per (Ugarit) silver shekel. This can be *yn msb* "cellar" wine, *vin ordinaire*, or *yn hsp* "decanted" wine (RS 16.179).[71] The value of 4,000 liters may therefore be assessed at approximately 625 (Ugarit) silver shekels. This is a steep sum in a second-millennium B.C.E. reality, when the salary of a workman was about one shekel per month and a sheep cost 1–1.5 shekels.[72] The market value of the 3,300–4,000 liters of Kabri wine that was about to be converted to symbolic capital may have been, as at Pylos, quite high, and this conversion would never have been made without a very good economic reason.

How much labor and vineyard area was needed to produce the 3,300 or more liters of wine stored in Room 2440? The Roman author Columella (*Rust.* 3 3.3.8–9) argues that one person could till seven *iugerea* of vineyard, a total area of 17,626 m^2, or 1.76 ha (each *iugerum* = 2,518 m^2).[73] This figure seems to correlate with data on labor investment in preindustrial vineyards in France. Vineyards of 5 ha could be tilled with hoes rather than plows by the families who owned them. Only much larger vineyards with more than 25–30 ha needed hired labor.[74] Wine yield varied quite a bit between the areas, yet some sense of scale can also be gained from data on the preindustrial vineyard yield in the Levant. Data from Syria in the 1950s suggest an average of 3,000 kg per ha,[75] while Turkish data from the 1930s–1950s suggest an average of 2,600 kg per ha, though the yields vary greatly between 500 and 4,200 kg

[65] Palaima 2004, 242.
[66] Piteros et al. 1990, 179 n. 332; Shelmerdine 1998, 297.
[67] Ruipérez and Melena 1990, 138–39.
[68] Nakassis 2012, 22.
[69] Durand 1988, no. 538; Sasson 2015, 157.
[70] Dossin 1950–1951, no. 38; Sasson 2015, 199.
[71] Pardee 2002, 220.
[72] Monroe 2010, table 3.
[73] Duncan-Jones 1982, 39, 371.
[74] Simpson 2011, 10–11.
[75] Zerbini 2013.

per ha.[76] The yield of wine per 100 kg of grapes is 55–65 liters (afterward there is a "second" wine).[77]

The 3,300 liters of wine, the minimal capacity for Room 2440, would require 6,000 kg of grapes (at 55 liters per 100 kg). Assuming a yield of 2,800 kg/ha, somewhere between Syria and Turkey's preindustrial average, the area of the Kabri palatial vineyard needed to produce this wine would have been only 2–3 ha. As the yield was very likely significantly lower in the Bronze Age, perhaps by half, the size of the vineyard should probably be doubled, to 4–6 ha. This is still a small vineyard that could be tilled by one family, or about five hired workers. Even if all the rooms in the Kabri storage complexes were filled with wine, it would still have required the efforts of no more than four or five families who were clients of the palace. Therefore, there is no reason to assume that any of the wine was collected via taxation from the populace or procured via trade.

As mentioned above, we have suggested elsewhere that the Kabri palace functioned as a large *oikos* or household—richer and more populous than other households of the period, but with minimal involvement in the economy of the private sector.[78] As far as we can tell at this point, it used no literate administration, and it has yielded no sealings, in contrast to virtually all contemporary palaces—from the Minoan palaces such as Knossos, Phaistos, Malia, Petras, and Galatas to palaces in Syria, such as Alalakh and Ebla. Furthermore, patterns of animal husbandry, textile production, pottery manufacture, and consumption were all conducted without any sign of the specialization that one would expect for a redistributive economy; rather, these activities were conducted in a self-sustaining domestic style, evidence that suggests the palace behaved economically much more like an independent estate. This is in stark contrast to Kabri's neighbor to the east, Tel Hazor, which, with deep economic and political connections to the Mari commercial and political networks in Syro-Mesopotamia, had both a literate administration and a redistributive economy during this same period.

The rulers of Kabri seem to have chosen to rally political support for their goals using the means of feasting and commensality. This was a well-planned step involving much preplanning and diverting of resources to this goal during the latest phase of the palace. Feasts had been a staple of life throughout the long existence of the Kabri palace, as seen, for example, in the development of specialized drinking-related ceramic wares, such as the "Kabri goblets" and oversized spouted kraters first seen in phase VI (late MB I) of the palace.[79] In phase III (late MB II), banqueting had been taking place in several loci within the Kabri palace, reflecting different scales of feasts, from exclusive banqueting for a handful of guests in the central room of the Orthostat Building to possible outdoor events for hundreds of participants.

For example, an analysis of the activities within the palace of phase III indicates that much of the space in the central part of the palace was dedicated to the consumption of food and drink. In Area D-West, a series of halls connected by passages and transitional rooms extended throughout the excavated area (fig. 16). In the east and northeast, Halls 751 and 1434 were both connected to Inner Court 703. Hearths and food remains found in Halls 751 and 1434, by both the previous and the renewed excavations, indicate that they were used for the gathering of people and the consumption of food. Although not fully excavated, these halls with their plastered floors could each have a floor area exceeding 100 m^2.

Several transitional rooms led from Inner Court 703 to the richly decorated Ceremonial Hall 611, with its frescoed floor, in the west. The large amphora decorated in the chocolate-on-white style discovered in this hall was found by organic residue analysis to have contained red wine.[80] With an inner space exceeding 100 m^2, the hall could have hosted as many as 100 people.

In contrast, the Orthostat Building (labeled 2372 and 2411 in fig. 16), located to the west of Ceremonial Hall 611, seems to have been the locus of more exclusive dining. This is indicated by bones belonging to choice cuts of meat found nearby as well as three pithoi found in its back room that are identical to the ones found in Room 2440.[81]

However, there may be evidence for even larger events that took place. The bones of a wild bovine that were excavated in locus 16009, which is an open

[76] Gorny 1995, table 11.1.

[77] Zerbini 2013, n. 33.

[78] Yasur-Landau et al. 2015.

[79] Yasur-Landau et al. 2011; Samet 2014.

[80] Yasur-Landau and Cline 2014, 241.

[81] Kempinski et al. 2002b, fig. 4.69; Yasur-Landau et al. 2012, 22; 2014; 2015, 618.

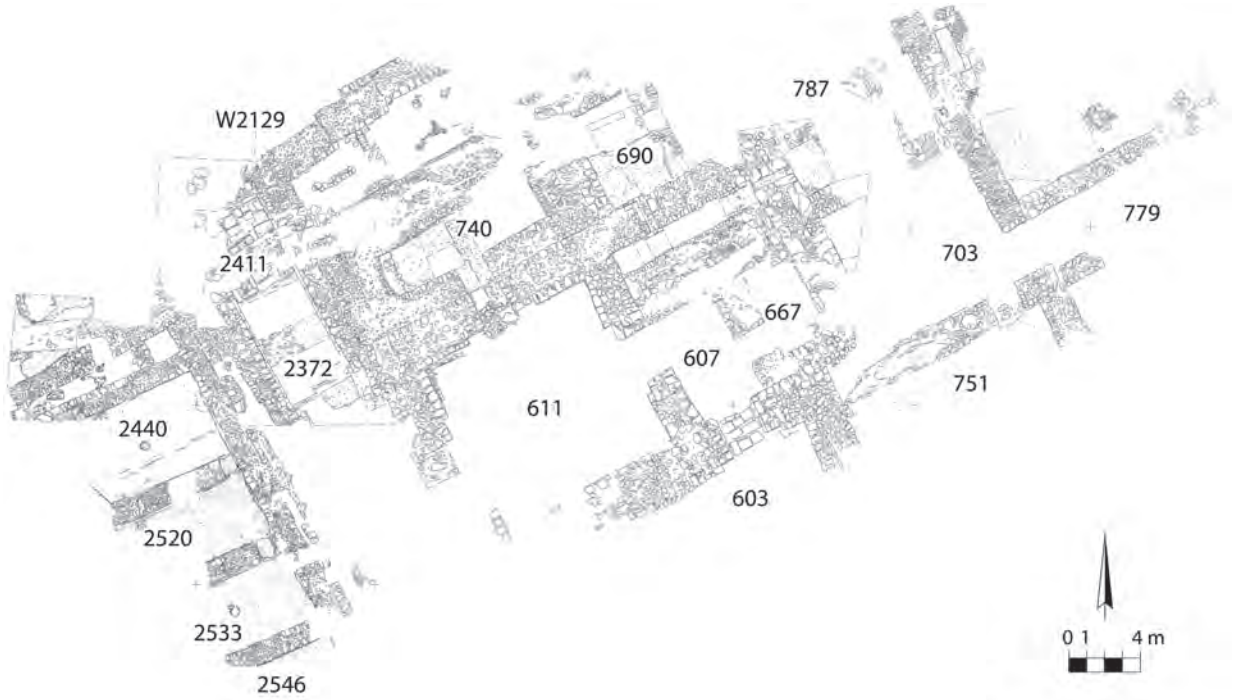

FIG. 16. Plan of Area D-West at Tel Kabri after the 2015 season (north at top).

courtyard between the official and domestic part of the palace in Area D-West and the ceremonial/cultic part of the palace in Area D-South and Area F, have been interpreted as perhaps those of a large bull that was hunted and then consumed in or near the palace. If this is indeed the case, a conservative estimate suggests that this single animal yielded at least 250 kg of meat. This can provide a substantial portion of meat for 500 to 1,000 people, even if no other animal was consumed.[82]

The deliberate choice of the Kabri rulers in using commensality as possibly the most significant tool in their long-term political strategy is reflected in the architectural changes between phases IV and III of the palace. The major renovation conducted between these two phases was heavily concerned with creating new infrastructure for banqueting. This included the construction of the Orthostat Building, aimed for exclusive dining, and the storage complexes, aimed at the preparation and storage of composite wines, perhaps for the needs of the entire palace.

While Ceremonial Hall 611 existed in phase IV, considerable changes had been made to the rooms to its east, including Inner Courtyard 703. To our mind, these changes in the core of the palace enabled a fine-tuning of the commensality policy by creating specially designed spaces to host events that greatly varied in scale and exclusivity. The storage complexes, with a large capacity and emphasis on the mobility of the pithoi in and out of the area, provided the flexibility needed for the logistic support for all these events.

This picture of variability in the loci of commensality may be compared with that of Pylos. There, the palace pantries contained sets of drinking vessels aimed for different scales of events, and finds of kylikes and metal vessels in various spaces indicated a "banqueting hierarchy" in which different locations in the palace were used to give the banqueters different degrees of exclusion and inclusion, according to their proximity to the heart of the palace, the megaron.[83]

However, why did the rulers of Kabri need such elaborate settings for feasts? In a recent article,[84] we argued that Kabri did not need a "command economy" with its policies of taxation of the populace and domination

[82] Marom et al. 2014, 75.

[83] Whitelaw 2001, 54–60; Bendall 2004, 113–25.

[84] Yasur-Landau et al. 2015.

by the force of the palace. Rather, we believe that Kabri functioned in a way similar to the model suggested for Ugarit in the 13th century B.C.E.[85] It was connectivity, rather than coercion, that gave the palace more lucrative opportunities for trade and allowed its rulers to achieve political and economic goals unattainable by other kinship groups in the polity. In short, the Kabri palace and its *oikos*-like economy was a major node in an intricate network that functioned both within its territory and outside it, including the networks of maritime exchange in the eastern Mediterranean.

The specialization in commensality may be related to answers given to the political challenges faced by the palatial elite of Kabri, enabling them to tailor-make events to answer each of these political needs by matching the space with the size and importance of the party entertained. They headed a polity with an estimated population of 28,000–29,000 people, many of whom resided in the urban center of Kabri.[86] Tensions between the ruling elite and the residents of the city, to which the recurring enlargement of the palace at the expense of private dwellings had no doubt contributed, had to be quelled.[87] At the same time, the ruling elite needed to mobilize labor for construction projects, such as the enlargement of the palace and maintenance of the massive fortifications of the city.

As in the Mycenaean palaces, feasts at Kabri may have been used to forge inner alliances within the polity as well as to mobilize labor.[88] From a geopolitical point of view, Kabri had an eastern border with the giant polity of Hazor, which was the largest tell in Canaan, more populous than Kabri, and which had strong connections to the Syro-Mesopotamian land routes of trading and political networks.[89] To the south and north of Kabri, the strong coastal polities of Acco and Tyre no doubt competed with Kabri for the revenues of maritime trade with Cyprus and elsewhere. Still, the large number of Cypriot imports, as well as the Aegean-style wall and floor paintings,[90] show that Kabri's sea trade remained prosperous throughout MB II, with the palace of Kabri retaining its position as an important node in the commercial network.

Lavish entertainment in the palace may have served to maintain and develop political ties and commercial alliances with emissaries from other Canaanite polities and with envoys and merchants from overseas, including from Cyprus and perhaps farther west. It is not hard to imagine a scene similar to that in the palace of Mari, where foreign messengers from faraway places such as Babylon, Carchemish, Yamhad, and even Hazor were allotted choice cuts of meat, and perhaps copious amounts of wine, for a banquet in the presence of the king.[91]

Heads of local families and kinship groups, foreign dignitaries, landmark events of the ruling household, large-scale festivals, and celebrations of the polity—the palace provided a setting able to host any and all of these, from intimate events of a few people in the Orthostat Building, creating a feeling of closeness, to events involving 100 or more people in the halls of the palace, and even events with 1,000 or more participants in the courtyards. The real allure of the palatial feasts at Kabri was the wine that was served; it was also a product tailor-made for such events: specially produced by the palace, with numerous ingredients both local and imported, and carrying with it the scent and taste of both the familiar and the exotic.

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[85] Routledge and McGeough 2009, 28.
[86] Yasur-Landau et al. 2008.
[87] Yasur-Landau 2011, 70–5.
[88] Wright 2004, 167.
[89] Marom et al. 2014, 62–3; Yasur-Landau et al. 2015.
[90] Cline et al. 2011.
[91] Birot 1960–1964, no. 747; Sasson 2015, 310.

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