

# The Swedish Jordan Expedition 2011 and 2012 at Tall Abu al-Kharaz

Preliminary results from the early Iron Age occupation in Area 9  
With contributions by D. Blattner, M. Alrousan & A. Abu Dalo

## Abstract\*\*

Tall Abu al-Kharaz, a twelve hectare-large tell in the central Jordan Valley, was occupied for approximately five millennia. In earlier excavation seasons most of the early Iron Age remains were found to have been disturbed by later settlers. Between 2009 and 2012 excavations revealed an extremely well-preserved city quarter dating from around 1100 BC, which represents an essential part of the settlement history of this city. The stone-built architectural compound consists of 21 rooms, with walls still standing to a height of more than 2 m. The inventories of these rooms, which comprised more than 200 complete vessels and other objects, were remarkably intact. Amongst the finds were imports from Egypt and Phoenicia. There were also finds which are associated with the culture of the Sea Peoples/Philistines, such as several Aegean and Cypriote-style vessels and other objects. The find context points to a hasty abandonment of the city. In the past, the beginning of the Iron Age has often been referred to as “the Dark Ages”, a period of cultural regression: this categorization is not appropriate to the find situation at Tall Abu al-Kharaz where the remains of a wealthy society, with far-reaching intercultural connections, can be identified.

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## \*\* Acknowledgements

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## Introduction

The 14th (2011) and 15th (2012) seasons of excavation at Tall Abu al-Kharaz were mainly devoted to the earliest Iron Age occupation of the site (for the location of Tall Abu al-Kharaz in the Southern Levant, see *Fig. 1*). The highest priority during these two seasons was given to the well-preserved Iron Age I (Phase IX) compound from Area 9 (*Fig. 2a, b*), which was partly exposed in 2009 and 2010,<sup>1</sup> the study of new material for a refined stratigraphy<sup>2</sup> and the collection of first-class radiocarbon samples from closed floor contexts. Numerous radiocarbon dates of short-lived samples from Phase IX point to a date around 1100 BC for the destruction of the compound (see Conclusions below).

Thirteen rooms of this early Iron Age compound were exposed in 2009 and 2010, represented by Trenches LI–LV with a total length of 28 m.<sup>3</sup> These rooms are fairly standardized and have inner dimensions of ca 2.50 m × 3 m to 3 m × 3 m.

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<sup>1</sup> See Fischer & Feldbacher 2010 and 2011; Fischer 2012; Fischer in press.

<sup>2</sup> This information is published in the third volume on Tall Abu al-Kharaz, which concentrates on the Iron Age; see Fischer in press. The first two volumes are Fischer 2008 on the Early Bronze Age and Fischer 2006a on the Middle and Late Bronze Ages.

<sup>3</sup> See Fischer 2012; extensive consolidation work was carried out after the 2010 season of excavation under the supervision of the Department of Antiquities and architect M. Al-Bataineh. Twelve rooms with walls which are still standing to a height of more than 2 m were cleaned and

They are arranged as pairs, which are connected with each other by equally standardized entrances of 0.60–0.70 m width. The compound is built against the Iron Age city wall and on top of the Middle/Late Bronze Age city wall. The rooms were covered by thick debris of burnt charcoal and mudbricks and were totally undisturbed. Amongst the finds were around 180 intact or complete ceramic vessels in addition to metal objects, textile production tools, faience vessels, stone tools, beads and scarabs and a clay oven, a *tannur*.<sup>4</sup> Some of the vessels contained organic remains, for instance wheat, barley, millet, chickpeas, olives and the dried remains of olive oil, and even barley flour.

The rich finds in the well-preserved compound encouraged us to extend the excavations towards the west and north (in 2011; Trenches LVIIA–D, Trench LVIIIA and Trenches LVIA–D) and towards the east (in 2012; Trenches LIXA–E). Another eight rooms were exposed in 2011 and 2012. The compound has now been revealed to a length of 46 m.

A synopsis is presented in *Table 1* in order to provide an overview over all phases of occupation of the entire site, including Phases IX–XII which are discussed here, but excluding post-Iron Age phases.

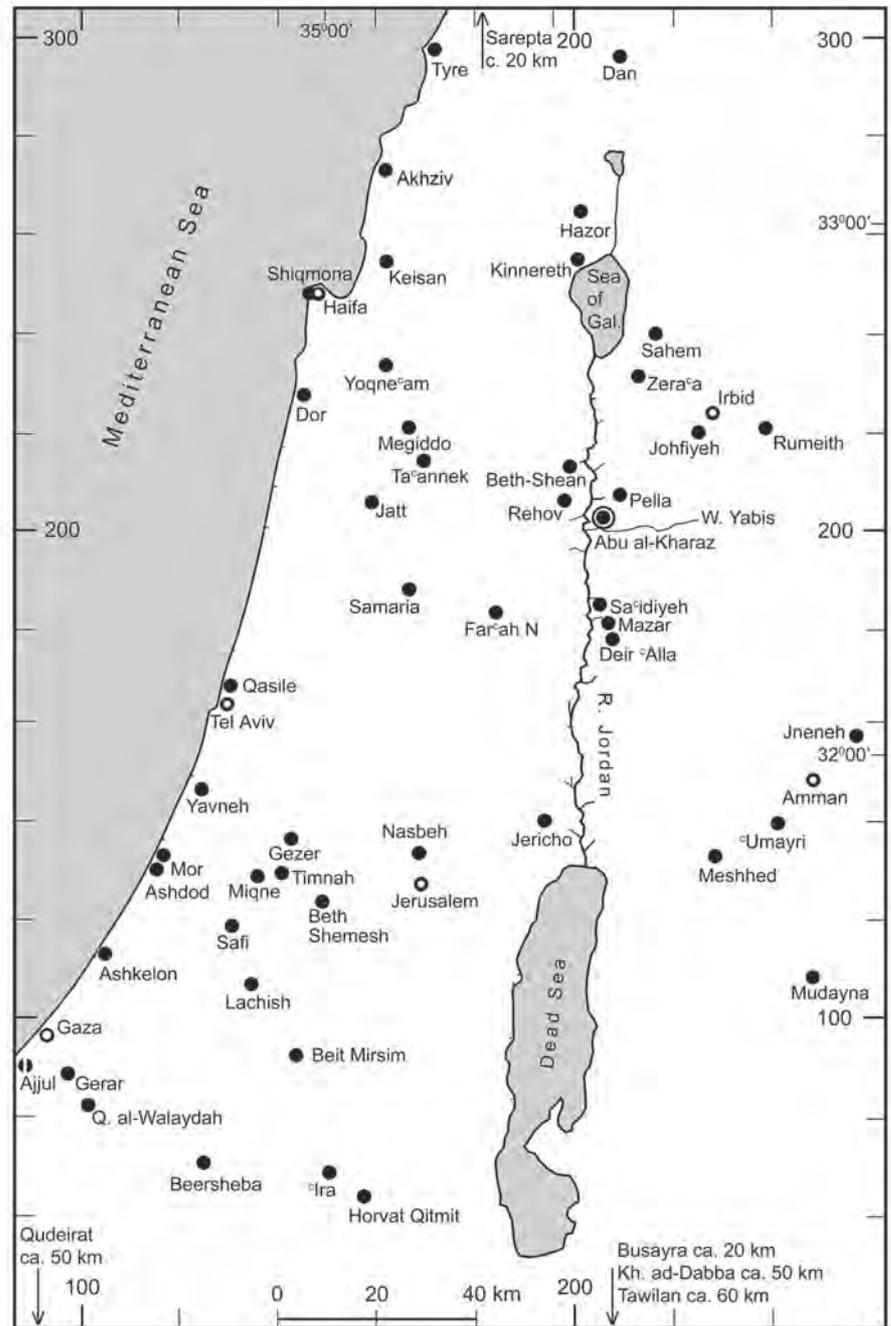


Fig. 1. Iron Age sites in the Southern Levant (compiled by T. Bürge).

consolidated in 2010. Further restoration work on an additional nine rooms was carried out in autumn 2012.

<sup>4</sup> See also Appendix 2 on the ovens from the Middle and Late Bronze Ages where the Arabic terms "*tabun*" and "*tannur*" are explained. These kinds of ovens persist throughout the Iron Age.

Table 1. Phasing of Tall Abu al-Kharaz.

Phases	Duration BC	Periods*	Comments
IA–B	3150–3050	EB IB	Chalcolithic sherds but earliest structures in Phase IA (EB IB), possible earthquake ends Phase IA; much preserved of Phase IB, many well-preserved structures, first city wall, flourishing society with rich find assemblage, imports from Egypt (Naqada IIIB) and Lebanon (Proto Metallic), major catastrophe/conflagration (earthquake?), possibly short occupation lacuna.
IIA–B	3050–3000	EB II	Well-preserved, massive city wall with possible tower, well-preserved domestic compounds, flourishing society, imports from Lebanon, probable earthquake ends Phase IIA, immediate reoccupation in Phase IIB (similar material) which ends in a major catastrophe/conflagration (earthquake?).
IIIA–B	3000–2900	EB II	Small scale reoccupation (“squatter occupation”), typical EB II pottery, minor destruction ends Phase IIIA, another destruction ends the Early Bronze Age occupation.
Lacuna	2900–1600	EB III– MB II/III	Site abandoned for roughly 1300 years.
IV/1	c. 1600	MB III	Little preserved, reuse of the EB defence system, industrial activities, typical late MB pottery, imports from Cyprus, Lebanon, general conflagration/destruction.
IV/2	1600–1525	MB/LB	Limited material preserved, city wall with casemate system, tower, commercial activities, imports from Lebanon from Phase IV/1 or 2, Chocolate-on-White Ware parallel with Tell el-Dab’a e/2, general conflagration/destruction ends this phase.
V	1525–1450	LB IA	Well-preserved, casemate system, commercial activities (bakery), pottery production, rich find assemblages incl. Cypriote Base-ring I, Cypriote White Slip I from Phase IV/2 or V, imports from Lebanon, violent conflagration/destruction.
VI	1450–1400	LB IB	Limited material preserved, partial repair, casemate system, new structures, Cypriote early White Slip II from Phase VI (or VII), no clear traces of destruction.
VII	1400–1350	LB IB/C– IC	Well-preserved small temple with rich finds, Cypriote White Painted WM I/II, White Slip II (bowls and tankard) and Base-ring I, conflagration/destruction.
VIII	1350–?	LB IC–II	Scanty remains, much destroyed by Iron Age settlers, likely destruction.
Lacuna		LB II	
IX	1100–1050	IA IB	Well-preserved, flourishing multicultural society, centralized planning, reuse and improvement of older defence installations, cell-plan structures with upper storey, Sea Peoples/Philistine-related finds, (direct/indirect) contacts with Cyprus, Phoenicia and the Aegean sphere, Egyptianizing pottery, major catastrophe/conflagration (assault).
X	1050?–930	IA IB/(IIA)	Moderately well-preserved, only regional cultural connections, certain repair of cell-plan structures, destruction.
XI	930–850	IA IIA	Moderately well-preserved, only regional cultural connections, repair of older structures, destruction/conflagration.
XII	850–800	IA IIA/B	Fairly well-preserved, new towers, contacts with Cyprus and Phoenicia, destruction/conflagration.
XIII	800–770	IA IIB	Fairly well-preserved, new towers, non-standardized domestic structures, contacts with the Cyprus, Phoenicia and the Neo-Assyrian cultural sphere, destruction/conflagration.
XIV	770–732	IA IIB	Well-preserved, prosperous society, new towers, fairly standardized interconnected domestic structures (4-room house type, more than one storey), metal workshop, contacts with the Cypriote, Phoenician, and Neo-Assyrian cultural sphere, destruction/conflagration—most likely by Assyrian invaders.
XV	732–600	IA IIC	Little preserved (on today’s surface), impoverished small settlement.

\* Pre-Iron Age periodization according to Fischer 2006a, 362–374 and 2008, 340–385.



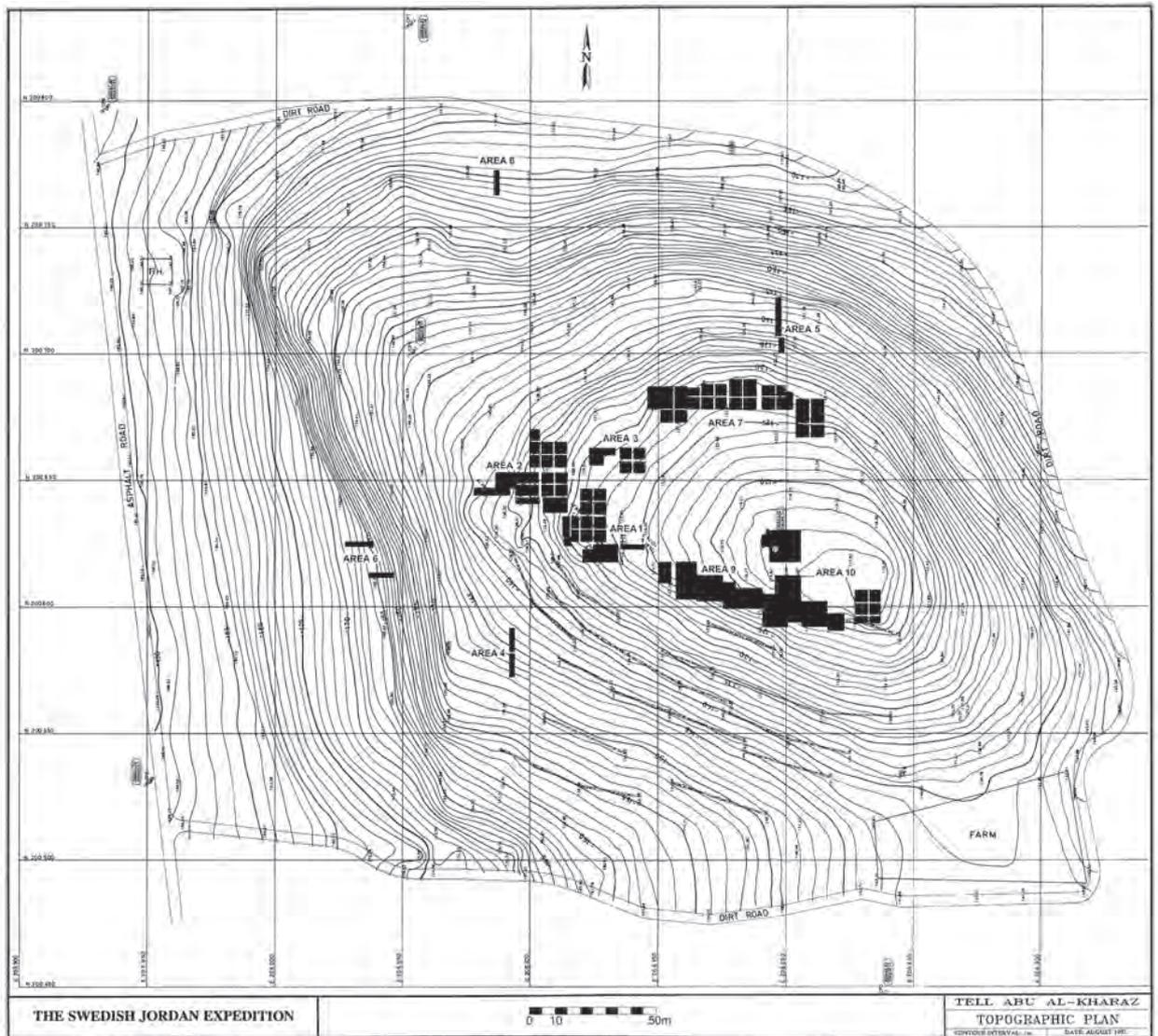


Fig. 2b. Tall Abu al-Kharaz. Topographical map with areas and opened trenches included (map modified by T. Bürge).

## IRON AGE

### Phase XII (Fig. 4)

A partly exposed wall and two *tawabeen*<sup>9</sup> in Trenches LVIIB and LVIIIA, which were built close together, belong to this phase of occupation. The northern one, approximately 0.70 m in diameter, is well-constructed and stands on a stone bench. Larger stones in front of the *tawabeen* were used as working surfaces.

In the northern part of the building the stone-paved space already exposed in 2010 (L212, 214) continues towards the

north (L290, 293, 295). There are additional spaces to the north and west of the latter (W617, 662, 659), the function of which is not totally clear: they most likely represent a courtyard and another domestic area. Finds from this area consist of an iron arrowhead (N1406) and a basalt grinding stone (N1407).

The majority of the sherds indicate a date in Iron Age II for this phase, but a few intrusive sherds dating from the late Roman/Byzantine and Abbasid periods were also found. There are no other finds of chronological significance.

<sup>9</sup> See note 4 and Appendix 2.

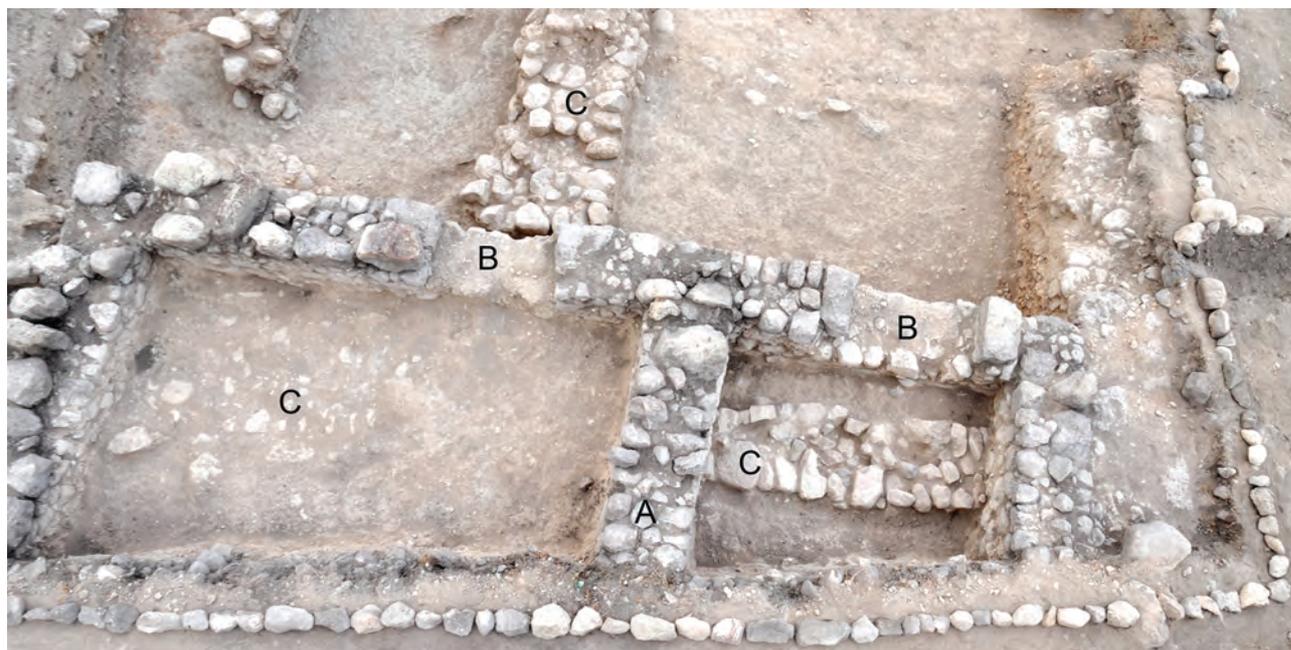


Fig. 3. Byzantine/Abbasid structure (photograph by P.M. Fischer).

#### Phase XI (Fig. 5a and b)

In the northern and eastern parts only a few loci and some walls were exposed before the excavations came to a halt: these are W666 and W636 in the northern part (TLVIC–D; Fig. 5a), and W683 and W684 in the north-eastern part (TLIXC; Fig. 5b), where fragments of a *tabun* north of W683 were also exposed. An interesting find from this area is a jar with red decoration on rim and shoulder (L355-3): instead of the usual and very regular “framed wavy-line” decoration the wavy line is irregular and almost resembles the imitation of a script (cf. the jar found in Phase X).<sup>10</sup> According to the pottery and radiocarbon results this stratum belongs to the end of Iron Age IIA.

#### Phase X (Fig. 6)

In the western part of Area 9 a long wall (W613) runs east-west from the building that was exposed in 2010. Other poorly preserved walls, together with a *tabun*,<sup>11</sup> also belong to this phase.

The main architecture of this phase is in the eastern part of the area (TLIVA and TLIXA–E) and is characterized by the reuse of virtually all Phase IX walls. However, it is clear from the sections of the walls that the Phase X walls are slightly wider stone or mudbrick walls.

East of the walled spaces (Rooms A–H) already excavated, ten more were exposed in 2012 (Rooms I–R): the four rooms in the west (Rooms I–L) are arranged in pairs and have beaten earth floors. The southern of the three pairs of the eastern rooms (Rooms N, P and R) have earth floors. The northern rooms (Rooms M, O and Q) are only partly excavated and show stone pavements most likely representing courtyards. The easternmost wall of the compound is significantly wider than the others and seems to represent the eastern limits of the compound.

Room J was affected by looting in 2009 and only a few *in situ* finds could be secured. In Room K a pit 1.5 m in diameter and 0.60 m deep did not produce any finds.

A bronze arrowhead (N1433) was found next to the pit, and a stone spindle whorl/loom weight in Room L (N1428).<sup>12</sup> Room N, which was covered by a layer of broken mudbrick debris from the roof construction, and charcoal and ash, contained two skeletons. These individuals obviously died in the collapsed building. Their bones were blackened by fire. According to the preserved skeletal remains and their teeth one skeleton is male, around 30 years old. The other one is female, around 25–30 years old. Other finds from this room are a *tabun*, a basalt pestle (N1440), a Philistine-style jug with white slip (L370-1), a cooking jug (L370-2) and several

<sup>10</sup> Fischer 2012, 170, fig. 5:1.

<sup>11</sup> See note 4 and Appendix 2.

<sup>12</sup> This spindle whorl is of Early Bronze Age date but was reused in Phase X.







Fig. 7. Iron Age loom weights from Area 9 (photograph by T. Bürge).

Fig. 6 (left). Tall Abu al-Kharaz, Area 9, plan of Phase X (drawing by M. Al-Bataineh and T. Bürge).

Amongst the numerous vessels from Room 11 (excavated in 2010) is a decorated jar which has recently been restored (L275-5; Fig. 12).

In 2012, seven more rooms were exposed in the eastern part of the compound (R15–21).<sup>15</sup> The clear stratigraphy allowed us to distinguish between finds from the basement and finds from the upper storey which fell down into the basement area in the fierce conflagration. During the excavations it became clear that Rooms 15 and 17 are built directly on or against the bedrock, which slopes upwards to the east and north. Therefore the easternmost three rooms to the south (R19–21) are single rooms with no counterparts to the north. They are also built directly on and against the bedrock.

Room 15 contained a small weight of haematite (N1441), a clay *pyxis* (N1442; Fig. 13:1), a calcite spindle whorl (N1443), an almost complete cooking jug (L369-1), several cooking pots, and a *pyxis* of elongated shape (L369-6; Fig. 13:3).

Room 16 was connected with Room 15 but the doorway was blocked with stones. Room 16 was partly looted and only its northernmost part was still intact. In this room a small hand-made juglet of unfired or very soft fired clay (N1432) and a tube of polished bone (N1439; Fig. 14 left) were found. A collapsed *tabun* with a chimney was exposed on the floor of the basement of this room.

Room 17 contained pieces of unfired pottery which again point to local pottery production. An open doorway connects this room with Room 18 (in W690).

In Room 18 three *tanneer*<sup>16</sup> were exposed. One of them was complete (L354-7) and found leaning against W692 (Fig. 15). It has a handle, which is the first ever found on a *tannur*

<sup>15</sup> R15 e.g. means Room 15.

<sup>16</sup> See note 4 and Appendix 2.

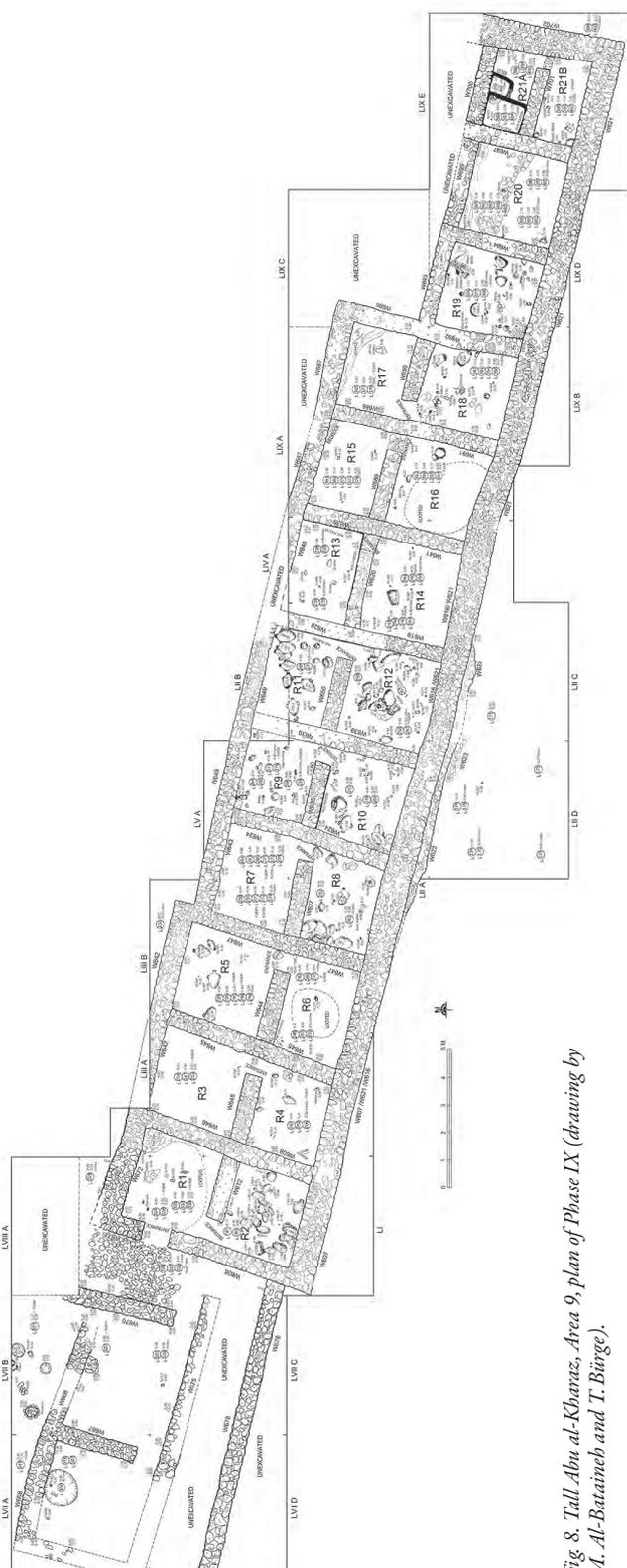


Fig. 8. Tall Abu al-Kharaz, Area 9, plan of Phase IX (drawing by M. Al-Bataineh and T. Büрге).



Fig. 9. The Iron Age I compound, Phase IX (compiled by T. Büрге).



Fig. 10a (left). Early Iron Age figurine of a lion, Phase IX (drawing by R. Feldbacher).

Fig. 10b (below left). Early Iron Age figurine of a lion, Phase IX (photograph by T. Bürge).



Fig. 11. Charcoaled wooden post from Room 1, Phase IX (photography by P.M. Fischer).

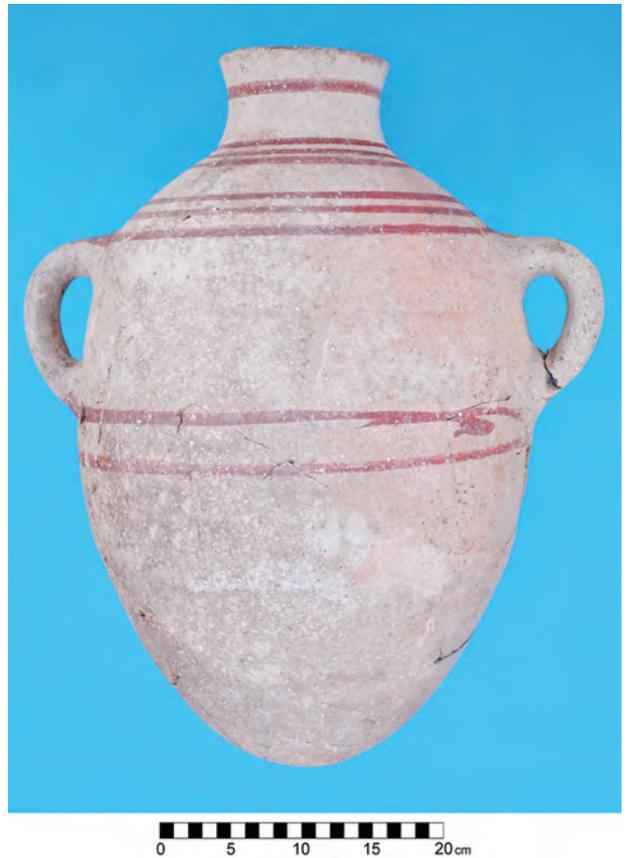


Fig. 12. Early Iron Age decorated jar from Room 11, Phase IX (photograph by T. Bürge).

Fig. 13. Early Iron Age pyxides from Rooms 15 (1, 3) and 18 (2) and pilgrim flask from Room 19 (4), Phase IX (drawing by M. Al-Bataineh, photograph by T. Bürge)

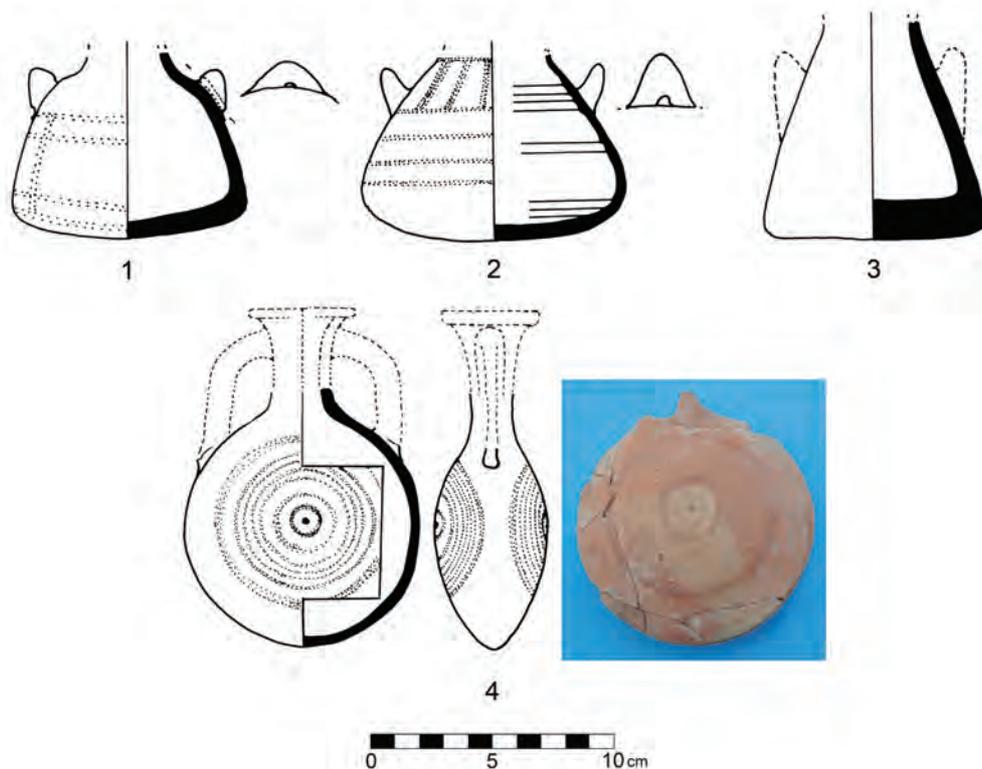


Fig. 14 (below). Bone tubes from Room 16 (left) and Room 19 (right), Phase IX (photograph by T. Bürge).



Fig. 15. Tannur with handle from Room 18, Phase IX (photograph by P.M. Fischer).

at Tall Abu al-Kharaz. Other finds from this room include a hand-made juglet of unfired clay (N1429), two small hand-made bowls of soft-fired clay (N1431, N1436), a lamp (L351-1), a clay spindle whorl (N1434), a complete jug (N1430), a juglet (L351-3), a decorated clay *pyxis* (L358-2; Fig. 13:2), another *pyxis* (N1435; Fig. 16:4a, b) and a bowl (L358-1; Fig. 16:1), the latter two of alabaster with incised decoration, and a lid of unfired clay (N1438).

Room 19 to the east of Room 18 has no adjacent room to the north and also contained several installations for heating: a part of a *tabun*, a *tannur* (L377-4) and an intact small heater (L377-5).<sup>17</sup> Additional finds included two hand-made

<sup>17</sup> It is unlikely that this object was a *tabun* because of its small dimensions.



Fig. 17. Early Iron Age decorated jug from Room 19, Phase IX (photograph by T. Bürge).

Fig. 16 (above and above right). Alabaster vessels from Rooms 1 (2), 12 (3) and 18 (1, 4), Phase IX (drawing by M. Al-Bataineh, photograph by T. Bürge).

bowls (N1446 and L377-7), a hand-made jug (L377-8), an oval object of unfired clay, possibly a frying pan (?; L377-6), two clay spindle whorls (N1445, N1451), a spindle whorl of sandstone (N1444) and one of stone (N1452), a polished bone tube with incised decoration (N1448; Fig. 14 right), and a ring-shaped basalt tool with a red pigment (N1449) which was possibly used during the pottery manufacturing process. Other ceramic finds included a small decorated pilgrim flask of high quality (N1453; Fig. 13:4), and a jug with red decoration (L377-2; Fig. 17). The shape of the latter recalls Late Bronze Age shapes. Around one kilogram of barley and wheat seeds was spread on the floor and numerous olive pits were collected in the western part of the room. The barley was possibly stored in an organic container. A wooden structure of indistinct shape was exposed close to the seeds. Another wooden construction found around the *tannur* possibly served as support. The northern part of this room was built directly on the bedrock, which has a steep slope towards the south. The southern part of the floor of Room 19 was built on a loose fill which was covered by large sherds and contained a mixture of

different seeds, such as lentils, barley and olive pits. A juglet (N1454) was found next to the sherds within the foundation of the floor. Therefore, we conclude that there are two floors present in Room 19.

Room 20 was disturbed by a large animal hole in the southern part. Finds from this room included a spool-shaped, Aegean-type, loom weight of unfired clay (N1458), a storage jar (L390-1), a lamp (L397-1) and two hand-made bowls of unfired clay (L391-1, L397-2). Bedrock and a section of the Middle/Late Bronze Age city wall bound the room to the north.

The easternmost room of the compound, Room 21, is somewhat different from all the other rooms (Fig. 18a, b). It is divided into a northern (R21A) and a southern (R21B) part by W701 with an entrance in the east. As the floor level of Room 21A is some 0.10–0.20 m higher than that of Room 21B, a threshold made of mudbrick was found in the doorway. There is a unique structure in Room 21A, namely two 0.80 m deep basins made of unfired clay. The walls around them are covered with a fine layer of clay plaster. Remains of bar-



*Fig. 18a. Tall Abu al-Kharaz, Room 21B, Phase IX, cooking jug (left) and jar (right) in situ (photograph by P.M. Fischer).*



*Fig. 18b. Tall Abu al-Kharaz, Area 9, Room 21, Phase IX, with clay structure (photograph by P.M. Fischer).*

Fig. 19. Cooking jug from Room 21B, Phase IX (drawing by M. Al-Bataineh, photograph by P.M. Fischer).



Fig. 20. Biconical jar from Room 21B, Phase IX (partly reconstructed, drawing by M. Al-Bataineh).



ley/wheat seeds show that at least one of the basins was used for the storage of grain. Two metal finds were recovered in Room 21A: a bronze toggle pin and a bead of pierced lead (N1450) resembling a sling bullet. Room 21B was obviously used as a storeroom. It contained two intact vessels: a cooking jug (N1457; Fig. 19) and a jar (N1456). Other finds were seven plain storage jars, two small jars, a jug with red decoration on the shoulder resembling a script (L395-5), a jug with a trefoil mouth (L395-4), a small krater and two bowls (L395-1, -3). Of special interest is a large biconical krater depicting palm trees, a bird and geometric elements in the metope style (L395-2; Fig. 20). This is one more early Iron Age product that recalls Late Bronze Age prototypes. Another exceptional find was the part of a small bronze wheel which originally had eight spokes (L 389-2; Fig. 21). Parallels from Philistine Tel Miqne-Ekron are interpreted as parts of four-wheeled cult

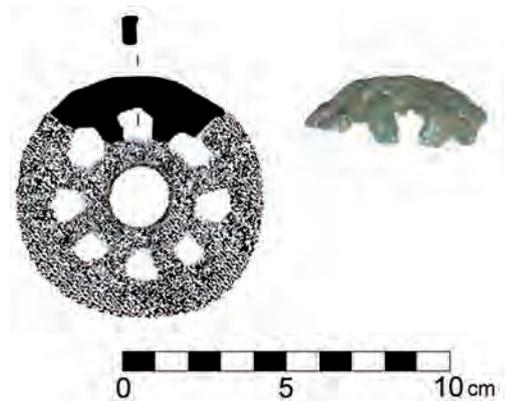


Fig. 21. Fragment of bronze wheel from Room 21B, Phase IX (drawing and photograph by M. Al-Bataineh).

stands.<sup>18</sup> Other finds from this room included a basalt mortar, again with traces of red pigment (N1455), a ring-shaped weight (N1460) and a small stone pendant (N1459). Numerous carbonized chickpeas were found in one vessel.

The eastern wall at the end of the compound, W702, with its 1 m width is significantly wider than all the other walls belonging to the compound. Its width corresponds exactly to that of the Iron Age city wall, W621. On the very last day of the excavations a test trench was opened east of the compound and it became clear that the city wall does not continue east of W702. A preliminary theory is that this opening in the city wall was one of the early Iron Age city gates. The position of the suggested gate is on a more moderate slope of the tell facing the Wadi al-Yabesh. It would make sense to assume that the main street leading from Wadi al-Yabesh to the fortified city centre was here.

#### LATE BRONZE AGE (PHASE V; FIG. 24:1–24)

There are no architectural remains which could be ascribed with any certainty to the Late Bronze Age. There are, nevertheless, impressive vessels of Chocolate-on-White Ware and other wares that clearly belong to the Late Bronze Age destruction layer of Phase V which is dated to after 1450 BC (see Appendix 1).

A test trench was dug north of W649. Finds of specific interest were four skeletons: the uppermost was only partially preserved whereas the lower three were almost complete. Two of them seemed to embrace each other. One young female had a bronze earring close to her left mastoid process. There was also a collared bead of bone amongst the bones. Our interpretation of the find circumstances rules out a tomb but suggests instead that we are dealing with earthquake victims (see Appendix 3, the osteological report). The date of this event is placed in the Late Bronze Age on the evidence of a few associated pottery sherds.

#### EARLY BRONZE AGE (PHASE II/III; FIG. 24:25)

A few walls (W676 and W677<sup>19</sup>) with associated Early Bronze Age pottery were exposed at the end of the 2011 excavation season in the most south-westerly part of the opened area. Related to these walls were hole-mouth jars and Metallic Ware (burnished) juglets of a type which has been traced petrographically to the Mt Hermon area in southern Lebanon.<sup>20</sup> This layer of occupation belongs either to Phase II or

III according to the internal phasing at Tall Abu al-Kharaz (see *Table 1*).

## Conclusions

The successful excavations in 2011 and 2012 increased our knowledge about the early Iron Age settlement of Tall Abu al-Kharaz which prior to 2009 was very incomplete. The Phase IX compound is now completely (?) exposed to a length of 46 m: it consists of 21 rooms, nine pairs and three single rooms to the east. These rooms represent the basement of a building on which another storey was built. The easternmost three rooms are built directly against the bedrock which prevented the building of three corresponding rooms to the north. As the rooms of the whole building are only connected within each pair (except for Room 1, which has an additional entrance to the west), but never with adjoining pairs or the exterior of the building, the only remaining possibility is that the rooms were entered from above via ladders (see reconstructions in *Fig. 22a, b*). The compound is now consolidated (see e.g. *Fig. 23* which shows the passage from Room 14 to 13, and the preserved height of the structures).

A thick destruction layer of mudbrick, burned wood and straw covered the Phase IX building. It contains the debris of the roof and the second floor which was built of mudbrick walls and a roof construction of wooden beams, straw and clay. Numerous finds from the upper storey were not found on the floor of the basement but within the destruction layer.<sup>21</sup>

The compound was built against the Iron Age city wall and was most likely an integral part of the defence system. A preliminary theory is that one of the city gates is just east of the end of the compound which ends in a wider wall than the other walls.

Besides an impressive variety of local pottery shapes there are numerous imports from Cisjordan, Egypt, Phoenicia and the Mediterranean sphere. This hints at far-reaching contacts all over the eastern Mediterranean of a relatively wealthy early Iron Age society at Tall Abu al-Kharaz. Spindle whorls and loom weights show that textiles were produced, and the storage of high-quality raw clay points to the local production of pottery. There are numerous storage vessels, many of which still contained large amounts of cereal grains such as barley and millet, chickpeas and olive oil, barley/wheat flour, and other semi-processed foodstuffs. In contrast to fine tableware and small finds, such as our scarabs<sup>22</sup>—which only indicate trade

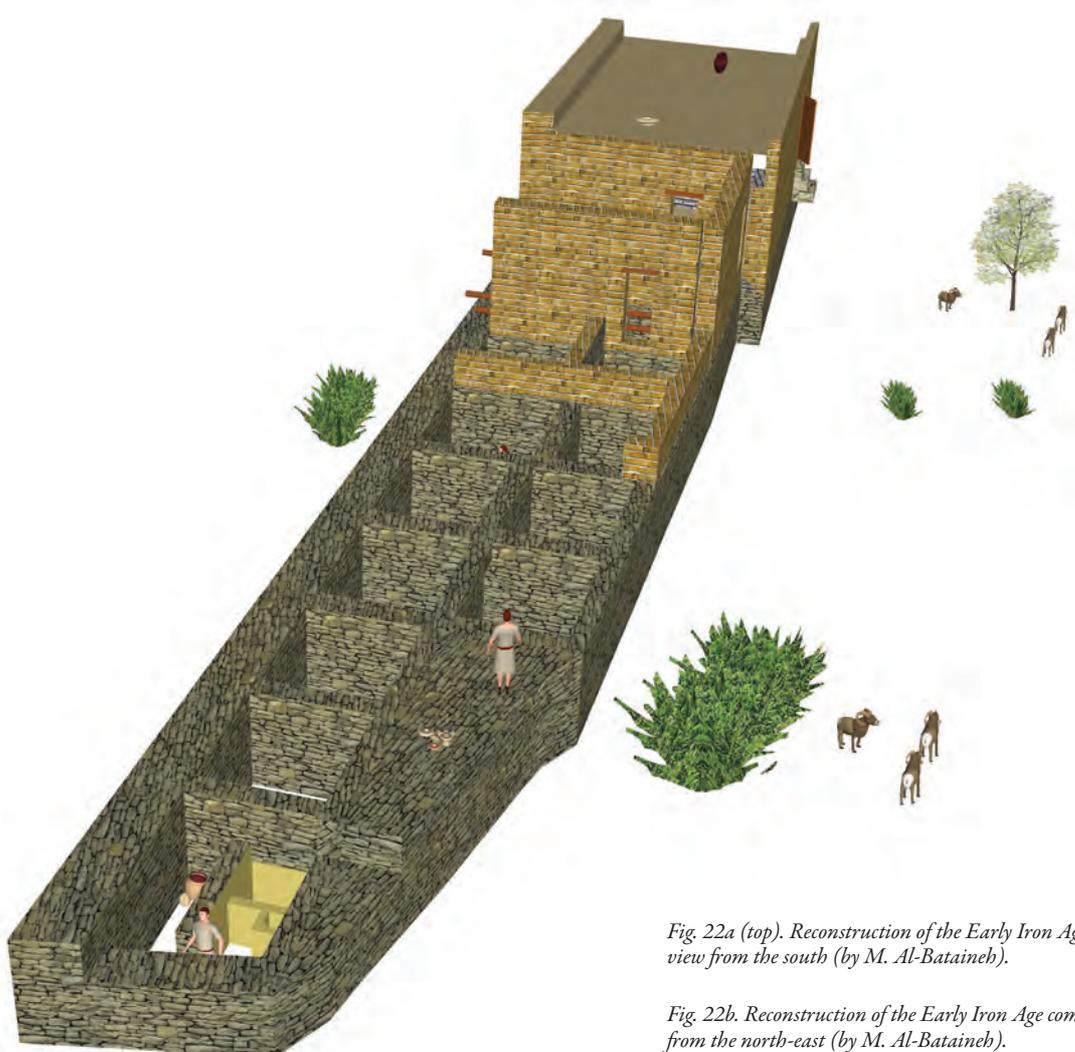
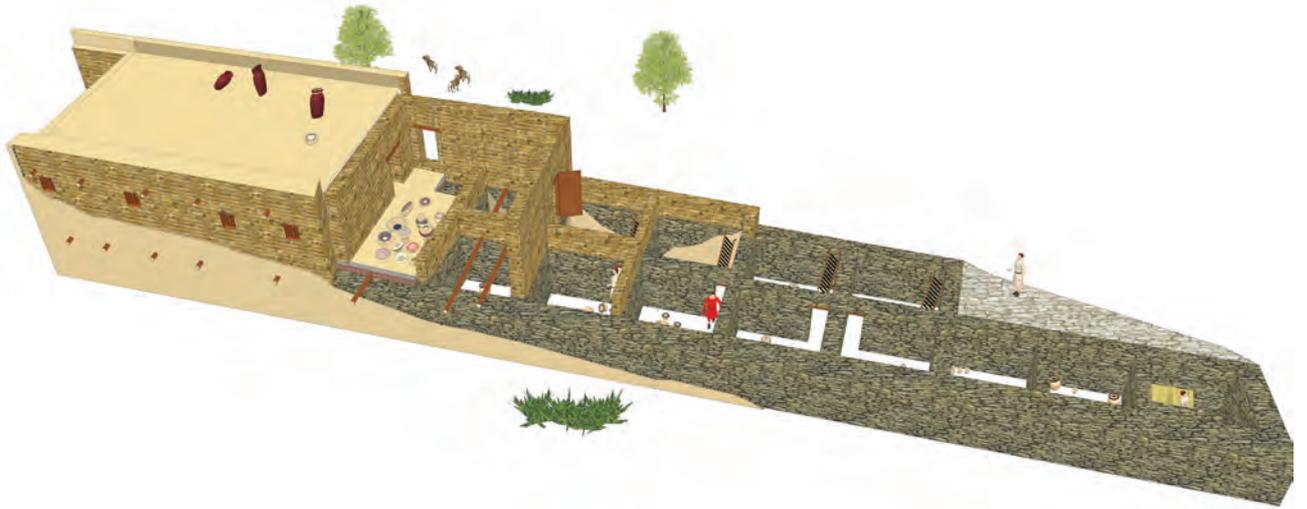
<sup>18</sup> Dothan 2002, 4–8.

<sup>19</sup> W677 is most likely not a separate wall. It may represent the collapsed superstructure of W676.

<sup>20</sup> Fischer 2008, 284–288.

<sup>21</sup> The division between the finds from the basement and those from the upper storey will be investigated in a future study, see Bürge forthcoming.

<sup>22</sup> See Fischer 2012, 173, 175, 179, fig. 18.



*Fig. 22a (top). Reconstruction of the Early Iron Age compound, Phase IX, view from the south (by M. Al-Bataineh).*

*Fig. 22b. Reconstruction of the Early Iron Age compound, Phase IX, view from the north-east (by M. Al-Bataineh).*

connections and the exchange of goods—there are special find groups whose appearance cannot be explained by trade. These groups are mainly represented by cooking pots and loom weights: in addition to the traditional Canaanite open-shaped cooking pot we found several examples of a closed, jug-like cooking pot (e.g. *Fig. 19*), a type which is known from the Aegean and Philistine cultural sphere. The same can be said about loom weights: the standard Canaanite loom weight is of spherical, unfired, pierced clay in the Iron Age (see shape in *Fig. 7 left*). In contrast, the majority of the loom weights from Phase IX are spool-shaped and made of unfired clay (see shape in *Fig. 7 right*; one is made of stone). This type of loom weight also has its origins in the Aegean/Philistine sphere of culture and is often regarded as an ethnic marker.<sup>23</sup> It is unlikely that cooking pots or loom weights of unfired clay were imported from Philistia, as such objects are usually locally produced and too fragile to transport over long distances. We therefore



*Fig. 23. Room 14 looking into Room 13 (photograph by P.M. Fischer).*

suggest the arrival of a new ethnic group which was strongly connected to the Sea Peoples/Philistines and intermingled or intermarried with local peoples. This theory has additional support in the fact that the city was abandoned after the most recent Late Bronze Age Phase VIII; consequently, the people of Phase IX were new migrants.

After the destruction of Phase IX and the abandonment of the city the area was reoccupied in Phase X after a possible occupational lacuna. Many walls of the previous building were reused in Phase X. In this phase, too, there are some objects—although much fewer in number—which are connected to the Philistines, such as the jug with the white slip (see above, L370-1) and again some spool-shaped loom weights. This hints at a certain Philistine presence at the site during Phase X as well but also to an accelerating assimilation of the immigrants. In Phase XI no Philistine traces could be recognized.

Radiocarbon dating was undertaken by E.M. Wild from the VERA-laboratory of the University of Vienna. Of a total of 42 radiocarbon dates from Iron Age contexts 15 are from floors of the Iron Age Phase IX compound in Area 9. According to the radiocarbon dates the destruction event of Phase IX took place around 1100 BC, i.e. between 1128 and 1055 BC ( $1\sigma$ ) or between 1193 and 1049 BC ( $2\sigma$ ); see *Table 2*.<sup>24</sup> We suggest the destruction of Phase X occurred in the later part of the 10th century BC.

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<sup>23</sup> E.g. Killebrew 2005, 216–217; Yasur-Landau 2010, 132–133.

<sup>24</sup> See Wild & Fischer in press.

Table 2. Radiocarbon dates from Phases IX and X.

Lab. no.	Material	Area/Locus	$\delta^{13}C$ (‰)	14C BP	Calibrated 2 $\sigma$			Phase
VERA-5266HS	twigs	9/160	-27.6 $\pm$ 1.0	2890 $\pm$ 40	1220BC	(92.6%)	970BC	IX
					960BC	(2.8%)	930BC	
VERA-5266HS_2	twigs	9/160	-29.0 $\pm$ 1.0	2880 $\pm$ 40	1210BC	(95.4%)	920BC	IX
VERA-5267HS	grain-twigs	9/160	-24.9 $\pm$ 1.1	2925 $\pm$ 40	1270BC	(95.4%)	1000BC	IX
VERA-5268	twigs	9/160	-25.4 $\pm$ 1.2	2940 $\pm$ 40	1270BC	(95.4%)	1010BC	IX
VERA-5268HS	twigs	9/160	-29.6 $\pm$ 1.8	2865 $\pm$ 40	1200BC	(95.4%)	910BC	IX
VERA-5544HS	twigs	9/208	-23.5 $\pm$ 1.5	2900 $\pm$ 35	1260BC	(1.7%)	1230BC	IX
					1220BC	(93.7%)	970BC	
VERA-5545	twigs	9/219	-26.8 $\pm$ 2.8	2855 $\pm$ 35	1130BC	(95.4%)	910BC	IX
VERA-5545HS	twigs	9/219	-17.9 $\pm$ 1.8	2955 $\pm$ 35	1300BC	(95.4%)	1040BC	IX
VERA-5546	chickpeas	9/237	-24.5 $\pm$ 1.9	2920 $\pm$ 35	1260BC	(5.5%)	1230BC	IX
					1220BC	(89.9%)	1000BC	
VERA-5546HS	chickpeas	9/237	-22.3 $\pm$ 1.3	2920 $\pm$ 35	1260BC	(5.5%)	1230BC	IX
					1220BC	(89.9%)	1000BC	
VERA-5550	millet	9/267	-7.2 $\pm$ 1.7	2985 $\pm$ 40	1380BC	(95.4%)	1050BC	IX
VERA-5550HS	millet	9/267	-6.4 $\pm$ 1.7	2915 $\pm$ 35	1260BC	(4.3%)	1230BC	IX
					1220BC	(91.1%)	1000BC	
VERA-5547HS	seeds-twigs	9/239	-26.0 $\pm$ 0.8	2960 $\pm$ 35	1310BC	(95.4%)	1050BC	IX
VERA-5548	grain	9/244	-25.9 $\pm$ 1.1	2940 $\pm$ 35	1270BC	(95.4%)	1020BC	IX
VERA-5548HS	grain	9/244	-26.7 $\pm$ 1.1	2895 $\pm$ 35	1220BC	(95.4%)	970BC	IX
VERA-5078HS	twigs	7/38	-25.7 $\pm$ 0.6	2875 $\pm$ 40	1210BC	(95.4%)	920BC	IX
VERA-5270HS	twigs	9/164	-26.9 $\pm$ 0.7	2880 $\pm$ 35	1210BC	(95.4%)	930BC	X
VERA-5271HS	twigs	9/165	-28.2 $\pm$ 2.9	2800 $\pm$ 35	1050BC	(95.4%)	840BC	X

# Appendix I:

## Pottery from a Late Bronze Age insula in Area 9

BY T. BÜRGE

### Introduction and context

An impressive collection of Late Bronze Age pottery, including some more or less complete vessels, was found in Area 9 in the northern parts of Trenches LVIIA and B and LVIIIA during the 2011 season of excavation at Tall Abu al-Kharaz (*Fig. 24:1–24*):<sup>25</sup> 24 complete or almost complete vessels and diagnostic parts of vessels. These include Chocolate-on-White Ware (CW; most of them with figurative and/or ornamental decoration), other monochrome and bichrome decorated wares, one of them with figurative decoration, and plain wares. No architectural structures could be associated with this material (see also main article); therefore it may be assumed that only this Late Bronze Age insula was left intact after destruction due to Iron Age building activities.

Although the project is mainly concerned with the Iron Age I compound, the Late Bronze Age material from the 2011 season of excavation must be regarded as equally important. Since a final volume on the Late Bronze Age occupation of the site has recently been published<sup>26</sup> this specific context will be described in detail.<sup>27</sup>

### Description of the pottery, parallels and discussion

#### CHOCOLATE-ON-WHITE WARE

The largest group of Late Bronze Age pottery from this area is represented by vessels of what is known as Chocolate-on-

White Ware.<sup>28</sup> This ware is generally defined by its thick white (or pink through yellowish white to light grey) wheel-burnished slip and reddish-brown (“chocolate-brown”) decoration.<sup>29</sup> The ware has been classified by Fischer in six groups,<sup>30</sup> two of them, Chocolate-on-White II and Eggshell Ware,<sup>31</sup> being represented amongst the Chocolate-on-White vessels from this year. The vessel types range from rounded and carinated bowls, chalices and kraters to jugs (ovoid and biconical) and ovoid jars. All these types are well attested within the Chocolate-on-White Ware repertoire from Tall Abu al-Kharaz and also at some other sites, such as Beth-Shean, Pella and Tall Deir ‘Alla. Most of the patterns on the vessels belong to the standard repertoire and include straight horizontal and crossed lines, framed wavy lines, downward-pointing triangles, rhombi linked end-to-end, chequerboards, ladder motifs, and dots. They appear—generally independently from the vessel shape—in a wide variety of combinations. There are also two figurative decorations: one is depicted on the exterior of a biconical jug (L327-3; *Fig. 24:10*) with a unique pattern of crossed lines on the rim and exterior and an image of stylized palm trees;<sup>32</sup> the other one (L318-3; *Fig. 24:14*) presumably belongs to a jug or jar and might also show a part of a palm tree or—according to a closer parallel from Tall Deir ‘Alla—of an acacia (see references below).

#### Catalogue (*Fig. 24:1–15*)

320-2 (*Fig. 24:1*): CW, carinated bowl, wheel-made, hard-fired, light red fabric, grey core, medium-fine, white slip, once burnished, chocolate-brown decoration on rim.

<sup>25</sup> Two more diagnostic fragments of Late Bronze Age vessels were discovered in Trenches LVIC and D, which are well distant from the aforementioned trenches and are residual remains from later occupation phases. These two fragments will not be considered. Six residual sherds of Cypriote White Slip II bowls—four of the “mature” and two of the “early-type”—were found in Trenches LIXB, D and E in Phases IX and X contexts.

<sup>26</sup> See Fischer 2006a.

<sup>27</sup> The same applies to the very small Early Bronze Age II context which was found some metres south of it, approximately at the same level (see description of context and finds in the main article). A final volume on the Early Bronze Age of Tall Abu al-Kharaz was published in 2008; see Fischer 2008.

<sup>28</sup> The term was first used to denote Chocolate-on-White vessels from Tell el-cAjjul and Lachish; see Petrie 1931, 10; Tuffnell *et al.* 1940, 80, and later Amiran 1970, 158–159, pl. 49. The first complete systematic investigation is by Fischer; see Fischer 1999, 2000, 2003; id. 2006a, 255–280; id. 2006b, 133–156.

<sup>29</sup> For further characteristics, criteria of classification, origins and general discussion see Fischer 1999, 2003 and 2006a, 257–260; Maier 2007, 286–289; Mullins 2007, 396–399.

<sup>30</sup> These are Proto-Chocolate-on-White Bichrome, Chocolate-on-White Bichrome, Chocolate-on-White I, Eggshell Ware, Chocolate-on-White II and Chocolate-on-White III; see Fischer 2006a, 260–268 with definition and criteria of classification.

<sup>31</sup> Also referred to as (Wheelmade) White Slip ware by Hennessy 1985, 109–110; Knapp *et al.* 1988, 59 and *passim*, or White Ware; see Maier 2007, 287; and general discussion on the terms in Mullins 2007, 389. This type is mainly represented by thin-walled bowls, which show the same characteristics as Chocolate-on-White Ware and can despite their lack of decoration be attributed to the Chocolate-on-White Ware group. See Fischer 1999, 11; id. 2003, 51–52; id. 2006, 266.

<sup>32</sup> Amiran 1970, 161–165 dedicates a whole sub-chapter to the “palm tree and ibex motif” on Late Bronze Age pottery. She argues that from the LB IIB on only the palm tree (without ibex) may be depicted as *pars pro toto* for the whole motif.

318-2 (*Fig. 24:2*): CW-Eggshell, deep carinated bowl, wheel-made, very hard-fired, light red fabric, medium-fine, yellowish-white slip, worn.

314-3 (*Fig. 24:3*): CW, rounded bowl, wheel-made, hard-fired, light orangish-brown fabric, grey core, medium-fine, mainly white inclusions, white slip, burnished, dark brown decoration on interior. Parallels shape with similar decoration: Fischer 2006a, 80, fig. 66:6; 116, fig. 121:2; 190, fig. 226:2.

312-1 (*Fig. 24:4*): CW, carinated bowl, wheel-made, hard-fired, light orangish-brown fabric, grey core, medium-coarse, multicoloured inclusions, white slip, chocolate-brown decoration on interior and exterior. Parallels shape: see typology in Fischer 2006a, 272, fig. 293:9.

330-1 (*Fig. 24:5*): CW, chalice, wheel-made, hard-fired, light brownish-grey fabric, medium-fine white inclusions, white slip, dark red decoration. Parallels shape: Fischer 2006a, 147, fig. 159:1 (goblet, not CW); Loud 1948, pl. 62:8 (goblet, not CW); Fischer 2006a, 220, fig. 256:10 (carinated bowl, not CW).

320-1 (*Fig. 24:6*): CW, krater, wheel-made, hard-fired, brownish-red fabric, thick grey core, medium-coarse, multicoloured inclusions, thick white slip. Parallels shape: same as L316-1 (?), no decoration preserved.

316-1 (*Fig. 24:7*): CW, krater, wheel-made, medium-hard-fired, light grey fabric, coarse, multicoloured inclusions, light yellow slip, once burnished, now worn, chocolate-brown decoration. Parallels shape: Fischer 2006a, 227, fig. 261:3; Mullins 2007, 417, fig. 5.5 (type KR1a, pl. 58:3 and KR1d, pl. 76:8); decoration: Fischer 2006a, 119, fig. 124:1; 168, fig. 195:3.

314-5 (*Fig. 24:8*): CW, small jug, wheel-made, hard-fired, pinkish-red fabric exterior and grey fabric interior, coarse, multicoloured inclusions, thick white slip, burnished, chocolate-brown decoration. Parallels shape and decoration: Fischer 2006a, 137, fig. 146:5; Smith & Potts 1992, 75; pl. 57:4.

327-2 (*Fig. 24:9*): CW, biconical jar, wheel-made, hard-fired, light brown fabric, grey core, medium-fine, multicoloured inclusions, light grey slip, burnished, chocolate-brown decoration. Parallels shape and decoration: Fischer 2006a, 119, fig. 124:1; 168, fig. 195:3 (not CW); McNicoll 1982, pl. 112:7; Bourke *et al.* 2006, 50, fig. 43:1.

327-3 (*Fig. 24:10*): CW, biconical jug, wheel-made, hard-fired, orangish-brown fabric, medium-coarse, multicoloured inclusions, white slip, once burnished, chocolate-brown deco-

ration. Parallels “palm tree” (?): Loud 1948, pl. 84:5; Ben-Tor & Bonfil 1997, 216, fig. III.17:10; Fischer 2006a, 68, fig. 55:6.

N1425 (L313; *Fig. 24:11*): CW, ovoid jar, wheel-made, very hard-fired, light orangish-brown fabric, grey core, medium-coarse, multicoloured inclusions, light yellow slip, once burnished, chocolate-brown decoration, rim broken and worn. Parallel shape: Fischer 2006a, 275, fig. 296.

318-1 (*Fig. 24:12*): CW, jug/jar, wheel-made, hard-fired, light-brown fabric, medium-fine, multicoloured inclusions, white slip, burnished, brown decoration. Parallel shape and decoration: Fischer 2006a, 118, fig. 123:1.

327-1 (*Fig. 24:13*): CW, jug/jar with everted rim, wheel-made, hard-fired, light orangish-brown fabric, thick grey core, multicoloured inclusions, yellowish-white slip, burnished, chocolate-brown decoration. Parallels shape: Fischer 2006a, 74, fig. 61:6; 116, fig. 121:9.

318-3 (*Fig. 24:14*): CW, jug/jar, wheel-made, hard-fired, light red fabric, thick grey core, coarse, mainly white inclusions, light yellow slip, burnished, chocolate-brown decoration. Parallels “acacia”: Franken 1964, pl. Ia; also Homès-Fredericq & Franken 1986, 141–142, no. 370; also van der Kooij & Ibrahim 1989, 91, fig. 4.

313-5 (*Fig. 24:15*): CW, small jug, wheel-made, medium-hard-fired, orangish-brown fabric, medium-coarse, multicoloured inclusions, light yellowish-orange slip, vertically-hand-burnished.

## OTHER DECORATED WARES

This group includes monochrome and bichrome decorated vessels, which cannot be attributed to Chocolate-on-White Ware. The decorative patterns of this group of vessels include horizontal, vertical and cross lines, wavy lines, rhombi, framed zigzag lines, running semicircles, chequerboards, herringbones and double triangles surrounded by black dots. One of them, a biconical jug (L322-1; *Fig. 24:17*), has a sophisticated bichrome decoration combining chequerboards, double triangles, dots, wavy lines and crossed lines/rhombi and attests to the high standard of craftsmanship. Both typical Chocolate-on-White vessel shapes and decoration also occur on other wares (or *vice versa*). This becomes especially obvious in the case of jug L313-6 (*Fig. 24:16*): its shape is characteristic of Chocolate-on-White (see parallels in description), and the pattern resembles examples from the Chocolate-on-White in this group of pottery, but it has an orangish-red slip, quite different from that of Chocolate-on-White, and reddish-brown decoration. One fragment of a closed vessel (L327-4; *Fig. 24:19*)—presumably a jug or a jar—shows two ibexes or

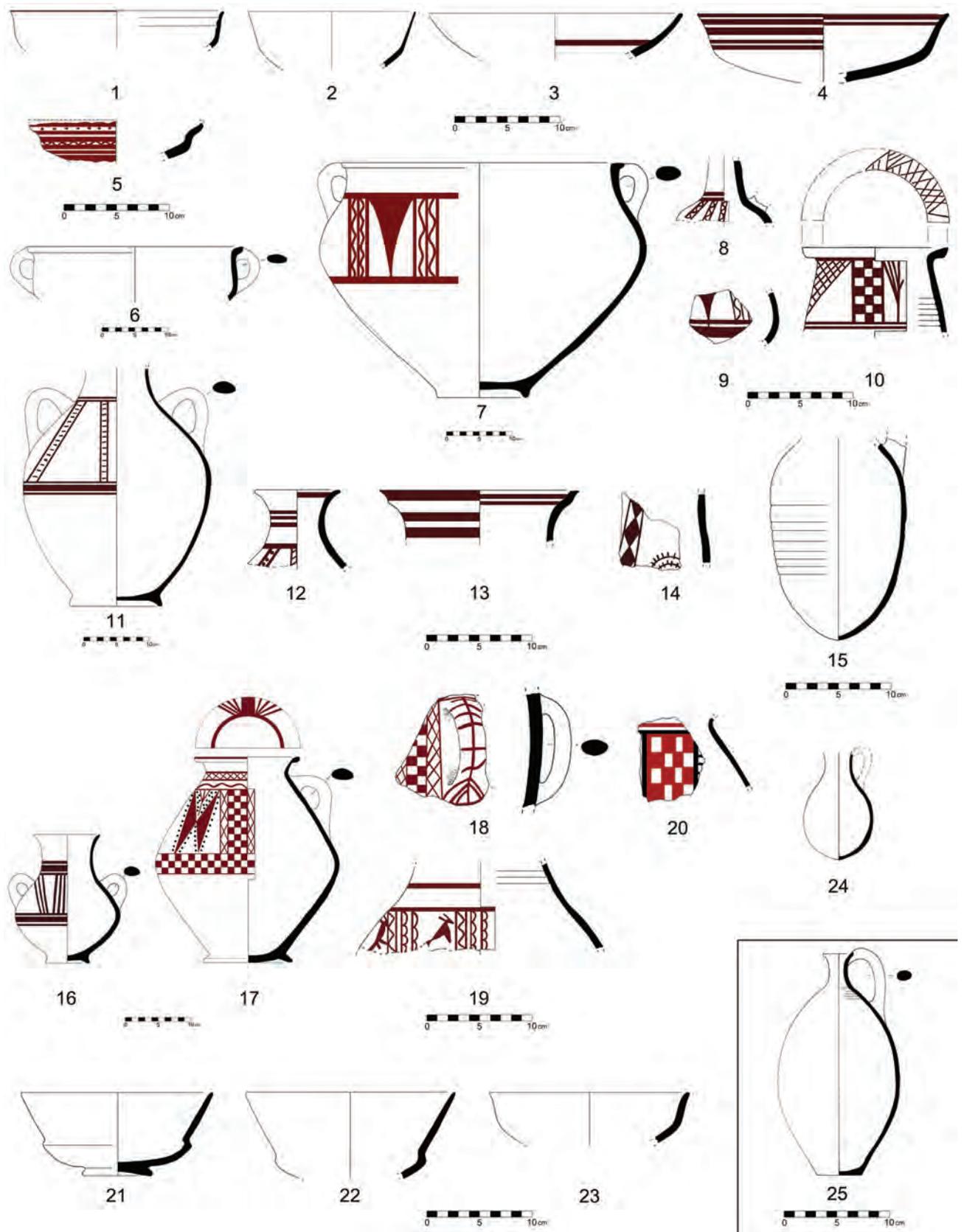


Fig. 24. Selected pottery from the Late Bronze Age (1–24) and the Early Bronze Age (25) (drawing by M. Al-Bataineh).

gazelles leaning against framed zigzag lines and semicircles. These animals are frequently depicted on pottery of the Late Bronze Age.<sup>33</sup> Since these animals are most often shown facing towards a tree, it may be asked whether the zigzag lines and semicircles next to them (on our example) might be highly stylized depictions of trees.

#### Catalogue (Fig. 24:16–20)

313-6 (Fig. 24:16): Small jug, wheel-made, hard-fired, light yellowish-brown fabric, medium-coarse, multicoloured inclusions (mainly grey), orangish-red slip, burnished, reddish-brown decoration, worn. Parallels shape: Fischer 2006a, 117, fig. 221:1; Schilk in Fischer & Feldbacher 2010, fig. 8:1 (both CW); Smith & Potts 1992, 75, pl. 57:5.

322-1 (Fig. 24:17): Biconical jug, wheel-made, hard-fired, orangish-brown fabric, thick grey core, medium-coarse, multi-coloured inclusions, light yellow slip, red and black decoration. Parallels shape: Fischer 2006a, 236, fig. 269:8; 237, fig. 270:1; also 274, fig. 295:5 (although more squat); Mullins 2007, 434–438.

336-1 (Fig. 24:18): Jug/jar, wheel-made, medium-hard-fired, grey fabric, medium-fine, white inclusions, light yellow slip, dark red decoration. Parallels decoration: Fischer 2006a, 116, fig. 121:11; 117, fig. 122:1, 3 (see only handles).

327-4 (Fig. 24:19): Jug/jar, wheel-made, medium-hard-fired, light orangish-brown fabric, grey core, medium-coarse, multicoloured inclusions, light brown slip, dark brown decoration. Parallels ibexes/gazelles: Maeir 2007, pl. 11:1; further parallels in Amiran 1970, 164–165.

313-4 (Fig. 24:20): Jug/jar, wheel-made, medium-hard-fired, greyish-brown fabric, medium-fine, black and white inclusions, light yellow slip, red and dark brown decoration.

#### PLAIN WARES

These vessels are undecorated and belong to the usual pottery repertoire of the Late Bronze Age; such as carinated and S-shaped bowls N1410, L315-1 and L318-5 (Fig. 24:21–23).<sup>34</sup> While small dipper-juglets occur from the Middle Bronze

Age<sup>35</sup> to the Iron Age with only small variations,<sup>36</sup> the fabric of juglet N1418 (Fig. 24:24) clearly belongs to the Late Bronze Age.

#### Catalogue (Fig. 24:21–24)

N1410 (L313; Fig. 24:21): Carinated bowl, wheel-made, hard-fired, light brown fabric, medium-coarse, multicoloured inclusions, light yellow slip.

315-1 (Fig. 24:22): Carinated bowl, wheel-made, hard-fired, orangish-brown to red fabric, brown core, medium-coarse, multicoloured inclusions, self-slip.

318-5 (Fig. 24:23): Carinated bowl, wheel-made, hard-fired, light yellow fabric, medium-coarse, mainly grey inclusions, self-slip.

N1418 (L327; Fig. 24:24): Dipper-juglet, wheel-made, medium-hard-fired, light yellow fabric, coarse, mainly grey inclusions, light yellow slip.

## Dating and conclusion

The great majority of the Late Bronze Age vessels found in 2011 have parallels in Tall Abu al-Kharaz, Phase V, corresponding roughly to LB IA–B.<sup>37</sup> The destruction of this phase can be dated to the mid-15th century BC.<sup>38</sup> Parallels from Beth-Shean are ascribed to Stratum R-2, which is also dated to LB IA–B.<sup>39</sup> The material from Pella, Tombs 62 and Tomb 20, does not provide any exact dates as it was dated in relation to material from Tall Abu al-Kharaz,<sup>40</sup> but the approximate date of the tombs is not contradictory to the dates from Tall Abu al-Kharaz and Beth-Shean.<sup>41</sup> In summary: there are no objections to attributing our material to Tall Abu al-Kharaz Phase V.

<sup>33</sup> Cf. again sub-chapter by Amiran 1970, 161–165 with examples; see previous note.

<sup>34</sup> See typology of Tall Abu al-Kharaz in Fischer 2006a, 218–222; 220, fig. 256; 221, fig. 257; typology of Beth-Shean in Mullins 2007, 401, fig. 5.2.; 410–413. Dating these bowls is difficult if the base is missing—furthermore, concave disc bases occur in all Late Bronze Age phases of Tall Abu al-Kharaz and are therefore not indicative.

<sup>35</sup> See typology of Tall Abu al-Kharaz in Fischer 2006a, 238–239, fig. 271: according to him earlier shapes are characterized by shorter necks and less marked shoulders, which makes an attribution of our juglet to Phase IV or V most likely; see also typology of Middle Bronze Age juglets from Beth-Shean in Maeir 2007, 275–276 and Late Bronze Age in Mullins 2007, 433–434. In fact, the vessels from the Late Bronze Age seem to be the closest to our example.

<sup>36</sup> See typology of the juglets from Beth-Shean in Mazar 2006a, 367–368.

<sup>37</sup> Fischer 2006a, 371; see also *Table 1* in the main report.

<sup>38</sup> Fischer 2006a, 372–373; 374, *Table 70*; Fischer 2006b, 241, *Table 1*.

<sup>39</sup> Mazar 2006b, 13, *Table 1.2*.

<sup>40</sup> Fischer 2003, 57.

<sup>41</sup> Potts 1992, 69.

## Appendix 2:

# Observations on the Middle and Late Bronze Age bread baking ovens from Tall Abu al-Kharaz

BY D. BLATTNER

### Introduction

The aim of this study is to associate the clay ovens from the Middle and Late Bronze Ages found at Tall Abu al-Kharaz with the fairly modern ethnological evidence from the Near East in order to find out if there are any traits that could be included in the interpretation of archaeological contexts.

### Ethnological evidence

There are two types of oven from our archaeological contexts, the *tabun* and the *tannur*. The main differences are in their general shape and the way they were heated.

The standard *tabun* (pl. *tawabeen*; Fig. 25:1) may be described as a hemispherical structure which is formed out of a mixture of clay and chaff.<sup>42</sup> It can be embedded a few centimetres into the floor,<sup>43</sup> and has a diameter between 0.70 and 1.10 m and an average height of 0.30 m.<sup>44</sup> Commonly, *tawabeen* are constructed with an opening on the top (*bab*), for putting the bread in and taking it out.<sup>45</sup> Some *tawabeen* have an opening on the side (*sannur*) for fire control.<sup>46</sup> Fuel, most usually small branches of wood, is inserted into the *tabun* in order to heat it up, prior to the baking process.<sup>47</sup> When a sufficient temperature is reached the ash is raked out, the *sannur* is closed and the bread is put onto the floor (*ka*) of the *tabun*. The floor of the *tabun* is usually covered with pebbles or sherds, or just made of smoothed clay.<sup>48</sup> After the opening on the top is closed with a lid (*rata* or *tabaka*), the entire oven

is covered with a slowly burning mixture of dung and chaff to assure a constant temperature on the inside.<sup>49</sup>

Depending on the size of the *tabun* up to 15 pieces of bread (diameters from approximately 15 to 25 cm and thicknesses of 1 to 1.50 cm) can be made in one baking process. Dalman writes about “very big tauābīn”<sup>50</sup> in Golan, in which about 40 pieces could be produced at once, which would imply an oven diameter of approximately 1.35 m. Dalman<sup>51</sup> also differentiates between *tawabeen* which are made with or without a floor. Another important observation by Dalman<sup>52</sup> is that these ovens are never placed in the living areas of the household, but always in “oven houses”. Since heating up a *tabun* is a very time-consuming process, which is usually started in the evening before baking, they are commonly shared by several families.<sup>53</sup>

The other type of oven is the *tannur* (pl. *tananeer*), which is made of the same clay and chaff mixture as the *tabun*. It has a cylindrical form, which narrows at the top and ends in an opening similar to that of the *tabun*. It was placed either above ground or partly underground.<sup>54</sup>

Both types are heated from the inside and produce bread 0.40 to 0.50 m in diameter and about 3 mm thick.<sup>55</sup> Through the top opening the formed dough is smacked against the inside of the heated *tannur*, using a special tool, similar to a cushion, and after cooking is removed using the same tool.

The underground *tannur* (Fig. 25:2) is first manufactured and then put into a hole in the ground which is dimensioned to fit it.<sup>56</sup> Since a certain air draught is required, there is often a tunnel at the bottom of the *tannur*, connected to a pit next to it.<sup>57</sup> It has an average diameter of 0.49 to 0.60 m and is between 0.70 and 1 m high.

The “above-ground” *tannur* (Fig. 25:3) is predominantly set a few centimetres into the floor and has an opening at the bottom (*menfas*), the function of which is to regulate the fire on the inside and also to provide air.<sup>58</sup> The heights range from 0.60 to 1.25 m; the diameters vary between 0.30 to 0.40 m at the top and between 0.50 to 0.90 m at the bottom.<sup>59</sup> Big *tananeer*, used in commercial bakeries, can reach heights of up to 1.90 m with diameters of around 0.70 m.<sup>60</sup> A special form of the above-ground *tannur* is the “egg-shaped” *tannur*, whose

<sup>42</sup> Dalman 1935, 75.

<sup>43</sup> Dalman 1935, 75; see also Mulder-Heymans 2002.

<sup>44</sup> Dalman 1935, 75, 78; McQuitty 1984, 261.

<sup>45</sup> Dalman 1935, 83.

<sup>46</sup> Dalman 1935, 78; Mulder-Heymans 2002.

<sup>47</sup> McQuitty 1984, 261; Dalman 1935, 79.

<sup>48</sup> Dalman 1935, 76, 78; McQuitty 1984, 261.

<sup>49</sup> Dalman 1935, 83; McQuitty 1984, 261.

<sup>50</sup> Dalman 1935, 83.

<sup>51</sup> Dalman 1935, 74–79.

<sup>52</sup> Dalman 1935, 77.

<sup>53</sup> Dalman 1935, 79; Mulder-Heymans 2002.

<sup>54</sup> Dalman 1935, 88.

<sup>55</sup> Dalman 1935, 105.

<sup>56</sup> Dalman 1935, 88.

<sup>57</sup> Dalman 1935, 89.

<sup>58</sup> Dalman 1935, 92.

<sup>59</sup> Dalman 1935, 91–92; Mulder-Heymans 2002.

<sup>60</sup> Mulder-Heymans 2002.

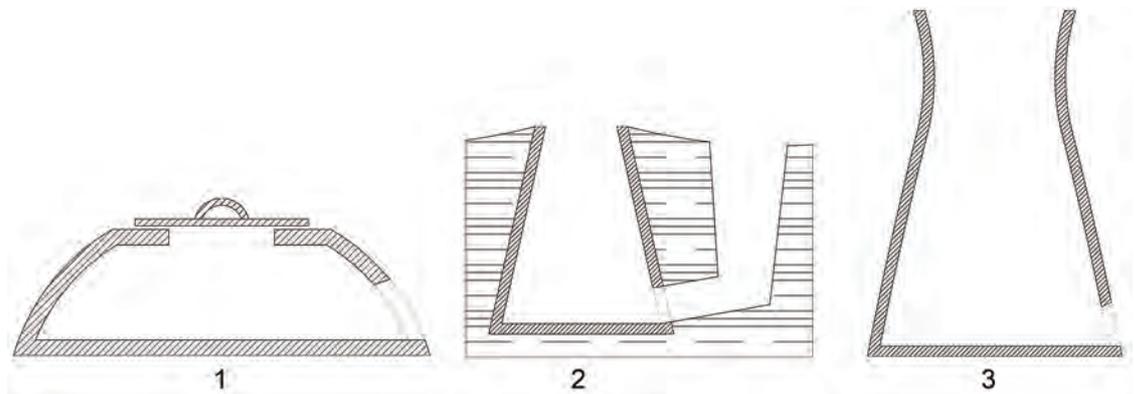


Fig. 25. Schematic drawings of various ovens: 1. *tabun*, 2. *tannur*, 3. "Above-ground" *tannur* (by D. Blattner).

opening points at an angle to the front of the top of the oven, to facilitate the baking process.<sup>61</sup>

Today *tananeer* are no longer used in the north of Jordan,<sup>62</sup> but they are quite common in Syria, where even *tananeer* manufacturers exist.<sup>63</sup> The ovens there are commonly placed in oven houses or against walls in order to protect the oven from wind and rain: exceptions are, however, reported from the Chabur area, where the ovens are placed some 100 m away from other buildings, and built into a clay and stone structure.<sup>64</sup>

## Archaeological evidence: material and discussion

This study focuses on the most interesting features of the Middle and Late Bronze Age ovens from the site and the ethnological and archaeological evidence will be compared.

Table 3 demonstrates that the first appearances of *tawabeen* and *tananeer* at Tall Abu al-Kharaz are in contexts belonging to Phase IV/2 (end of the Middle Bronze Age), which dates from the first half of the 16th century BC.<sup>65</sup> The first *tananeer* from Tall Irbid belong to the same time period.<sup>66</sup> It seems as if this type of oven was introduced to Tall Abu al-Kharaz or the region as a whole during this period, since the only evidence of Early Bronze Age baking facilities is hearths.<sup>67</sup>

None of the published ovens was found undamaged or even complete—the best preserved one, from Area 1 (Locus

160'),<sup>68</sup> was preserved up to a height of 0.60 m with a diameter of 0.90 m. Another fairly well-preserved oven is from Area 2 (Locus 365):<sup>69</sup> it has an outer diameter of 1 m and an inner diameter of 0.86 m, and a reconstructed height of 0.80 m.

The diameter of the ovens ranges from 0.30 m to about 1 m, with the exception of a large oven found in Area 1 (Locus 306)<sup>70</sup> which has a diameter of 1.80 m. What purpose it fulfilled cannot be answered with certainty, since no similar features have been found so far.

Table 3 also shows that the oven form most frequently found at Tall Abu al-Kharaz seems to have been the *tannur*. From 16 definable ovens only three were *tawabeen*, all of them from different periods, indicating that the two oven forms existed simultaneously. It is noticeable that the "bakery" in Area 1 was equipped with two *tananeer* and one *tabun*. Since the bread produced by the two types of ovens is different, it seems that the owners of this bakery wanted to provide both types of bread for their customers.

Moreover we may state that all of the excavated ovens were placed either in open areas, such as courtyards, or in separate oven houses, but in almost every case (exceptions: ovens 5, 13, 14, 15) against or near a wall, which is very similar to the ethnological evidence described above.

Interesting features can be studied in the above-mentioned *tannur* from Area 2 (Locus 365). It has a big diameter and two openings on the bottom, one of them slightly higher than the other one and of rectangular shape, whereas the bottom opening seems to be typical of a *tannur*. There are several possible explanations for this feature. One of the holes could have been used as an air vent and the other could have been used to provide the oven with fuel or to put in the bread. Since the

<sup>61</sup> Dalman 1935, 93–94.

<sup>62</sup> McQuitty 1984, 261.

<sup>63</sup> Mulder-Heymans 2002.

<sup>64</sup> Mulder-Heymans 2002.

<sup>65</sup> Fischer 2008, 374.

<sup>66</sup> McQuitty 1984, 261.

<sup>67</sup> Fischer 2008, 31–244.

<sup>68</sup> Fischer 2006a, 46–47.

<sup>69</sup> Fischer 2006a, 100–101.

<sup>70</sup> Fischer 2006a, 45–46, 51.

oven is not completely preserved, there might have been an opening at the top.

Another feature of the excavated ovens is the reinforcements with pottery sherds on the outside, which certainly also functioned as a heat-preserving feature. Surprisingly, only the *tananeer* were equipped with pottery reinforcements, as demonstrated by the finds from Area 1: whilst *tananeer* were reinforced, the *tabun* (from the same context) is not. Consequently the reinforcement with pottery sherds can be considered as a feature only seen in *tananeer*.

Table 3. The clay ovens from Tall Abu al-Kharaz (data from Fischer 2006a).

No.	Phase	Area	Trench	Locus	Diameter (m)	Location	Reinforced	Type	Preserved height (m)	Additional information
1	IV/2	1	XXVII A/B	160'	0.90	SE of courtyard	x	<i>tannur</i>	0.60	free standing but next to wall, next to (grain?) silo, surrounding area covered with ash
2	IV/2	1	XXIX A	306	1.80	open space, (yard?)			0.30	large oven, dark ash
3	IV/2	2	IV	3	0.90	shelter next to courtyard	x	<i>tannur</i>	0.30	surrounded by pebbles
4	IV & V	7	XXII B	105'	0.80	NE of courtyard	?	<i>tabun</i>	0.20	constructed against city wall
5	IV/2	9	XLII	143	0.70	open area (disturbed)	x	<i>tannur</i>	0.32	
6	V	1	XXVI A	142	0.90	NW of courtyard		<i>tan-nur?</i>	0.39	free standing
07	V	1	XXVII A	154'	0.70	SE of courtyard (roof supported) in niche		<i>tabun</i>	0.42	part of "bakery"
8	V	1	XXVII A	157	0.70	"baking house"	x	<i>tannur</i>	0.27	part of "bakery", ash inside
9	V	1	XXVII A	158	0.90	"baking house"	x	<i>tannur</i>	0.30	part of "bakery"
10	V	2	IX	365	1.03	SW corner of courtyard		<i>tannur</i>	0.55	two openings at the base, one slightly higher
11	V	9	XXIV	100	0.74	baking/cooking chamber	x	<i>tannur</i>	0.25	protected by at least three walls, next to fire place (kitchen ?)
12	V	9	XLII	139	0.70	NW corner of courtyard	x	<i>tannur</i>	0.25	next to rectangular structure, opening at the base
13	VI	1	XXVI A	122	0.50	courtyard/open space		<i>tabun</i>	0.15	
14	VI	10	XLIV A	83	0.60	open space, (disturbed)	x	<i>tannur</i>	0.19	
15	VII	2	III	45'	0.90	open area	x	<i>tannur</i>	0.20	
16	VII	3	XI A	56	~ 0.70	S corner (?) of courtyard	x	<i>tannur</i>	0.40	constructed of EB sherds, next to circular stone structure
17	VII	3	XI A	97	0.30	in between two walls	x	<i>tannur</i>	0.20	

## Conclusions

Regarding the considerable similarities between the ethnological and the archaeological data about clay ovens, some conclusions may be drawn:

1. There is continuity in material culture and tradition from the Middle and Late Bronze Ages until today.

2. Ovens were and still are in most cases positioned on the outside of buildings and living areas. Exceptions are the oven houses, which provide parallels to our installations.

The evidence from the Iron Age at the site will be studied in a future project. It will be interesting if the above suggestion, i.e. that only the *tananeer* from this period were reinforced with pottery, stands up to further examination.

## Appendix 3: Reflections on human skeletons from Tall Abu al-Kharaz 2011

BY M. ALROUSAN & A. ABU DALO

### Introduction

Skeletal remains provide valuable information on ancient human populations and enable bioarchaeologists to contribute to the reconstruction of their living conditions. These include diet,<sup>71</sup> activity pattern,<sup>72</sup> demography,<sup>73</sup> climatic changes<sup>74</sup> and burial rituals.<sup>75</sup> In this preliminary report, however, only provisional data are presented on four skeletons from the settlement of Tall Abu al-Kharaz. Further studies are necessary and will be forthcoming.

### Context

During the excavation season of 2011, in the eastern part of Trench LVID in Area 9, four partially preserved human skeletons were discovered.<sup>76</sup> These individuals are considered the first human remains from a settlement context at Tall Abu Al-Kharaz (see main report; test trench north of W649).

Their positions were as follows: two adults were found hugging each other, and two other individuals were found close by (Fig. 26). The skeletons were embedded in a layer of ash and surrounded by pottery sherds. One of the embracing adults had a bronze earring in the area close to the left “ear”. There was also a collared bead of bone amongst the bones. The test trench does not provide enough information but it is most likely that the individuals were killed by collapsing building elements.

On the basis of accompanying archaeological finds, for instance pottery sherds, the bronze earring and the associated



Fig. 26. Two of the skeletons embracing each other (photograph by P.M. Fischer).

structures, the finds were assigned to the Late Bronze Age. Moreover, the discovery of ash and fragmentary pottery indicated that we were dealing with a destruction layer.

### Examination

The first and uppermost skeleton was in such a poor state of preservation that neither age nor sex could be determined using anthropological techniques. The other three skeletons located below it were in a better condition. Two of the individuals lay close together in an apparent embrace. These two individuals lay with their faces turned towards each other. The more southerly one lay prone with the head turned towards the north, the more northern one supine and with the head turned south. However, the lower limbs of these two individuals could not be completely excavated due to lack of time because they continued into the eastern section. The fourth skeleton, which also continued into the (northern) section, lay a little to the north: a cranium with the teeth, obviously from an adult, parts of the spinal column, the ribs and a shoulder joint could be secured.

A collared bead of bone was found amongst the bones on the level of the uppermost, poorly preserved, skeleton. A bronze earring was found beneath the left mastoid process of the southerly skeleton of the embracing pair. Spots of ash and scattered sherds seem to point to a destructive event.

Both sex and age determination were partially conducted *in situ* since some of the skeletal remains were poorly preserved. Further bioarchaeological investigation was performed in the

<sup>71</sup> Smith 1984, 39–56; Eshed *et al.* 2006; Alrousan & Pérez-Pérez 2008.

<sup>72</sup> Larsen 1997; Weiss 2007.

<sup>73</sup> Eshed *et al.* 2006.

<sup>74</sup> Al-Shorman 2002.

<sup>75</sup> Al-Shorman 2007.

<sup>76</sup> We want to thank the director of the excavations P.M. Fischer for giving us access to the material. Thanks are also due for the support of M. Al-Bataineh. H. Dibajah took the photographs, for which we are also indebted.

laboratory of the Faculty of Archaeology and Anthropology of Yarmouk University. Sex was estimated based on the morphological features displayed by the pelvis and the skull according to Brothwell.<sup>77</sup> The age of each individual was calculated based on several techniques and qualitative traits of the pubic symphysis and dental eruption as presented by Bass,<sup>78</sup> Ubelaker,<sup>79</sup> White<sup>80</sup> and Fischer.<sup>81</sup> Thereafter pathological findings were recorded based on studies by Steinbock,<sup>82</sup> Aufderheide and Rodriguez-Martin.<sup>83</sup>

## Results and discussion

As a result of the poor state of preservation the sex and age of the uppermost human skeleton was not possible to assess. Examination of the two embracing individuals points to a male and a female. The estimated age of the male, lying further to the north, is about 30–35 years. The female lying south of the former with the head facing north appears to have been an adult woman whose more precise age could not be determined. The sex and more precise age of the fourth individual could not be estimated because the necessary anatomical parts were missing.

Paleopathological studies of skeletal material are an important source of information on the life of past people which allows us to draw conclusions about their state of health, the diseases that affected them and their culture.<sup>84</sup> The diagnosis of paleopathological conditions is difficult, since the process of pathogenesis takes a long period of time to have a noticeable effect on the skeletal system. The dental remains are also an important source of information on habits, living conditions and pathology.<sup>85</sup>

During the life of an individual, the articular surfaces of the joints are exposed to mechanical stress: heavy lifts affect the joints of shoulders, elbows, hands, and back, while excessive walking affects the joints of hips, knees, and feet. The most evident pathological feature in the skeletons is osteophytes, i.e. different types of vertebrae display various degrees of lipping. Some of the cervical vertebrae of the adult male have a particular degree of osteophyte formation on the upper margin of the articular surface (*Fig. 27*; lipping on the cerebral



*Fig. 27. Lipping of the cerebral vertebra (photograph M. Alrousan).*

vertebra). This kind of marginal lipping may be the result of the repeated carrying of heavy loads on the upper back.<sup>86</sup> This seems to be a logical consequence of heavy agricultural activities.

Heavy activities leave significant marks on skeletal remains, especially in the area of muscle attachments. Extra bone growth or enthesopathy of the muscle attachment, implying activity and behavioural adaptation of heavy demand on muscles is a phenomenon well known in male skeletons due to gender-based activities.<sup>87</sup> The presence of extra bone growth on the ribs of the adult is proof of regular physical



*Fig. 28. Extra bone growth on ribs (photograph M. Alrousan).*

<sup>77</sup> Brothwell 1986.

<sup>78</sup> Bass 1987.

<sup>79</sup> Ubelaker 1987.

<sup>80</sup> White 1991.

<sup>81</sup> Fischer 1980.

<sup>82</sup> Steinbock 1976.

<sup>83</sup> Aufderheide & Rodriguez-Martin 2005.

<sup>84</sup> Steinbock 1976; Larsen 1997.

<sup>85</sup> Molnar 1971; Fischer 1980; Smith 1984; Christensen 1998; Hillson 2001; Eshed *et al.* 2006; Alrousan 2011.

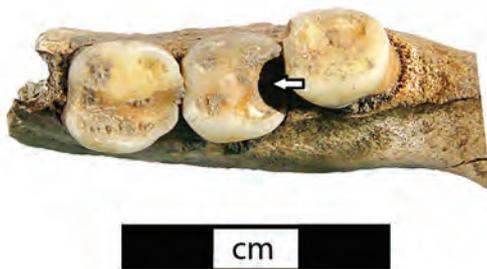
<sup>86</sup> Bridges 1994.

<sup>87</sup> Hawkey & Merbs 1995; Churchill & Morris 1998.

stress on the intercostal muscles (*Fig. 28*; extra bone growth on ribs).

Dental remains are the best preserved human remains in any archaeological context, since they possess specific properties that enable them to withstand even very hostile environmental conditions.<sup>88</sup> Humans use their teeth not only for food processing but also as tools. Food processing results in wear of the tooth enamel both macroscopically (dental wear) and microscopically (microwear). Based on the type of dental wear, we can study which type of food was consumed and learn about the food processing techniques that were used. The shape and degree of wear are strongly associated with a particular subsistence economy.<sup>89</sup> The teeth of the two adult individuals displayed heavy wear of oblique form (*Fig. 29*). This type of wear indicates a society based on agriculture, whereas the flat form is commonly found amongst people whose economy was based mainly on hunting and gathering.<sup>90</sup> The presence of specific tools which were used to process food, for instance, grinding stones and pestles, indicates that agriculture was the backbone of the economy in the Late Bronze Age.<sup>91</sup>

Demineralization of dental enamel due to exposure to acids which are produced by the interaction between oral bacteria and carbohydrates is known as dental caries and results in cavities in dental tissue. The two embracing adults exhibit caries as a result of carbohydrate consumption (*Fig. 29*)<sup>92</sup> and fractures of the mesial or distal parts due to extensive wear. The archaeological findings of the Late Bronze Age at the site suggest that the people consumed significant amounts of plant remains and various types of grain like emmer wheat, einkorn wheat, barley, as well as beans, lentils, flax and olives.<sup>93</sup>



*Fig. 29. Heavy wear of teeth and caries (photograph M. Alrousan).*



*Fig. 30. Radial fracture of skull (photograph M. Alrousan).*

The presence of traumatic lesions of bones in the ancient human populations is well documented.<sup>94</sup> A radial fracture in the skull of the adult male may have been the cause of death of this individual (*Fig. 30*). According to Byers<sup>95</sup> and Hart,<sup>96</sup> this type of fracture resulted from blunt trauma, possibly due to a falling building element or another heavy object that struck the cranial vault.

In terms of burial habits, people of the Late Bronze Age buried their deceased relatives in various types of tombs. The find situation strongly suggests that the four individuals were not buried in a tomb. The presence of the ash, fallen mudbrick and broken vessels suggests that a catastrophe occurred, most likely an earthquake, which is a common phenomenon in the Jordan Valley.<sup>97</sup>

## Conclusions

The four skeletons most likely represent earthquake victims from the Late Bronze Age. Two of them were adults, a man of 30–35 years and female of indeterminable age. The adults were found embracing each other. The age and sex of the remaining skeleton could not be determined. The find context may point to members of the same family. Further investigations including DNA studies will be helpful to support or reject this assumption.

<sup>88</sup> Fischer 1980, 6–18.

<sup>89</sup> Eshed *et al.* 2006; Alrousan 2009.

<sup>90</sup> Smith 1984; Eshed *et al.* 2006.

<sup>91</sup> See Fischer 2006a, 306–320, 357, 358.

<sup>92</sup> See X-rays in Fischer 1980, 6–18; see also Larsen 1984; Lubell *et al.* 1994.

<sup>93</sup> Fischer 2006b, 173.

<sup>94</sup> Fischer 1980, 6–18; Lovell 1997; Hart 2005.

<sup>95</sup> Byers 2002.

<sup>96</sup> Hart 2005.

<sup>97</sup> Nur & Cline 2000.

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