TALL ABŪ AL-KHARAZ
THE SWEDISH JORDAN EXPEDITION 2011: FOURTEENTH SEASON
PRELIMINARY EXCAVATION REPORT

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Introduction

The fourteenth season of excavation at Tall Abū al-Kharaz was carried out with the kind support of the Department of Antiquities and its acting Director General Fares al-Hmoud between 18 September and 13 October 2011. The 2011 project was devoted to the well-preserved Iron Age I compound from Area 9 which was partly exposed in 2009 and 2010 (see Fischer and Feldbacher 2009, 2010, 2011). It was anticipated that the continued excavation north of the compound would produce additional Early Iron Age material for the fourth volume on Tall Abū al-Kharaz (Fischer forthcoming). The collection of first-class radiocarbon samples from closed floor contexts had as usual, high priority.

Expansive consolidation work was carried out after the 2010 season of excavation under the supervision of the Department of Antiquities and architect M. Al-Bataineh. Fourteen rooms with walls which are still standing upright to a height of more than 2m were cleaned and consolidated. Restoration work will be initiated as soon as the entire compound is exposed.

In 2011 two sub-areas were opened in Area 9: one as Trench LVIA-D to the north of Trenches LIIB and LIVA from 2010, and the other west of Trench LI from 2010 as Trenches LVIIA-D and LVIIIA (see **Fig. 1**).

The 2011 team consisted of 28 persons including P. M. Fischer (director), T. Bürge (assistant field director), H. Ta'ani (foreman, trench master), M. Al-Bataineh (surveyor, draughtsperson). Trench masters were S. Ahmed, D. Blattner, C. Böhm, R. Feldbacher, F. Luckscheiter and S. Scherzer. A. Pihl was assistant trench master during the second half of the campaign. The representative of the Department of Antiquities was Z. Ghnaimat. The expedition was further backed up by the inspector of Pella, N. Khasawneh. Additional support was provided by S. Esbeihat (cook). The brothers Y. (pottery washing) and S. Suleiman Musa (transportation) assisted. Twelve local workers from Pella, al-Mashāri' and al-Yābis were engaged in the excavations.

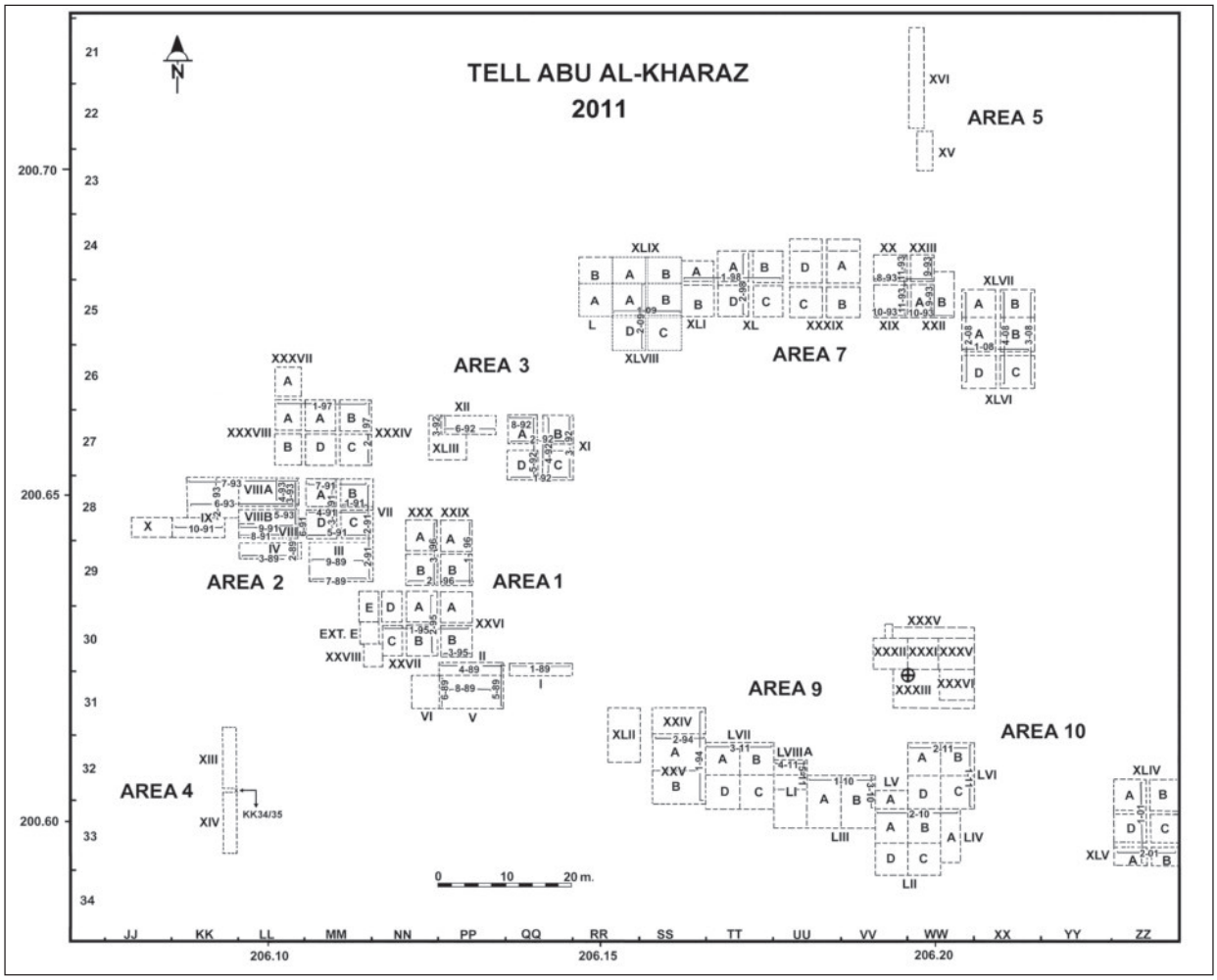
The Royal Court, represented by T.R.H. Prince Raad Ibn Zaid and Princess Majda Raad, and the Swedish Embassy headed by H.E. C. Sparre again showed interest in our work and provided support. With the kind permission of the Department of Antiquities Mohammad Alrousan, anthropologist from the Department of Archaeology and Anthropology of the Yarmouk University in Irbid, gave support in the investigation of four skeletons, most likely earthquake victims, from the Late Bronze Age. Amongst visitors were those from Zarqa University and the Department of Antiquities. The staff of the Swedish Embassy in Amman were given a guided tour of Tall Abū al-Kharaz.

Results from the 2011 Excavations in Area 9

1. The North-Eastern Part: Trenches LVIA-D (Fig. 1)

Background

The compound which was exposed in 2009 and 2010 dates to Iron Age I according to six radiocarbon dates from the floor of Stratum 1C[1] which are all between roughly 1200-1000



1. Overview Google Earth satellite image of Wādī Faynān field systems WF442 and WF443.

BC. The results from 2009 encouraged us to extend the 2010 excavations eastwards and a total of 28m represented by Trenches LI-LV were opened during these two seasons. In 2011 the area was extended to the north by Trenches LXVIA-D and to the west by Trenches LVIIA-D and LVIIIA. The opened up area slopes 2.78m in 38m from east to west, and 2.9m in 15m from north to south.

Unfortunately three deep looters' pits, approx. 3m wide, were dug in the area after the 2009 excavations, thus destroying three complete rooms: numerous broken vessels were found around the pits. Other areas also suffered from extensive looting due to the fact that the tall is privately owned and not the property of

1. Stratum 1 C is built directly on the Late Bronze Age city wall. The term "Stratum" should only be considered as a term of convenience for use during the field work and in the preliminary reports (see Fischer 2006: 26). It is used to designate a level of occupation regardless of the area and numbered as it is excavated. From 1989 to 1994 consecutive numbering of the strata was used in the preliminary reports submitted to ADAJ. Nevertheless, it was later decided that Stratum 1 A, B … designate the phases from Iron Age. Since we discovered pre-Iron Age phases during the 2011 season of excavation Stratum 0 A, B... was introduced for post-Iron Age layers of occupation, viz. mainly Late Roman, Byzantine and Islamic structures. Stratum 2 with sub-divisions is reserved for the Late and Middle Bronze Ages, and Stratum 3 with sub-divisions for the Early Bronze Age. All these divisions and sub-divisions are only valid in the preliminary reports. The final phasing for the Early, Middle and Late Bronze Ages is in Fischer 2006a,b; 2008. There are six sub-phases for the Early Bronze Age (IA,B; IIA,B; IIIA,B), two sub-phases for the Middle Bronze Age (IV/1 and 2) and four sub-phases for the Late Bronze Age (V-VIII). The final phasing of the Iron Age will consequently start with Phase IX, which corresponds to Stratum 1 C, i.e. the earliest Iron Age occupation.

the Department of Antiquities: thus no guard was installed on the site before 2010. Thanks to the kind intervention by the former Director General of the Department of Antiquities, Z. Al-Saad, a guard was installed after the excavation in 2011: since then no new looters' pits have been discovered.

Stratum 0A-C

The architectural remains of two occupational phases, most of them just below a thin layer of colluvial soil, were relatively well-preserved despite their superficial positions. There is a structure consisting of two rooms to the north (W657, 652, 651, 656). Two windows, each 1m wide, open up the rooms to the south, viz. towards where the Wādī al-Yābis flows. This structure was clearly built in two phases (Stratum 0A and B): the lower part is well-constructed of relatively small rounded stones whereas the upper part is built of large blocks of stone, obviously deriving from the collapsed "White Building" to the north which represents an Iron Age tower that was reused during later periods (Fischer 1991; Ingemarsdotter 1997; Fischer 1998).

South of this structure is a courtyard where numerous vessels were found. A staircase leads towards the east and a bench is built along a 1m wide wall, W653. There are two spaces and a bench against this wall to the south (W654, 655, 658).

To judge from the pottery the building was used in Byzantine (Stratum 0A) and Abbasid (Stratum 0B) times.

Two walls (W663, 664; Stratum 0C) appear below the Byzantine layer (Stratum 0B). The date of these walls is difficult to assess because the excavations did not continue below the foundation of the 0A-B structure to the north: it was decided to preserve this structure for the time being.

Stratum 1A

This occupation layer is related to the corresponding stratum from the excavations in 2010. There is one stone-paved room which represents the continuation of the stone-paved space from 2010 (L212, 214). 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.

The majority of the sherds are from the second part of the Iron Age 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.

Stratum 1B

Only a few loci and some walls were exposed before the excavations came to a halt (W666, 636). According to the pottery and radiocarbon this stratum belongs to the end of Iron Age I or possibly the beginning of Iron Age II.

Stratum 2

A test trench was dug north of W649 (see the excavation report from 2010). Finds of interest were four skeletons: the uppermost was only partially preserved whereas the lower three were almost complete. Two of them seem to embrace each other. One young female had an earring of bronze close to her left *processus mastoideus.* 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.

Stratum 3

Below the skeletons we reached a mudbrick wall (W674), below which had been built directly upon bedrock. The level of the bedrock is -3.13m which demonstrates that there is a natural terrace just above the Iron Age I (Stratum 1C) compound to the south (the floor level of Stratum 1C just 2m to the south is 4.60m). The pottery is exclusively Early Bronze Age.

2. The Western Part: Trenches LI, LVIIA-D and LVIIIA (Fig. 1)

Stratum 1A

A partly exposed wall and two *ṭawābīn*, which were built close together, belong to this phase of occupation. The northern one, approximately 0.7 m in diameter, is well-constructed and stands on a stone bench. Larger stones in front of the *ṭawābīn* were used as working surfaces. Pottery points to a date in Iron Age II.

Stratum 1B

A long wall (W613), running east-west, and other poorly preserved walls, together with a *tabun*, belong to this phase. Dating from the pottery is not unambiguous, but a date around Iron I/IIA is suggested.

Stratum 1C (**Figs. 2 and 3**)

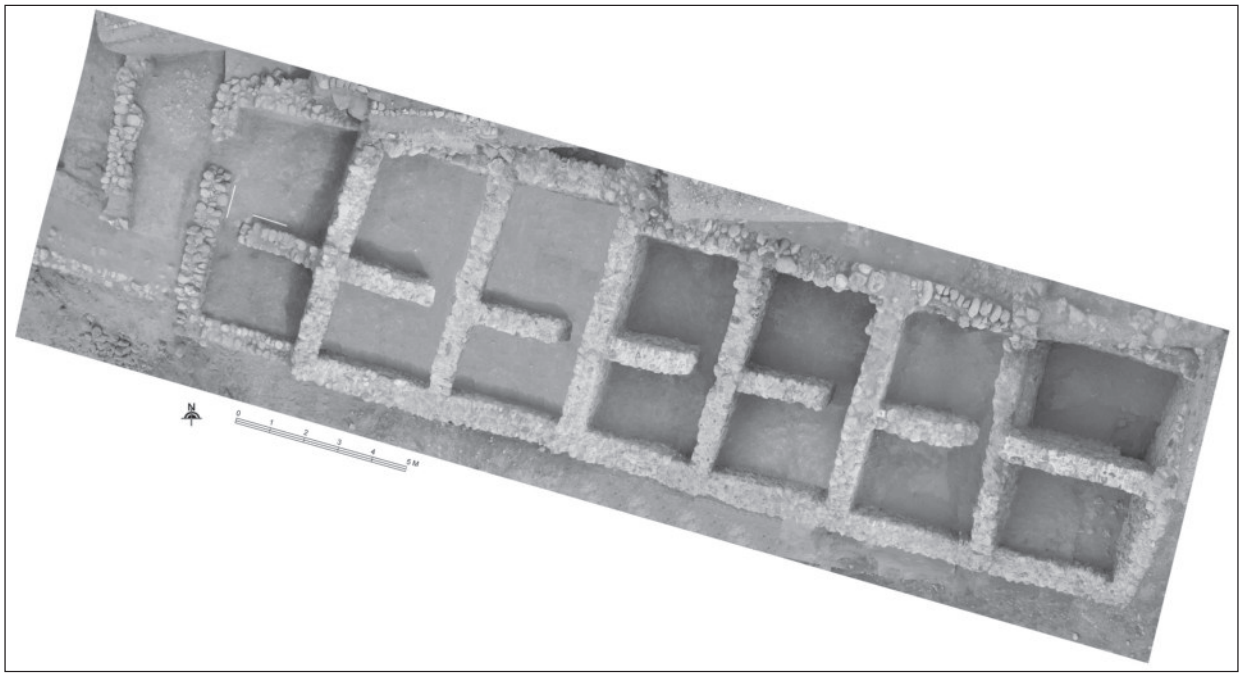
Room 1 belongs to the Iron I compound, which was partly excavated in 2009-2010 and consolidated in 2011 (**Fig. 2**). This room is one of the three rooms that were looted after the 2009 season. The southern part was totally emptied by the looters whereas the northern part was partly intact.[2] A depot of fine clay in the eastern part of the room and several broken unfired vessels point to the production of pottery or at least the storage of unfired vessels and raw material. This room contained a considerable amount of charcoaled wood possibly indicating wooden shelves where the unfired vessels were stored. Samples from wooden posts were sent to the Cornell Tree Ring Laboratory, Cornell University, USA.

Room 1 is the only one of the 14 rooms hitherto excavated that has two entrances: the "standard" opening between Rooms 1 and 2, but here in the western part, which contrasts with the other 12 excavated rooms, where the openings are always to the east. The second entrance, which is the only one so far from the outside of the building, is 1 m wide. The irregularity of the corner stones may possibly imply that this "entrance" was opened after the destruction of the compound. The following finds derive from Room 1: a stone pestle, a basalt weight (?) with a cylindrical depression at the bottom, a spearhead and a vessel of alabaster/calcite from which the neck and rim are missing (N1423).

West of the compound is another complex with a different layout but with an identical direction of the walls. This complex comprises at least six rooms with several hearths. An unusual find was made just to the north of W668, namely a fired clay figurine of a lion (N1424; **Fig. 4**).

Stratum 2

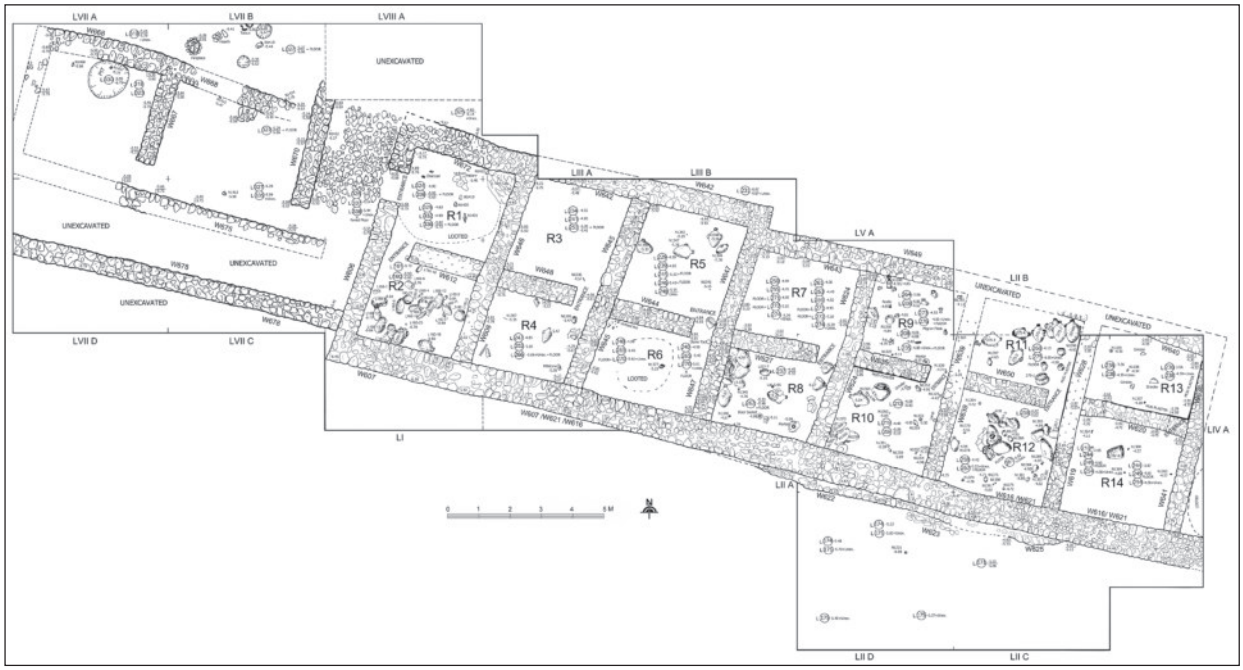
There are no architectural remains which could be ascribed with any certainty to the Late Bronze Age. There are, nevertheless, impressive vessels of Chocolate-on-White Ware and other wares that clearly belong to the Late Bronze Age destruction layer of Phase V which is dated to after 1450 BC (see Appendix 1).[3]



2. Photograph of the consolidated Iron Age I compound.

2. A sizable heap of sherds from the looting was found around Room 1 when the excavations were resumed in 2010.

3. See also Appendix 2 on the Middle and Late Bronze Age ovens.



3. Stratum 1C (Phase IX), Iron Age I compound.

4. Early Iron Age figurine of a lion.

Stratum 3

A few walls (W676 and 677[4]) with associated Early Bronze Age pottery were exposed at the end of the 2011 season of excavation 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 (Fischer 2008: 284-288). One of the juglets is a new type at Tall Abū al-Kharaz (**Fig. 5:25**). This layer of occupation belongs either to Phase II or III ac-

4. W677 is most likely not a separate wall. It may represent the collapsed superstructure of W676.

cording to the internal phasing at Tall Abū al-Kharaz.

Future Objectives

Guarding of the site has been granted by the Department of Antiquities, which will facilitate the continuation of the project. Consolidation of the well-preserved architectural remains has high priority and has been carried out on the majority of the exposed walls. Further investigations of Area 9 will take place in the future.

Appendix 1: Late Bronze Age Pottery from the 2011 Season of Excavation *(T. Bürge)*

Introduction and Context

An impressive collection of Late Bronze Age pottery including some more 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 Abū al-Kharaz:[5] 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.

Description of the Pottery, Parallels and Discussion (Fig. 5)

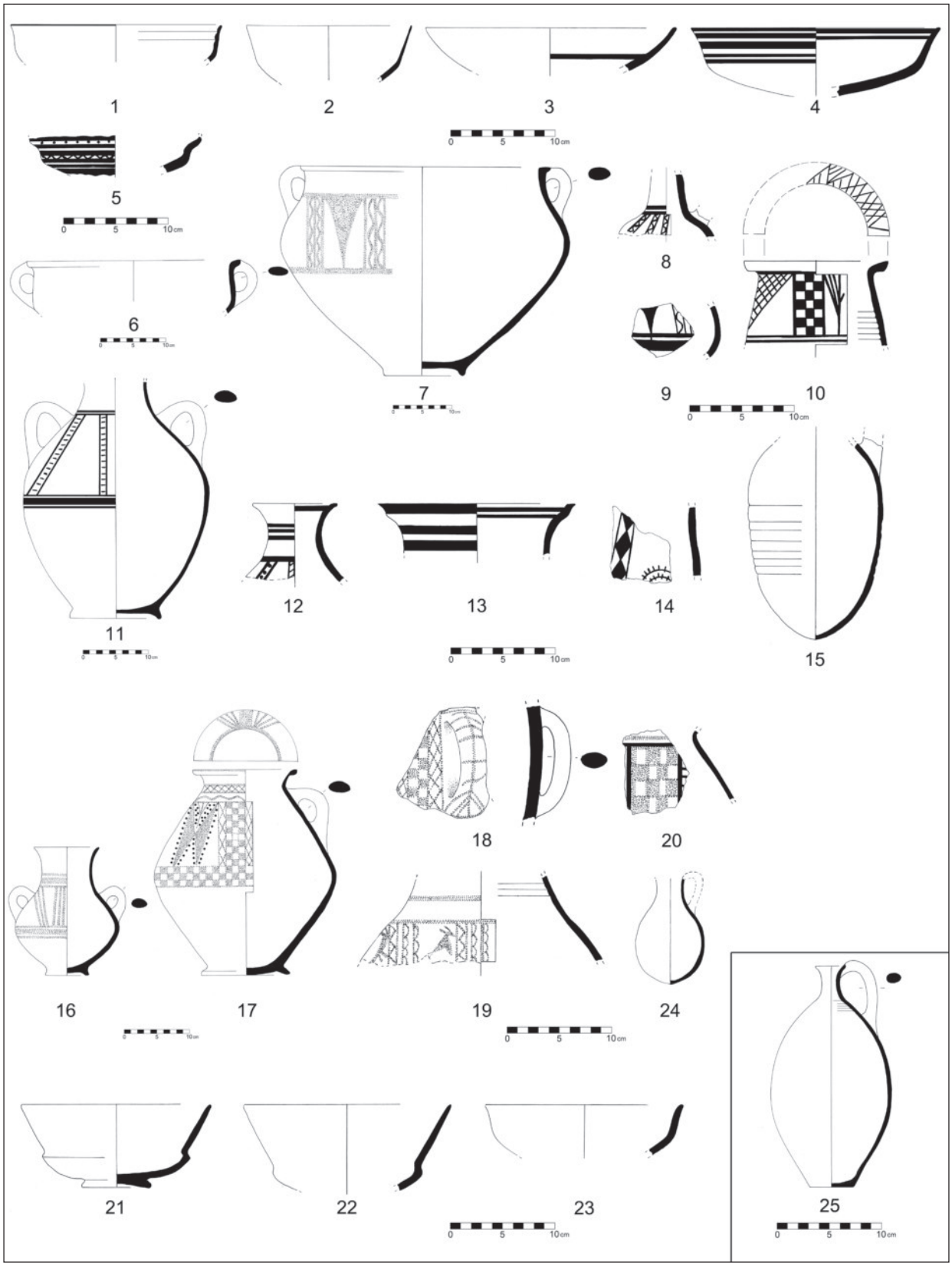
1. Chocolate-on-White Ware

The largest group of Late Bronze Age pottery from this area is represented by vessels of what is known as Chocolate-on-White-Ware (**Figs. 5:1–15**). This ware is in general defined by its thick white (or pink through yellowish white to light grey) wheel-burnished slip and reddish-brown ("chocolate-brown") decoration[6]. This late Middle and Late Bronze Age ware has been classified by Fischer in six groups according to shape, decoration and manufacturing technique (see Fischer 2006a: 260–262, Table 52). The vessel types range from rounded (**Fig. 5:3**) and carinated bowls (**Figs. 5:1, 2, 4**), chalices (**Fig. 5:5**) and kraters (**Figs. 5:6, 7**) to jugs or jars (ovoid and biconical; see **Figs. 5:8–15**). Most of the decorative 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. All these vessel types and patterns are well attested within the Chocolate-on-White Ware repertoire from Tall Abū al-Kharaz (Fischer 2006a: 255–280) and also at some other sites, such as Beth-Shean (Mullins 2007: 396–398, 417), Pella (Hennessy 1985, Bourke *et al.* 2006: 50–51) and Tall Dayr ʻAllā (van der Kooij and Ibrahim 1989: 91, fig.4). The patterns appear – generally independently from the vessel shape – in a wide variety of combinations thus making most of the vessels unique. However, L314-5 (**Fig. 5:8**), L327-2 (**Fig. 5:9**) and L318-1 (**Fig. 5:12**) have close parallels concerning vessel shapes and decorations at Tall Abū al-Kharaz (for L314-5 see Fischer 2006a: 137, fig. 146:5; for L327-2, see 119, fig. 124:1; 168, fig. 195:3 and for L318-1, see 118, fig. 123:1) and Pella (for L314-5 see Smith and Potts 1992: 75; pl. 57:4; for L327-2 see McNicoll 1982: pl. 112:7; Bourke *et al.* 2006: 50, fig. 43:1). There are also two vessels with figurative decorations amongst the material from 2011: one motif is depicted on the exterior of a biconical jug (L327-3, **Fig. 5:10**) with a unique pattern of crossed lines on the rim and exterior. It shows stylized palm trees (see parallels in Ben Tor *et al.* 1997: 216, fig. III.17:10; Fischer 2006a: 68, fig. 55:6). The other decoration (L318-3, **Fig. 5:14**) presumably was painted on a jug or jar and might also show a part of a palm tree or – according to a closer parallel from Tall Dayr ʻAllā (Franken 1964: pl. Ia; also van der Kooij and Ibrahim 1989: 91, fig. 4) – of an acacia.

The vessel types, decorative patterns and the carefully executed decoration allow an attribution of the material from 2011 to the Chocolate-

5. 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.

6. For further characteristics, criteria of classification, origins and general discussion see Fischer 1999, 2003 and 2006a: 257–260; Maeir 2007: 286–289; Mullins 2007: 396–399.



5. Late Bronze Age pottery from Phase V (1–24); Early Bronze Age Metallic Ware juglet (25).

on-White II sub-group. A bowl (L318-2, **Fig. 5:2**) belongs to the Eggshell Ware group.[7]

2. Other Decorated Wares

This group includes monochrome and bichrome decorated vessels, which cannot be attributed to Chocolate-on-White Ware (**Figs. 5:16–20**). 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. 5:17**), has a sophisticated bichrome decoration combining chequerboards, double triangles, dots, wavy lines and cross 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. 5:16**): Its shape is characteristic of CW (see e.g. Fischer 2006a: 117, fig. 221:1; Schilk in Fischer and Feldbacher 2010: fig. 8:1; Smith and Potts 1992: 75, pl. 57:5), and the pattern resembles examples from the CW in this group of pottery, but it has an orangish-red slip, quite different from that of CW, and reddish-brown decoration. One fragment of a closed vessel (L327-4, **Fig. 5:19**) – presumably a jug or a jar – shows two ibexes or gazelles leaning against framed zigzag lines and semicircles. These animals are frequently depicted on pottery of the Late Bronze Age (e.g. in Beth-Shean: Maeir 2007: pl. 11:1 or on a chalice from Tall Dayr ʻAllā van der Kooij 2006: 216, fig. 13b).[8] Since these animals are most often shown directed 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.

3. 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 (**Fig. 5:21**), L315-1 (**Fig. 5:22**) and L318-5 (**Fig. 5:23**).[9] While small dipper-juglets occur from the Middle Bronze Age[10] to the Iron Age with only small variations,[11] the light yellow, coarse fabric of juglet N1418 (**Fig. 5:24**) clearly belongs to the Late Bronze Age.

Dating and conclusion

The great majority of the Late Bronze Age vessels found 2011 have parallels in Tall Abū al-Kharaz, Phase V, corresponding roughly to LB IA – B (Fischer 2006a: 371). This is also the period during which CW II and Eggshell Ware flourished. Its destruction can be dated to the mid-15th century (Fischer 2006a: 372–373; 374, table 70; Fischer 2006b: 241, table 1). As regards Beth-Shean, vessels of the Chocolate-on-White ware type mainly occur in Stratum R-2 (Mullins 2007: 398), which is also dated to LB IA – B (see Mazar 2006 (ed.): 13, table 1.2). The material from the tombs from Pella does not provide any exact dates as it was dated in relation to material from Tall Abū al-Kharaz (Fischer 2003: 57), but their approximate dating is not contradictory to the dates from Tall Abū al-Kharaz and Beth-Shean (see Potts 1992: 69). In summary: there are no objections in attributing our material to Tall Abū al-Kharaz Phase V.

Appendix 2: Middle and Late Bronze Age Clay Ovens from Tall Abū al-Kharaz *(D. Blattner)*

Introduction

The aim of this study is to associate the clay ovens from the Middle and Late Bronze Ages found at Tall Abū al-Kharaz with the fairly mod-

7. 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 (Fischer 1999: 11; id. 2003: 51–52; id. 2006: 266).
8. They often occur in combination with palm trees; cf. the sub-chapter by Amiran 1970: 161–165 with examples.
9. See typology of Tall Abū 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 of these bowls is difficult if the base is missing – furthermore, concave disk bases occur in all Late Bronze Age Phases of Tall Abū al-Kharaz and are therefore not indicative.
10. See typology of Tall Abū al-Kharaz in Fischer 2006a: 238 fig. 271: according to him (ibid: 239) 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; 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.
11. See typology of the juglets from Beth-Shean in Mazar 2006: 367–368.

ern 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 *ṭābūn* and the *tannūr*. The main differences are in their general shape and the way they were heated.

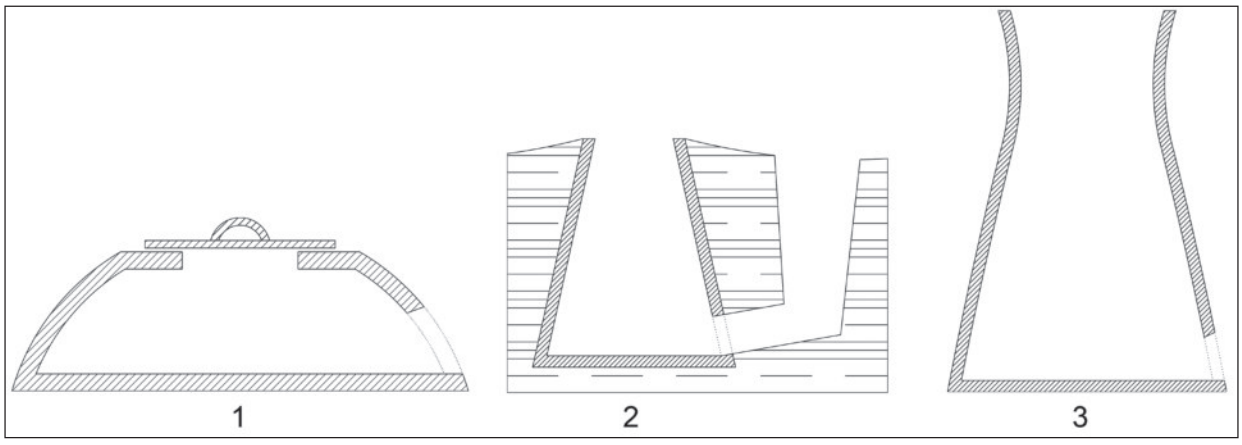
The standard *ṭābūn* (pl. *ṭawābīn*; **Fig. 6:1**) may be described as a hemispherical structure which is formed out of a mixture of clay and chaff (Dalman 1935: 75). It can be embedded a few centimetres into the floor (ibid, see also Mulder-Heymans 2002), and has a diameter between 0.7 and 1.1m and an average height of 0.3 m (Dalman 1935: 75, 78; McQuitty 1984: 261). Commonly, *ṭawābīn* are constructed with an opening on the top (*bāb*), for putting the bread in and taking it out of the oven (Dalman 1935: 83). Some *ṭawābīn* have an opening on the side (*tannūr*) for reasons of fire control (Dalman 1935: 78, Mulder-Heymans 2002). Fuel, most likely small branches of wood, is inserted into the *ṭābūn* in order to heat it up, prior to the baking process (McQuitty 1984: 261, Dalman 1935: 79). When a sufficient temperature is reached the ash is raked out, the *tannūr* is closed and the bread is put onto the floor (*Qā'*) of the *ṭābūn*. The floor of the *ṭābūn* is usually covered with pebbles or sherds, or just made of smoothed clay (Dalman 1935: 76, 78; McQuitty 1984: 261). After the opening on the top is closed with a lid (*ghaṭā*) the entire oven is covered with a slowly burning mixture of dung and chaff to assure a constant temperature on the inside (Dalman 1935: 83; McQuitty 1984: 261).

Depending on the size of the *ṭābūn* up to 15 pieces of bread (diameters from approximately 15 to 25cm and thicknesses of 1.0 to 1.5cm) can be made in one baking process. Dalman (1935: 83) writes about "very big *ṭawābīn*" in Golan, in which about 40 pieces could be produced at once, which would imply an oven diameter of approximately 1.35m. Dalman (1935: 74–79) also differentiates between *ṭawābīn* which are made with or without a floor. Another important observation by Dalman (1935: 77) is that these ovens are never placed in the living areas of the household, but always in "oven houses". Since heating up a *ṭābūn* is a very time-consuming process, which is usually started in the evening before baking, they are commonly shared by several families (Dalman 1935: 79; Mulder-Heymans 2002).

The other type of oven is the *tannūr* (pl. *tanānīr*), which is made of the same clay and chaff mixture as the *ṭābūn*. It has a cylindrical form, which narrows at the top and ends in an opening similar to that of the *ṭābūn*. It was either placed above-ground or partly underground (Dalman 1935: 88).

Both types are heated from the inside and produce bread of 0.4 to 0.5m in diameter and about 3mm thick (Dalman 1935: 105). Through the top opening the formed dough is smacked against the inside of the heated *tannūr*, using a special tool, similar to a cushion, and is finally removed using the same tool.

The underground *tannūr* (**Fig. 6:2**) is first manufactured and then put into a hole in the



6. Schematic drawings of various ovens. 1. Ṭābūn. 2. Tannūr. 3. "Above-ground" tannūr.

ground which is dimensioned to fit it (Dalman 1935: 88). Since a certain air draught is required, there is often a tunnel at the bottom of the *tannūr*, connected to a pit next to it (Dalman 1935: 89). It has an average diameter of 0.49 to 0.6m and is between 0.7 and 1m high.

The "above-ground" *tannūr* (**Fig. 6:3**) is predominantly set a few centimetres into the floor and has an opening at the bottom (menfas) the function of which is to control the fire on the inside and also to provide air (Dalman 1935: 92). The heights range from 0.6 to 1.25m; the diameters vary between 0.3 to 0.4m at the top and between 0.5 to 0.9m at the bottom (Dalman 1935: 91, 92, Mulder-Heymans 2002). Big *tanānīr*, used in commercial bakeries, can reach heights of up to 1.9m with diameters of around 0.7m (Mulder-Heymans 2002). A special form of the above-ground *tannūr* is the "egg-shaped" *tannūr*, whose opening points at an angle to the front of the top of the oven, to facilitate the baking process (Dalman 1935: 93, 94).

Today *tanānīr* are no longer used in the north of Jordan (McQuitty 1984: 261), but they are quite common in Syria, where even *tanānīr* manufacturers exist (Mulder-Heymans 2002). 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 100m away from other buildings, and built into a clay and stone structure (Mulder-Heymans 2002).

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 1 demonstrates that the first appearances of *ṭawābīn* and *tanānīr* at Tall Abū al-Kharaz are in contexts belonging to Phase IV/2 (end of the Middle Bronze Age), which

Table 1: The clay ovens from Tall Abū 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›	0.9	SE of courtyard	x	*tannūr*	0.6	free standing but next to wall, next to (grain?) silo, surrounding area covered with ash
2	IV/2	1	XXIX A	306	1,8	open space, (yard?)				large oven, dark ash
3	IV/2	2	IV	3	0.9	shelter next to courtyard	x	*tannūr*	0.3	surrounded by pebbles
4	IV & V	7	XXII B	105›	0.8	NE of courtyard	?	*ṭābūn*		constructed against city wall
5	IV/2	9	XLII	143	0.7	open area (disturbed)	x	*tannūr*	0.32	
6	V	1	XXVI A	142	0.9	NW of courtyard		*tannūr*?	0.39	free standing
7	V	1	XXVII A	154›	0.7	SE of courtyard (roof supported) in niche		*ṭābūn*	0.42	part of "bakery"
8	V	1	XXVII A	157	0.7	"baking house"	x	*tannūr*	0.27	part of "bakery", ash inside
9	V	1	XXVII A	158	0.9	"baking house"	x	*tannūr*	0.3	part of "bakery"
10	V	2	IX	365	1,03	SW corner of courtyard		*tannūr*	0.55	two openings at the base, one slightly higher
11	V	9	XXIV	100	0.74	baking/ cooking chamber	x	*tannūr*	0.25	protected by at least three walls, next to fire place (kitchen ?)
12	V	9	XLII	139	0.7	NW corner of courtyard	x	*tannūr*	0.25	next to rectangular structure, opening at the base
13	VI	1	XXVI A	122	0.5	courtyard/ open space		*ṭābūn*	0.15	
14	VI	10	XLIV A	83	0.6	open space, (disturbed)	x	*tannūr*	0.19	
15	VII	2	III	45›	0.9	open area	x	*tannūr*	0.2	
16	VII	3	XI A	56	~ 0.7	S corner (?) of courtyard	x	*tannūr*	0.4	constructed of EB sherds, next to circular stone structure
17	VII	3	XI A	97	0.3	in between two walls	x	*tannūr*	0.2	

dates from the first half of the 16th century BC (Fischer 2008: 374). The first *tanānīr* from Tall Irbid belongs to the same time period (McQuitty 1984: 261). It seems as if this type of oven has been introduced to Tall Abū al-Kharaz or the region as a whole during this period, since the only evidence of Early Bronze Age baking facilities is hearths (Fischer 2008: 31-244).

None of the published ovens was found undamaged or even complete – the best preserved one, from Area 1 (Locus 160; Fischer 2006a: 46-47), was preserved up to a height of 0.6m with a diameter of 0.9m. Another fairly well-preserved oven is from Area 2 (Locus 365; Fischer 2006a: 100-101): it has an outer diameter of 1m and an inner diameter of 0.86m, and a reconstructed height of 0.8m.

The diameter of the ovens ranges from 0.3m to about 1m, with the exception of a large oven found in Area 1 (Locus 306; Fischer 2006a: 45-46, 51) which has a diameter of 1.8m. What purpose it fulfilled cannot be answered with certainty, since no similar features have been found so far.

Table 1 also shows that the oven form most frequently found at Tall Abū al-Kharaz seems to have been the *tannūr*. From 16 definable ovens only three were *ṭawābīn*, all of them from different periods, indicating that the two oven forms existed simultaneously. It is noticeable that the so called bakery in Area 1 was equipped with two *tanānīr* and one *ṭābūn*. 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 either placed in open areas, like 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 *tannūr* 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 *tannūr*. 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 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 method. Surprisingly, only the *tanānīr* were equipped with pottery reinforcements, which is demonstrated by the finds from Area 1: whilst *tanānīr* were reinforced, the *ṭābūn* (from the same context) is not. Consequently the reinforcement with pottery sherds can be considered as a feature, only seen in *tanānīr*.

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 *tanānīr* from this period were reinforced with pottery, stands up to further examination.

Appendix 3: Human Skeletal Remains from 2011 *(M. Alrousan, S. Ahmed, C. Böhm and A. Abu Dalo)*

Introduction and Context

In the eastern part of Trench LVIIC in Area 9 four partially preserved human skeletons were discovered during the excavations in 2011. These individuals are the first human remains from a settlement context at Tall Abū al-Kharaz.

Skeletal remains provide valuable information on the biological data of the individual concerned and help to reconstruct the living conditions at any site. These include diet (Smith 1984: 39-56; Eshed *et al*. 2006: 145-159; Alrousan and Perez-Perez 2008: 45-59), activity pattern (Larsen 1997; Weiss 2007: 931-940), demography (Eshed *et al*. 2006: 145-159), climatic changes (Al-Shorman 2002: 7-26) and burial rit-

uals (Al-Shorman 2007).

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

This bioarchaeological study aims to analyze the skeletal remains, in order to expand our knowledge of the people who lived at Tall Abū al-Kharaz during the Late Bronze Age.

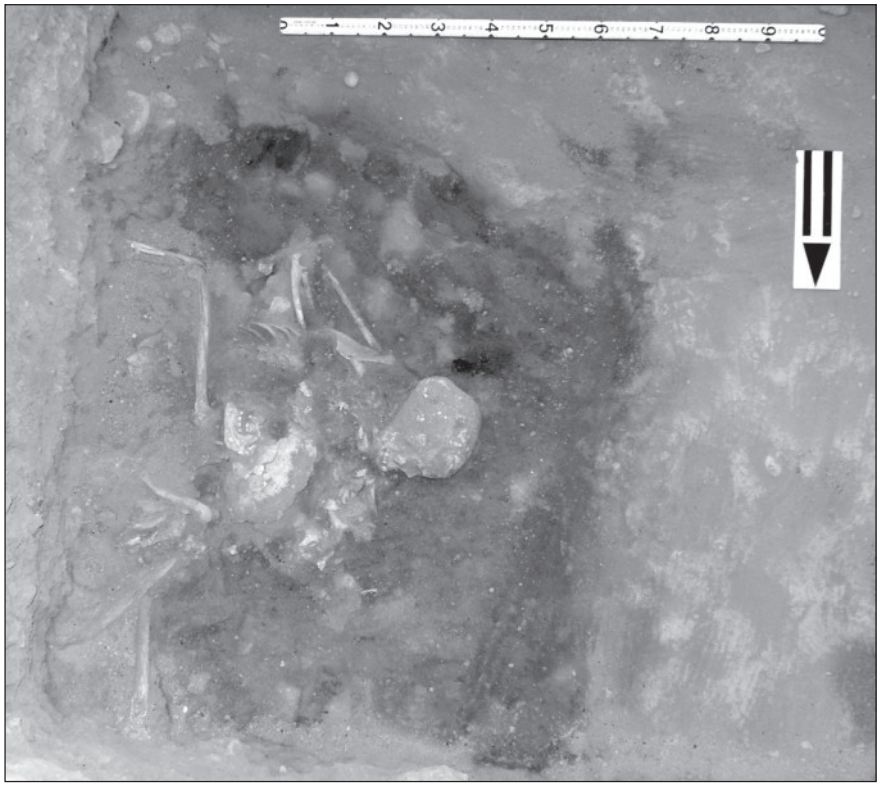
Materials and Methods

Four human skeletons are the basis of this study. The remains were in part poorly preserved due to the specific conditions of this context.

The uppermost individual was the most poorly preserved, possibly due to a later disturbance. The lower three individuals were almost fully preserved. They were found in such a way that two of the individuals lay close together in an apparent embrace (**Fig. 7**). These two individuals lay with their faces turned towards each other. The more southerly 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 preserved and 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. The lower three individuals were lying upon an ash layer. Spots of ash and scattered sherds were found amongst them, which seem to indicate that some kind of destruction had taken place. A bronze earring was found beneath the left mastoid process of the southerly skeleton of the "embracing" pair.

Sex and age had to be determined *in situ* due to the poor state of preservation, while further analysis took place in the laboratory. Determination of gender was performed based on pelvic morphology and morphology of the skull according to Brothwell (1986). The age of each individual was determined and calculated using techniques based on morphology of the pubic symphysis and dental eruption as presented by Bass (1987), Ubelaker (1987) and White



7. Two of the skeletons embracing each other.

(1991) and Fischer (1980).

Diagnosis of pathological lesions or changes was based on previous studies by Steinbock (1976), Aufderheide and Rodrigues-Martin (2005). Paleopathology is 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 (Steinbock 1976; Larsen 1997). 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 were examined for pathological traits (Molnar 1971: 175-190; Eshed *et al*. 2006: 145-159; Fischer 1980).

Results and Discussion

The first and uppermost skeleton was in such a poor state of preservation that neither age nor sex could be determined using anthropological techniques. 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 individual lying further to the south with the head facing north appeared to have been an adult woman. Neither age nor gender of the fourth individual could be determined due to the poor state of preservation and the absence of important skeletal parts.

The only pathological feature found in the four individuals of the study is the occurrence of osteophytes, while lipping appears on the vertebrae of the male adult. Some of the cervical vertebrae of the adult male display a particular degree of osteophyte formation on the upper margin of the articular surface. This kind of marginal lipping may be the result of carrying heavy loads on the upper back (Bridges 1994: 83-93).

Heavy activities leave marks on skeletal remains, especially in the area of muscle attachments. Extra bone growth or enthesopathy of the muscle attachment of the ribs of the adult male could be demonstrated. It is known that the extra bone growth develops due to heavy demand on the muscle or to musculoskeletal stress (Hawkey and Merbs 1995: 324-338). From this, one can infer that the heavy demand on the intercostals muscles may have been due to regular and strenuous physical stress.

The next important aspect is the dental state. Dental remains are the best preserved remains in the archaeological context, since they possess the material properties to withstand environmental conditions. The study of the dental status allows the reconstruction of many important aspects of living conditions, such as diet (Alrousan 2011), age (Hillson 2001; Fischer 1980), culture (Molnar 1971: 175-190; Smith 1984: 39-56; Eshed *et al*. 2006: 145-159) and evolution (Christensen 1998: 333-360). Dental wear indicates what type of food was consumed by ancient people and helps us to learn about their food processing techniques. The shape and degree of wear are strongly associated with a subsistence economy (Eshed *et al*. 2006: 145-159; Alrousan 2009). The teeth of the two adult individuals displayed heavy wear of oblique form. This type of wear indicates a society based on agriculture, although the flat form is also commonly found amongst people whose economy was based mainly on hunting and gathering (Smith 1984: 39-56; Eshed *et al*. 2006: 145-159). 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 (see Fischer 2006a: 306-320, 357, 358).

The two embracing adults exhibit caries as a result of carbohydrate consumption (Larsen 1984: 367-392; Lubell *et al*. 1994: 201-216) and fractures of the mesial or distal parts due to extensive wear (Fischer 1980). 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 (Fischer 2006b: 173).

The presence of traumatic lesions in the ancient human populations is well documented (Lovell 1997: 139-170; Hart 2005: 1-6; Fischer 1980). A radial fracture in the skull of the adult male may have been the cause of death of this individual, since this fracture occurred *ante mortem* without any signs of healing. According to Byers (2002) and Hart (2005), this type of fracture resulted from blunt trauma, possibly due to a falling rock that struck the cranial vault.

Conclusion

Four human Late Bronze Age skeletons were discovered at Tall Abū al-Kharaz. Two of them, an adult man and a woman, were well preserved and in an apparent embrace. Because of the poor state of preservation the age and gender of the other two skeletons could not be determined. The position of the skeletons may indicate that they belonged to one family. DNA analysis could be made to prove or disprove this assumption. The presence of an ash layer, ash spots and broken jars associated with the skeletal remains and also the possibly lethal cranial fracture of the adult male suggest that they died under falling structures, possibly caused by an earthquake.

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