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Archaeological Differences between the Southern Transjordan/Edomite Plateau and the Southern Ghawrs, the Northeast ʻArabah, and the Faynān Region during the Bronze Age

Introduction

This paper explores cultural variation in the archaeological record of two different geographical regions in southern Jordan during the Early to Late Bronze Age (*ca.* 3600-1200 BC). The two regions are; 1) the southern Transjordan/Edomite Plateau and, 2) the Dead Sea Rift Valley. The latter region, for the purposes of this paper, is confined to the southern Ghawrs, the northeast ʻArabah, and the Faynān region.

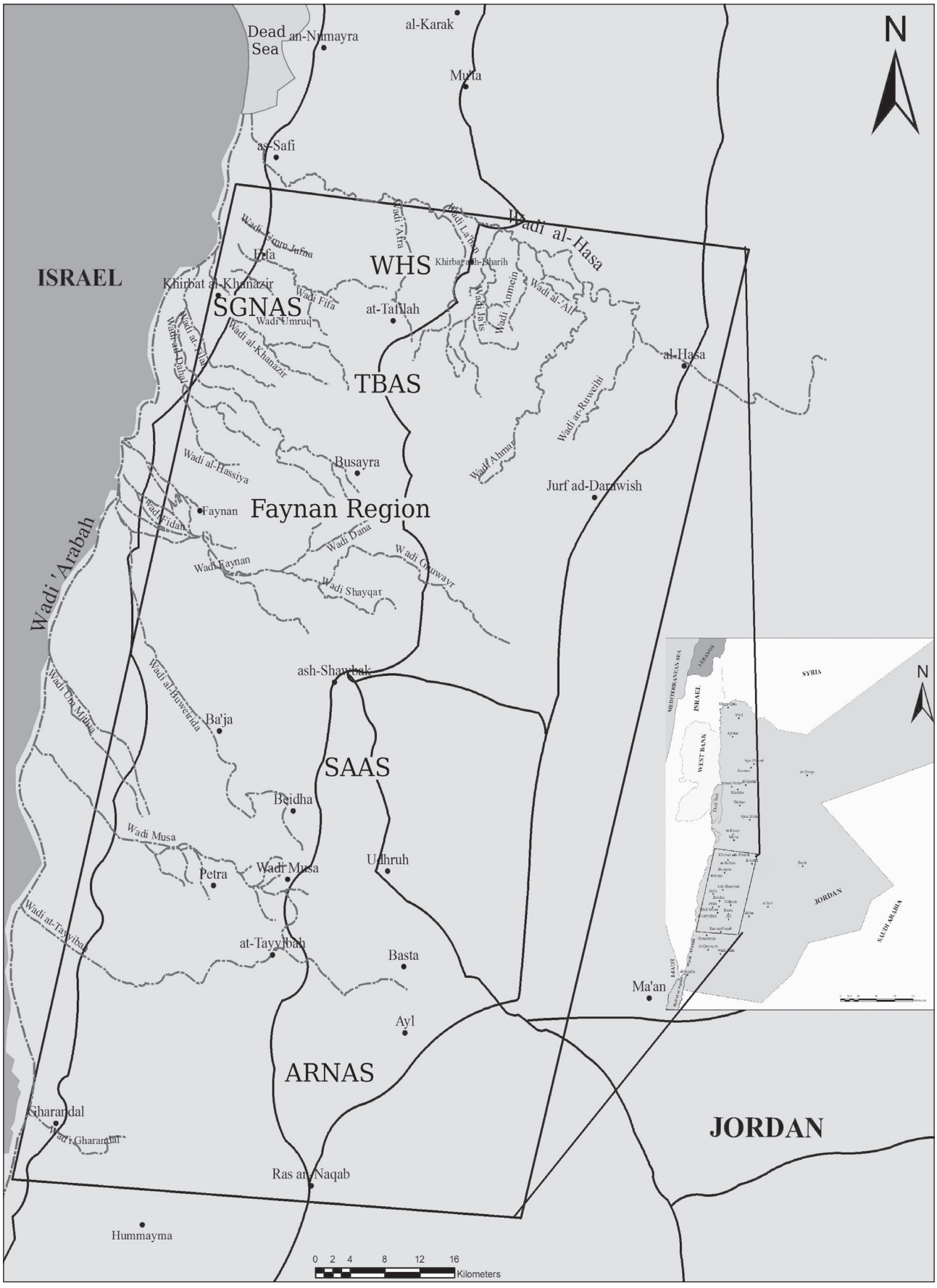
The area of interest here extends for a distance *of ca.* 115 km north-south, from Wādī al-Ḥasā to the edge of the escarpment at Rās an-Naqab, and *for ca.* 60 km east-west, from the steppe to the international border between Jordan and Israel (FIG. 1). It is important to point out that within this area elevations range from more than 1700 m above sea level on the southern Transjordan Plateau in Jibāl ash-Sharāh *to ca.* 400 m below sea level to the west of aṣ-Ṣāfī in the Dead Sea Rift Valley.

There are three ecological zones that characterize southern Jordan, these are; 1) the Irano-Turanian zone, 2) Mediterranean zone and, 3) the Saharo-Sindian zone. The Irano-Turanian zone includes the desert region, the Mediterranean zone includes the plateau and highlands, and the Saharo-Sindian zone is confined to the Wādī ʻArabah in the Dead Sea Rift Valley (FIG. 2). Different ecological zones provide different resources and therefore different opportunities and challenges to social groups exploiting the local resources, thus, it is expected that these differences would be observed in the archaeological record as economic and social variation.

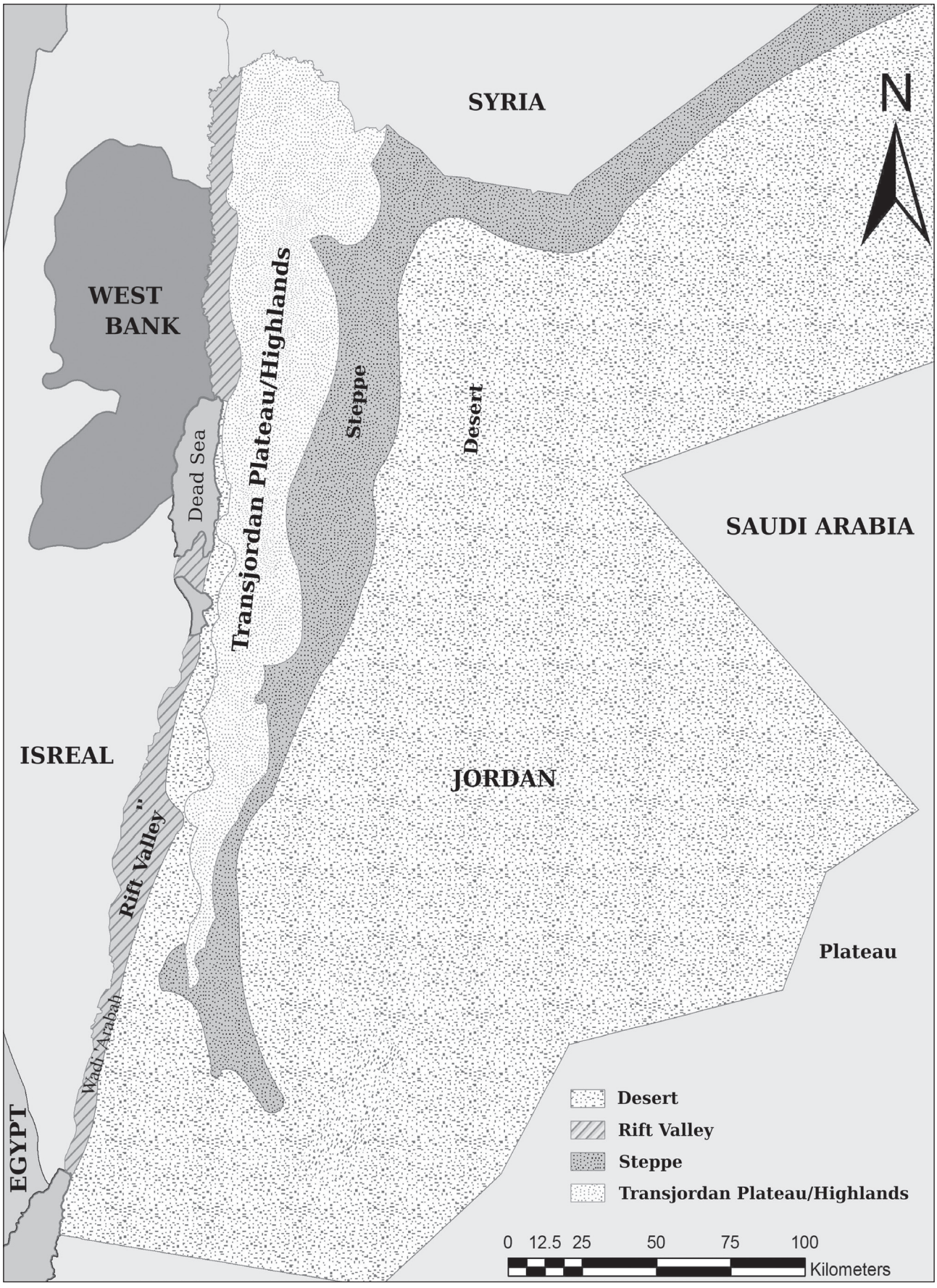
The entire region can be defined as peripheral in terms of its ability to sustain human activity on a large scale. Due to this fact, there were periods in the past when people moved into the region in order to exploit economic and environmental opportunities but also times when the region became devoid of human activity possibly because these opportunities had disappeared. It is the former process that appears to be more visible in the archaeological record.

Climate

The Early Bronze I-III period (3800-2450 BC) is generally recognized to have been the moistest period during the last 6000 years (Frumkin *et al*. 1991; 1994). During this time, there was increased precipitation throughout the Dead Sea basin. It was followed during the EB IV period (2450-2000 BC) by an arid climate that was similar to, or maybe even more arid than, the present one. Relative to this Harlan states: “In general, it is agreed that the Early



1. Map of Jordan with the Geographical Area of Interest Indicated.



2. Major Morphological Units of Jordan.

Bronze Age opened during a minor pluvial with a temperature averaging somewhat below the present, and the rainfall being somewhat higher" (2003: 56). It is thought by some that a warm, dry period, similar to the present climate, perhaps even more arid, contributed around 2000 BC to the collapse of the empires of the Middle East (Weiss *et al*. 1993; Issar 1995: 354). This climatic situation continued until *ca.* 1200 BC and was probably one of the factors contributing to the end of the Late Bronze Age.

Literary Evidence

Literary evidence for human presence in southern Jordan during the Bronze Age comes from Egypt. Kitchen finds evidence from the Middle Bronze period (2000-1550 BC) for the presence of mainly nomadic pastoralists in what later became the land of Edom. This evidence, according to Kitchen, comes from the story of Sinuhe (*ca.* 1900 BC) and from the Brussels series of Egyptian "Execration Texts" (*ca.* 1800 BC). In the texts Kitchen sees reference to "chiefs" of clans of (the territory) of Kushu (Kushan) that is, in his opinion, the territory south of Wādī al-Ḥasā and east of Wādī ʻArabah (1992: 21-23; 2003: 473). Moreover, Egyptian literary evidence from Tall al-Amarna (early 14th century BC) refers to the "lands of Seir" (Pritchard 1969: 488). Thus, the Egyptian scribes knew of a land of "Seir" at this early date (Kitchen 2003: 473).

The term "Edom" appears for the first time in Papyrus Anastasi VI, part of a series of Egyptian literary texts written during the time of Pharaoh Merneptah (1213-1203 BC) and which were a group of letters serving as models for schoolboys (British Museum 10245). One communication presents the form in which an official on the eastern frontier of Egypt might report the passage of Asiatic tribes into the better pasturage of the Nile Delta region. Specifically, the text indicates that "the Bedouin tribes of Edom" are permitted to pass the fortress of Merneptah "to keep them alive and to keep their cattle alive" (Pritchard 1969: 259). The picture is one of pastoralists with their livestock (Kitchen 1992: 27, 2003: 474). Thus, according to the Egyptian literary evidence, there is some evidence for an inhabited Edom/Seir and at least intermittent relations with Egypt from the early Middle Bronze Age and into the Late Bronze Age (Kitchen 1992: 21-27, 2003: 473).

While the Hebrew scriptures identify the land of Seir with Edom (Genesis 32.3; 36.8-9: 21; Numbers 24.18; etc.), we have no certainty as to just what territory the Egyptian writers had in mind when referring to both "Mount Seir" and "Edom." Are they one and the same territory? Is it the same region as the later biblical writers had in mind? Is it the one that is traditionally designated in the Bible as the "lands of Seir" and the "land of Edom," that is, territory to the east of Wādī ʻArabah and south of Wādī al-Ḥasā? The most that can be said, on the basis of the Egyptian texts, is that pastoralists were in the area during at least some of the Middle and Late Bronze periods.

Archaeological Evidence for the Transjordan/Edomite Plateau

The archaeological evidence for human presence on the southern Transjordan/Edomite Plateau during the Early-Late Bronze periods comes to a large extent from my four archaeological survey projects carried out between 1979 and 2011, The Wādī al-Ḥasā Archaeological Survey (WHS) (MacDonald *et al*. 1988), The Ṭafīlah-Buṣayrah Archaeological Survey (TBAS) (MacDonald *et al*. 2004), The Shammākh to Ayl Archaeological Survey (SAAS) (MacDonald *et al*. 2010, 2011) and The Ayl to Rās an-Naqab Archaeological Survey (ARNAS) (MacDonald *et al*. 2012). In addition, relevant findings of other surveyors and/or excavators on the periods of interest are included here. This evidence is summarized below and the presentation is, for the most part, north-to-south.

The Wādī al-Ḥasā Archaeological Survey (WHS)

WHS team members collected Early Bronze Age pottery from 50 sites. At 25 or 50 percent of these sites we collected fewer that five Early Bronze Age sherds.

WHS team members judged some of these sites to be significant (MacDonald *et al*. 1988: 155-59, 160, 166). These sites are, for the most part, located in the areas of Wādī(s) al-Ḥasā, ʻAfrā, and Laʻbān, that is, in the north-western segment of the survey territory (FIG. 1). They are now mostly destroyed, however, some of them may have been Early Bronze settlements (MacDonald *et al*. 1988: 155). Other Early Bronze Age sites in the area are in the form of possible animal pens, retaining walls and the remnants of what may have been platforms and/or towers. It must be noted, however, that many of these sites are multi-period and the architectural remains may not be from the Early Bronze Age. Only further investigation, particularly in the form of excavation, can help to determine the period(s) represented.

It ought to be pointed out that this is the area of the survey territory that is best suited for agricultural pursuits. Moreover, it has the greatest supply of water both from springs and from the Wādī al-Ḥasā and its tributary wadis. In contrast, the eastern part of the territory is steppe terrain, which generally receives less than 200 mm of precipitation annually. Nevertheless, WHS team members documented two clusters of Early Bronze Age sites in the eastern extremity of the survey territory. These sites could have served as seasonal camps for herders since they do not appear to be substantial enough to have served as full-time habitations (MacDonald *et al*. 1988: 161-63). They are similar to others dated to the first half of the third millennium BC excavated in southern Israel and southern Sinai (Beit-Arieh 1981).

WHS Site 23, Mashmil/al-Mushimmin is located between Wadis ʻAfrā and Laʻbān (see Figure 1) and was the only site in the WHS territory from which survey-team members collected a significant number of Early Bronze IV sherds (MacDonald *et al*. 1988: 163). However, since the site is multi-period, only excavations will reveal whether or not the architectural remnants date to the Early Bronze Age IV. As we will see below, Early Bronze IV presence is minimal on the plateau while in the southern Ghawrs, the northeast ʻArabah, and the Faynān region it is significant, especially in the form of tombs and evidence of metallurgical activity (MacDonald *et al*. 1992).

The WHS project did not document any significant Middle and/or Late Bronze Age presence in the area. In fact, there were only three sites at which survey-team members collected pottery from these periods; Middle Bronze-Late Bronze sherds at one site, Middle Bronze/Late Bronze/Iron Age material at one site, and Late Bronze Age material at one site. In addition, we collected Late Bronze-Iron Age pottery at two sites; Late Bronze-Iron IA at one site and Late Bronze-Iron Age at the other; at three further sites the material collected was unclassified. At all of the sites where we collected pottery that we identified as Middle Bronze-Late Bronze are located in the western part of the region, specifically, to the west of Wādī Laʻbān (MacDonald *et al*. 1988: 166-70).

It is clear from information that we received from the inhabitants and/or landowners of the area that many of the sites have been severely or completely destroyed by development, especially as land was cleared, often by bulldozing for agricultural purposes. Moreover, many of the sites in question could have been destroyed centuries ago due to land clearance and/or the use of materials from the remnants of older structures for building purposes.

The Ṭafīlah-Buṣayrah Archaeological Survey (TBAS)

TBAS team members collected Early Bronze Age II sherds from one site located just to the east of the *Via Nova Traiana*, which

cuts through the central segment of the TBAS territory (see below) and more generally in the western half of topographical Zone 2. Moreover, we collected Early Bronze Age sherds, without further precision, from three sites. These sites are not concentrated in any one part of the region (MacDonald *et al*. 2004: 56) and the quantity of sherds collected in each instance was small. What is striking about the TBAS territory, in comparison to Early Bronze Age presence in the territory of the WHS project, is the relative absence of Bronze Age material generally.

TBAS team members did not find Middle Bronze Age ceramics at either the random squares or the sites documented in the area. Moreover, Late Bronze Age ceramics were identified in only one of the topographical zones of the TBAS territory. On the basis of the evidence to date, it can be concluded that there is virtually no evidence of human settlement and/or activity in the entire territory during either the Middle or Late Bronze periods (MacDonald *et al*. 2004: 56).

The Shammākh to Ayl Archaeological Survey (SAAS)

SAAS team members collected undiagnostic Early Bronze Age pottery from two of the 108 random squares accessed. Both are located in topographical Zone 3, that is, in the eastern segment of the survey area. Further Early Bronze Age pottery was collected from four sites in the SAAS territory. Two of these sites are located in the locales of traditional southern Jordanian agricultural villages, which are now mostly abandoned. All four sites yielded ceramics from several periods and as a result the sites cannot be confirmed as substantial Early Bronze Age settlements (MacDonald *et al*. 2010, 2011), although excavation could alter this conclusion. Middle Bronze/Late Bronze pottery was collected from only one SAAS site, which may have been a seasonal pastoralist camp.

Excavations undertaken by ʻAmr *et al*. at Khirbat an-Nawāflah, a site located in the northern segment of the town of Wādī Mūsā, have brought to light "scarce indications of the Early and Middle Bronze Age…, namely an EB IV 'Canaanean blade' and a few pottery sherds that may date to the MB II with no associated structures" (2000: 231-32).

Petra Region

The work of the Natural History Museum of Nürnberg (NHG) has resulted in the discovery of a number of Early Bronze sites in the Petra region. The area extending approximately 10 km to the north of Petra is rich in sites from various periods. Lindner *et al*. discovered five sites in the region where "the majority of the finds should be dated to the Early Bronze Age II" (Lindner and Genz 2000: 57). They found only slight evidence for later occupation at all five sites (2000: 57). Prior to these findings, Lindner *et al*. had proposed similar dates for two sites, to the south of Petra, Ṣabrā/Rās Dakhlallah (Linder and Zeither 1990) and as-Sadah (Lindner *et al*. 1990).

For the most part, Lindner *et al*.'s documented Early Bronze Age sites are located in defensive locations *ca.* 800-1200 m above sea level. Four campaigns at one of these, Umm Saysabān, revealed rectangular structures made from sandstone slabs. The concentration of storage jars and grinding installations, along with the absence of cooking and serving vessels in these buildings suggest to Lindner *et al*. that they had a storage function, perhaps used on a seasonal basis (2001; see also Philip 2008: 190 and Hübner 2012: 729).

The Brown University Petra Archaeological Project discovered and tested in 2012 an Early Bronze Age site at Jabal al-Qarn located on an isolated hilltop in the northern hinterland of Petra at the eastern limits of the Amareen tribal village of Bayḍā. The site is described as a multi-phased settlement in an area that provides a 360º view of the surrounding landscape and a perennial spring to its east (Vella *et al*. 2012; Urban *et al*. 2014).

The Ayl to Rās an-Naqab Archaeological Survey (ARNAS)

Although team members collected Chalcolithic-Early Bronze Age lithics and potsherds from sites in the ARNAS territory we did not collect any that we could identify as purely Early Bronze or Middle Bronze. The same holds true for 141 random squares of the project. In addition, we collected Late Bronze sherds, in small quantity, from only one site (MacDonald *et al*. 2012: 421).

Conclusions

There was evidence of Early Bronze Age activity, especially the Early Bronze I-II periods, on the southern Transjordan/Edomite Plateau in the northwestern quadrant of the survey area. This presence, most likely in the form of agricultural villages and activities associated with them, appears to have been concentrated in the locale of Wādī(s) al-Ḥasā, ʻAfrā, and Laʻbān. In the same period and in the same area, pastoralists would have probably used the central and eastern segments on a seasonal basis. However, south of this area there is little evidence of human presence throughout the Early Bronze Age, with the exception of the Petra region where there are many springs, As indicated above, evidence for an Early Bronze IV presence is absent, with the exception of the extreme northwest of the survey region, on the southern Transjordan Plateau. Evidence for Middle and Late Bronze Age presence is minimal to non-existent throughout the entire plateau area.

Archaeological Evidence for the Southern Ghawrs, the Northeast ʻArabah, and the Faynān Region

The second geographical region of study is within the Dead Sea Rift Valley immediately to the west of the southern Transjordan/Edomite Plateau. As indicated in the introduction, for the purposes of this paper the areas of interest here are the southern Ghawrs, the northeast ʻArabah, and the Faynān region (see FIG. 1).

As indicated above, there is evidence of an improved climate in the region beginning in the Early Bronze Age. This may have played a role in the increased population in the southern Ghawrs, the Northeast ʻArabah, and the Faynān region, evidenced by cemeteries, indications of agricultural activities, and the mining of copper ore dating to the period. Moreover, improved technologies for extracting and smelting copper ore may have been a factor. In addition, the development of urban centres during the Early Bronze II-III period to the north at Bāb adh-Dhrāʻ (Schaub and Rast 1989; Rast and Schaub 2003; Schaub and Chesson 2007) and an-Numayra (Coogan 1984) and to the west at Arad (Amiran and Ilan 1996; Sowada 2009: 44-45) may also have been a factor in the interest in the resources of the area and a consequent increase in population (Sowada 2009: 202). An additional factor is the presence of water, mostly from wadis and springs.

The destruction/abandonment of the Early Bronze Age III marks the end of the urban era at both Bāb adh-Dhrāʻ and an-Numayra. However, occupation and agricultural activities continued at the former site, both within and outside the town site in the Early Bronze IV period (Rast and Schaub 2003: 8, 17; McCreery 2003: 463).

Southern Ghawrs/Northeast ʻArabah Archaeological Survey (SGNAS)

SGNAS team members collected Early Bronze Age I ceramics from five sites, Early Bronze Age IIB sherds at one site, Early Bronze Age II-III sherds at three sites, Early Bronze Age IV ceramics at 30 sites, Early Bronze Age ceramics without further specification at 29 sites, and Early Bronze Age IV-Middle Bronze Age I ceramics at one site (MacDonald *et al*. 1992: 61-71).

A large number of these sites are cemeteries, dating from the Early Bronze Age I to the Early Bronze Age IV. The cemeteries are located immediately south of Wādī al-Ḥasā at aṣ-Ṣāfī, at the western and eastern segments of ancient

Fīfā, as well as at multiple sites in the Wādī al-Khanāzīr and an-Nukhbār region, at the southern extremity of the southern Ghawrs and the northeastern extremity of Wādī ʻArabah. Several of these sites are multi-period. In fact, it appears that the southern Ghawrs and northeast ʻArabah region was a major burial ground throughout the Early Bronze Age.

Neeley identified 17 Early Bronze Age lithic scatters in the SGNAS survey region (1992: 37, Table 19). However, in Neeley's view these were not representative of the region as a whole because it did not include sites identified by SGNAS team members as Chalcolithic/Early Bronze Age. Moreover, he omits those sites from which survey-team members collected a large number of Early Bronze sherds along with lithics from the same period.

Continuity in settlement patterns from the Chalcolithic into the Early Bronze Age is evident in the Wādī Fīfā area, whereas, in the Wādī al-Khanāzīr and an-Nukhbar region new lithic types appear (Neeley 1992: 41). The most frequent site "types" for the Early Bronze Age lithic sites are, in order of frequency, graves, surface scatters, architectural features, wall alignments and cemeteries (Neeley 1992: 41).

Excavations in 1989-1990 at Fīfā, as part of the Expedition to the Dead Sea Plain, uncovered Early Bronze Age IA cist tombs, constructed of large stone slabs and wadi cobbles. Each tomb contained the disarticulated remains of between one and three individuals, along with some grave goods (Rast and Schaub 2003: 15; Chesson and Schaub 2007: 255). Others have excavated Early Bronze Age tombs at both aṣ-Ṣafī and Fīfā. However, they have yet to publish their findings.

Also in 1989-1990, Rast and Schaub directed the excavation of a number of the tombs at Khirbat al-Khanāzīr/Abū Ishrayḥīb in the northeast ʻArabah. The excavated graves contained the disarticulated remains of the dead, along with grave goods of pottery and beads (Rast and Schaub 2003: 15; Chesson and Schaub 2007: 258).

SGNAS team members did not identify either Middle or Late Bronze Age sites in the survey region. An exception was a Pre-Pottery Neolithic site (MacDonald *et al*. 1992: 250) located at the mouth of Wādī Fīdān where we collected one Early Bronze IV-Middle Bronze I sherd. We did collect what were possible Middle Bronze I period sherds at Site 198C in Wādī ad-Daḥal (MacDonald *et al*. 1992: 71), however, Collins *et al*. (2012: 52) report Middle Bronze sherds in association with the mostly Early Bronze Age burials at an-Naqab, aṣ-Ṣafi, immediately south of Wādī al-Ḥasā where it enters the southern Ghawrs. Otherwise, one has to look just to the north of Wādī al-Ḥasā for evidence of Middle Bronze presence. This evidence is in the form of burials, from the Middle Bronze Age IIA/B period in the area of Dayr ʻAyn ʻAbāṭa (Collins *et al*. 2012; see also Politis 1993: 505-06, 518, Pl. VI.1-2; 1995: 483-89, 1997: 342, 344-47). In addition, even farther to the north, in the vicinity of Bab adh-Dhrāʻ, there is a Middle Bronze Age II village called Dhahrat adh-Dhrāʻ 1. This 12-hectare site is the only known, early second millennium settlement in southern Jordan (Berelov 2006b: 2). Moreover, it is part of the evidence for sustained human settlement of the Dead Sea Plain from the Neolithic period to the Middle Bronze Age (Berelov 2006a: 5; 2006b). However, there is no evidence of Late Bronze presence in the area.

The Faynān Region

For the present purposes, the Faynān region consists of the Wādī(s) Fīdān and Faynān as well as adjacent areas. Wādī Fīdān and Wādī Faynān are eastern tributaries of Wādī ʻArabah. Early Bronze Age presence is attested to in both. A great deal of this human activity in the area has to do with the mining, smelting and transport of copper. Evidence suggests that the increase in copper extraction in the Faynān region and its possible movement through Wādī Fīdān during the Chalcolithic and Early Bronze Age gave

rise to population increase in the region, which remained relatively unchanged into the Early Bronze Age (Neeley 1992: 41).

There is ample evidence for continued exploitation and extraction of metal ores in the Faynān region throughout the Early Bronze Age (Hauptmann *et al.* 1992; Hauptmann 2000). The evidence for copper extraction, including geological characteristics and distribution, mining technologies and operations, smelting methods and various technical aspects of copper production has now been presented in detail by Hauptmann (2000, 2007). Specifically, Genz summarizes these findings; "copper mines dating to the Early Bronze II-III period are known from Wādī(s) Ḍānā, Khālid, and Wādī Ratiyyah/Qalb Ratiyyah; one mine in Wādī Khalid produced some Early Bronze IV sherds that were used as lamps; mining tools are found at most sites in the region; smelting furnaces, dated by radiocarbon means to EB II-III, are attested on hilltops at Faynān and Rās an-Naqab[1]; slag heaps, also dated by radiocarbon means, are from Early Bronze II-III; and the estimation is that copper production reached amounts of several hundred tons" (Gentz 2000: 56-57).

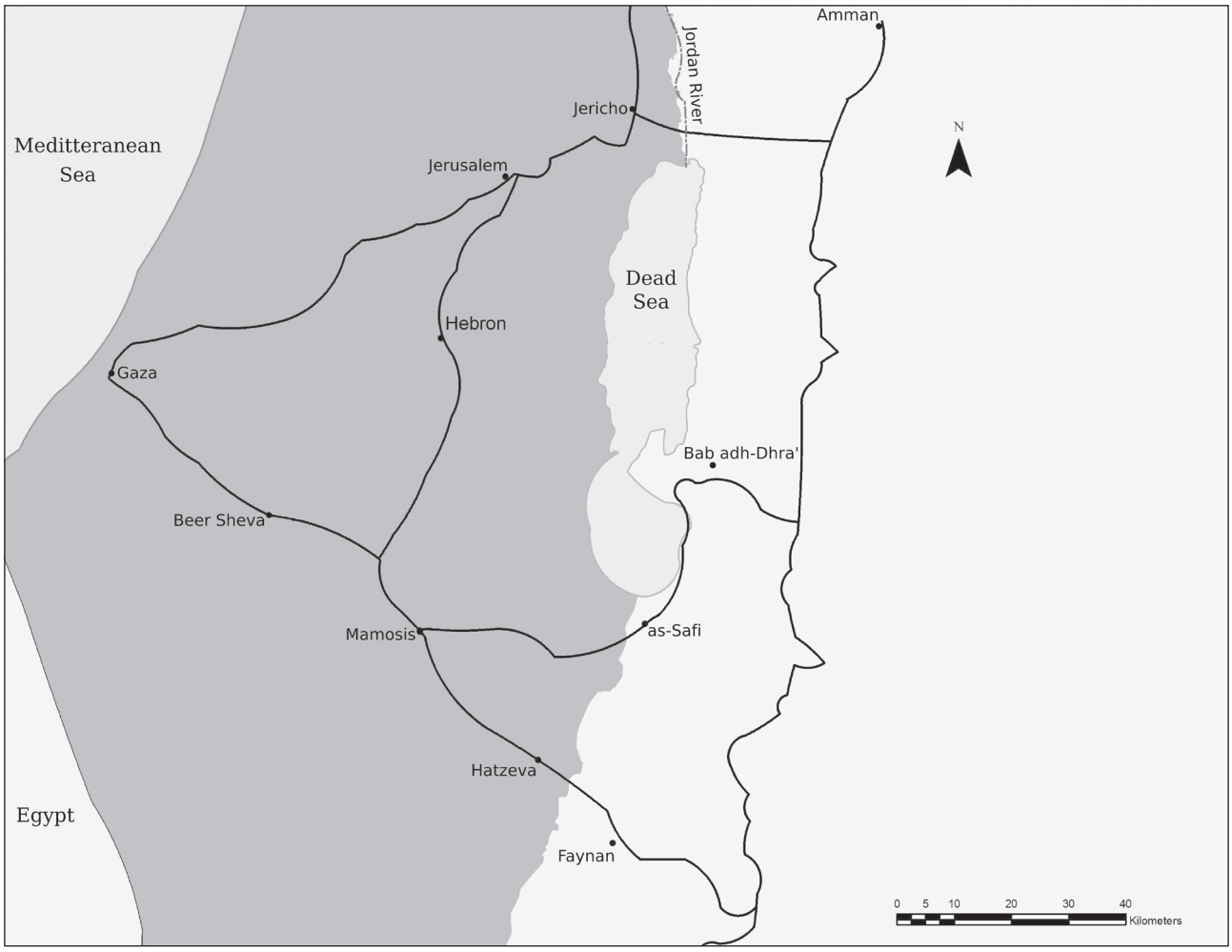
Early Bronze Age I

The late fourth millennium BC village site of Wādī Fīdān 4 (MacDonald *et al*. 1992: 59, 250-51; Adams and Genz 1995) is a small (0.87 hectare in size) agricultural settlement, whose inhabitants practiced floodwater irrigation alongside small-scale production of copper (Adams 2002: 25; Meadows 2001). Wādī Fīdān 4 evidenced the first workshop with all necessary steps in the metallurgical-production chain. There is evidence, in the form of ores, crushed slag, crucible fragments, remains of small clay-built hearths, and copper droplets for the processing on-site of small quantities of copper probably using a crucible technology (Adams 1999; 2002: 26; Hauptmann 2000: 189). Pfeiffer says "in Wādī Fīdān 4 almost all steps of the metallurgical *chaîne opératoire* are present. Besides smelting and melting of copper, mining activity in the nearby mines is attested at this place through the presence of stone mauls. Only casting moulds and ingots are absent" (2009: 315). She concludes that Wādī Fīdān 4 was integrated into a network of settlements supplying a wide area with raw materials (2009: 316). Thus, the first local control of the production of copper can only be demonstrated at this site in the second half of the 4th millennium BC (Hauptmann 2013: 306). It is possible that both ore and processed copper were traded (FIG. 3). Moreover, there is evidence to suggest that Faynān ores may have reached Maadi in the Nile Valley as well as Chalcolithic sites in the Beer Sheba Valley (Hauptmann and Pernicka 1989: 137-41; Philip 2008: 191).

Wādī Faynān 100, is an 11-hectare site in the middle of the Wādī Faynān valley, dating to the late fourth millennium BC (Early Bronze I, *ca.* 3600-3000 BC). It is characterized by rectilinear stone structures, courtyards, outdoor activity areas with pits, fire installations and ephemeral walls. The remains suggest domestic activities, including evidence of metalworking (Wright *et al.* 1998: 33). At Faynān 100 a few Early Bronze Age I structures were excavated. In them was found metallurgical material and evidence that metallurgical processes had taken place in the vicinity (Pfeiffer 2009: 316).

Hauptmann *et al*. demonstrate that the majority of the copper objects from the site were smelted from ore obtained from the Wādī 'Arabah, most likely from Faynān, and not from ore deposits in Sinai (Hauptmann 2007: 272-73), as is the case with 'Arād. At 'Arād, the remains of metallurgical activities from phase V date mostly into the middle of the 4th millennium B.C. (Pfeiffer 2009: 313).

1. This Rās an-Naqab is within the Wādī Faynān area. It is located to the northeast of Khirbat Faynān. It is, therefore, not the one that is located at the southern extremity of the Transjordanian Plateau.



3. Route from Faynān Region to Beer Sheba.

Early Bronze Age II/III

Najjar *et al*. (1995; see also Hauptmann and Weisgerber 1987; Hauptmann 1989, 2000; Levy *et al*. 2004; and Grattan *et al*. 2007) posit that methods of extractive metallurgy reach a high technological level in the middle of the third millennium BC.

During the Early Bronze Age II/III (mid third millennium BC) ore from the Dolomite Limestone Shale (DLS) was mined in the Faynān region using the 'room and pillar method'. The ore was smelted in natural draught furnaces. These are the earliest smelting furnaces known so far. The copper was mostly traded to the northwest of Faynān and the main trading posts there were Barqat Ḥuṭayyah and Khirbat Ḥamrā Ifdān (see below). These sites were local control posts along the way to the 'Arabah, and at the same time they were also specialized villages, where crude copper was cast into ingots as well as tools (Hauptmann 2007: 306).

Khirbat Hamrat Ifdan was excavated in the 1980s by Adams (1992) and then in the 1990s by Levy *et al*. (2002). It is both a settlement and a smelting site located on an island-like 'inselberg.' that rises *ca.* 25 m above Wādī Fīdān and is *ca.* 1 km north of the oasis of 'Ayn al-Fīdān. Late occupations at the site date to the Islamic, Byzantine and Iron Age periods. A second and third stratum date to the Early Bronze IV and Early Bronze III periods respectively. It was during the later period that the site was most extensively occupied. Archaeometallurgical remains uncovered include smelting and melting crucible fragments, prills and lumps of copper, slag, ores, copper tools, a few smelting

remains, and casting moulds for tools. The metal processing activities were concentrated in some 80 rooms, courtyards and other spaces within the excavated area (Hauptmann 2007: 134-36).

Evidence for Early Bronze Age II, or transitional Early Bronze Age II/III presence and activity in Wādī Fīdān comes from *Barqat Ḥuṭayya*, a site excavated by Fritz (1994). Adams (1999; 2003) revaluated Fritz's findings, and Flinder re-excavated the site in 1993 as part of the German Mining Museum project (unpublished). The site consists of a rectilinear building on a hill, the summit of which is covered with the remains of slag and other metallurgical debris, reaching a depth of 50 cm in places. Both ceramic and radiocarbon evidence point to a date in the earlier third millennium BC. Present at the site is both locally produced and imported vessels from sites to the west. Philip states that "the increasing sophistication of the material culture, and the evidence for closer integration with wider regional developments appears consistent with the increase in both scale and sophistication of the extractive metallurgy at this time, as was documented by Hauptmann (2000). It appears, then, that Faynān copper was assuming a much greater role in the regional economy" (Philip 2008: 191). In addition to copper production, there is evidence for farming in the area. This is especially the case for the Early Bronze I-III periods.

Analyses of Metal Artifacts from the Area

The isotopic composition of the dagger JD-46/5 from *Bāb adh-Dhrā'* does not exclude the possibility that locally produced copper might have been mixed with imported tin. The isotopic pattern of this dagger lies well within the area formed by the ores and metals from the DLS in Faynān (Hauptmann 2007: 283).

Fourteen metal artifacts and four crucible fragments were found during the excavation of the Early Bronze II-III site of *An-Numayra*. There are indications of the treatment of copper in the settlement. Together with the ore sample JD-47/6 one could even assume smelting occurred at the site. Indeed, the excavator concludes that "the infrequent small finds included remains of secondary copper refining (Room 15)…." (Coogan 1984: 77). In addition, the lead isotope ratios of the two adzes and a needle are identical with each other and with the pattern of Faynān copper. It is also possible that at least some of the artifacts found at *An-Numayra* were produced there (Hauptmann 2007: 283).

At Jericho, three of seven metal samples analyzed show a composition that might indicate a provenience of the metal from the 'Arabah deposits. These are a crescent-shaped axe and two metal prills. From this evidence, it is probable that copper from Faynān was still used in Jericho during the Early Bronze Age IV. Numerous 'crescent-shaped bar ingots,' used during this time period (Hauptmann 2007: 284) support this premise.

Hauptmann *et al.*'s study of 21 copper artifacts from EB II/III layers at Arad and three contemporaneous copper objects from the southern Sinai led them to conclude that the source areas could have been Faynān and/or Timna. However, neither the lead isotope signature nor the trace element pattern, nor a combination of the two, allows them to distinguish unambiguously between the two regions (Hauptmann *et al*. 1992). That said, the probability that the source was the Faynān region is argued on the basis of circumstantial evidence: 1) convenience, that is, Faynān is closer to 'Arād than Timna; 2) ample evidence from Faynān that copper ores were mined and smelted during Early Bronze II/III while such is not the case for Timna; and 3) ores from the Massive Brown Sandstone (MBS) available at Faynān are a match for four of the artifacts (1999: 14). This is yet another indication of trade in copper from Faynān across the 'Arabah in the Early Bronze II/III period.

Early Bronze Age IV

More than 100 crescent-shaped ingots, *ca.* 12-15 cm long with a more or less T-shaped section, have been excavated in settlements of the Early Bronze Age IV/Middle Bronze Age I in the southern Levant to the north, west and southwest of the Dead Sea. All of the sites in which these ingots have been found are to the west and northwest of Faynān. In contrast, crescent-shaped ingots have not been found in Transjordan (Hauptmann 2007: 285).

In order to find the source of the crescent-shaped bar ingots twenty of the ingots from Khirbat Ḥamrā Ifdān were analyzed for their chemical and lead isotope composition. Hauptmann concludes that there is a high statistical probability that those artifacts come from the widely outcropping but isotopically uniform ore mineralizations of the DLS in Faynān. The bar ingot trade from Faynān supports previous observations of a pronounced 'metallurgical drift' of Faynān copper to the north, northwest and southwest from the Chalcolithic period onwards (Hauptmann 2007: 285-288).

There was a decline in the exploitation of Faynān copper in the second half of the third millennium BC. This probably reflects both shifts in Egyptian trade and the vulnerability of the agricultural system to deteriorations in the environment, caused by over exploitation of resources and possibly by a changing climate. However, the "Wādī Faynān Landscape Survey" (WFLS) found evidence for a densely occupied landscape in the Early Bronze Age with marked differentiation between arable, pastoral, and metallurgical activities. This occupation involved the development of simple floodwater farming systems (Barker and Mattingly 2007: 427). According to the WFLS, the landscape was characterized by predominantly pastoral use through the course of the second millennium BC. However, during this period, some people were still visiting the mountain rim from time-to-time to extract and process copper ores (Barker and Mattingly 2007: 427).

Cemeteries of the Southern Ghawrs and Northeast 'Arabah during the Early Bronze Age

As indicated above, there are vast cemeteries dating to all periods of the Early Bronze Age in the southern Ghawrs and northeast 'Arabah. In the cemeteries at aṣ-Ṣafī and Fīfā, where some graves have been excavated and Early Bronze Age I-III ceramics have been collected, it is very likely that the people buried there came from either the Negev and Sinai in the Early Bronze Age II period and from the Beer Sheba Valley in the Early Bronze Age III period (Haiman 1996: 15-16; Beith-Arieh 1981, 1989). The origin of the occupants of the Early Bronze Age IV cemeteries is less clear. There are no settlements Early Bronze Age IV settlement in the survey region other than Bāb adh-Dhrā' and none identified on the southern Transjordan Plateau to the east. It may be suggested therefore, that some of the people buried in these cemeteries may have come from the Negev and Sinai and been involved in the copper industry of the Faynān region and/or its transport to the west. The basis for this conclusion is that around 1,000 EB IV sites have been identified in the Negev and Sinai deserts and a few of these sites are large permanent settlements consisting of 100-200 structures. The vast majority of the sites, however, are small, temporary encampments with a few poorly-built structures. The economy of these small encampments was most likely pastoralism and agriculture. At the larger sites, however, there is evidence related to industry and the trade in copper. Haiman maintains that the emergence of settlements both large and small in the region during Early Bronze Age IV is related to the transport of copper by means of donkeys from Faynān to Egypt (1996). In Haiman's opinion, the location of the permanent sites "suggests that a road connected the southern area of the Dead Sea with the eastern Nile Delta, connecting the natural passages with natural water sources" (1996: 14) (FIG. 3).

Goren's petrographic analyses of the pottery assemblages from the above-mentioned Early Bronze Age IV sites in the Negev and Sinai deserts leads him to conclude that most of the ceramics were produced in Transjordan or Judaea and imported (1996). This in itself indicates relations between the southern Ghawrs, the northeast 'Arabah, and the Faynān region during the Early Bronze Age IV.

Archaeometallurgical activities in the survey area ceased sometime in the Middle Bronze Age (2000-1200 BC). Indeed, there is no incontovertable evidence for metal production during either the Middle or Late Bronze Ages (Hauptmann and Weisgerber 1992: 63).

Conclusions

Water was much more abundant in the Dead Sea Rift Valley than on the southern Transjordan Plateau. On the southern Transjordan Plateau water was more readily available in the area south of Wādī al-Ḥasā and in the Petra region. It is in these areas where Early Bronze Age presence is attested.

During the Early Bronze Age all metallurgical activity that took place in the Dead Sea Rift Valley was documented in the survey region discussed in this paper. There is no evidence for the same on the southern Transjordan Plateau. Thus, there is a considerable degree of difference in the way in which people utilized the two regions. The plateau is characterized by agricultural and pastoral activity while the Dead Sea Rift Valley is characterized by agricultural pursuits, cemeteries, metallurgical activity, and the transport of copper. Moreover, there is presently no convincing evidence for contact between the two regions. Mining and smelting activity was carried out by people from the west and not from the east, that is, from the plateau. Moreover, the ores and finished products of this activity were transported to the west. In addition, the people buried in the cemeteries of the southern Ghawrs and northeast 'Arabah would have come from the west and not from the east.

There is minimal evidence of human presence and activity during both the Middle and Late Bronze periods. This is the case for both the southern Transjordan/Edomite Plateau and the Dead Sea Rift Valley.

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